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### Analysis of Patent Referencing to IEEE Papers, Conferences, and Standards 1997-2011

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## **Analysis of Patent Referencing to IEEE Papers, Conferences, and Standards 1997-2011**

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## Executive Summary

IEEE engaged 1790 Analytics in this project to assess the impact of IEEE publications on developments in various technologies. This impact is measured by examining the extent to which patented inventions build upon papers from IEEE journals, IEEE-sponsored conferences, and IEEE standards. This is an update of previous reports, and examines patents issued from January 1, 1997 through December 31, 2011.

The main findings of this report are:

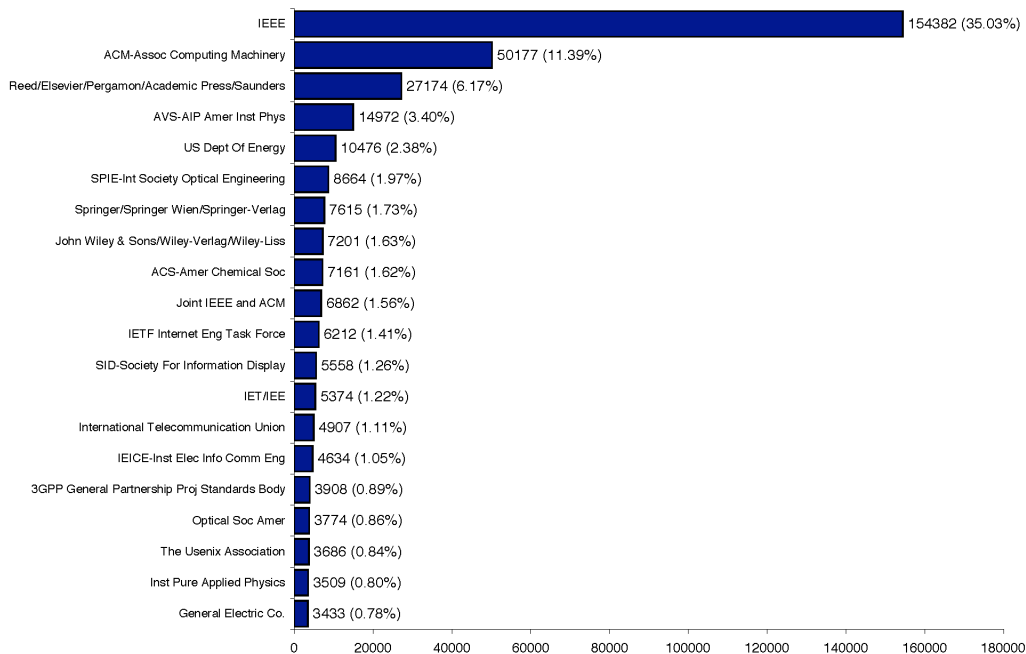
- New technology continues to build upon science, and the dependence is increasing. When we did a similar study last year we found that the top 25 companies were granted 50,861 patents in 2010. These patents made a total of 184,180 non-patent references, an average of 3.62 non-patent references per patent. In this study, the top 25 companies in 2011 were granted 51,826 patents. These patents made a total of 205,634 non-patent references, an average of 3.97 non-patent references per patent. In other words, not only did the total number of non-patent references increase, but on a per-patent basis 2011 patents reference more non-patent materials on average than 2010 patents. Since a large number of these non-patent references are to scientific articles and conference papers, this suggests that today's technology developments are increasingly linked to developments in published science.
- A large portion of this science base comes from papers presented at IEEE sponsored conferences and published in IEEE journals. The top 25 patenting companies in 2011 have referenced approximately 441,000 articles in the last 15 years. About 35% (154,382) of those articles appeared in IEEE journals or IEEE sponsored conferences.
- In this study, we also went beyond the top 25 patenting companies and analyzed all patents from the last 14 years in several technology categories of interest to IEEE members and customers. For example, approximately 36% of all scientific references from Computer Hardware patents go to IEEE publications. The second most referenced publisher is ACM (Association for Computer Machinery) with 16 % of the referenced publications. In other Information Technology areas, such as Information Storage, Semiconductor Manufacturing, and Computer Software, the results are similar.
- In Telecommunications technology, IEEE is particularly important. The 201,000+ references to IEEE articles and conferences represent just about half of all science references from Telecommunications patents since 1997. To help put this in perspective consider: Telecommunications is a very technology driven industry and that technology is often built upon scientific discoveries published in journal and conference papers. If we consider this set of papers as the science base of telecommunications, than roughly half of that science base is published in IEEE journals or presented at IEEE sponsored conferences. Also, the 201,000+ references

to IEEE dwarf the combined total of the next 20 publishing organizations in this technology.

- IEEE is referenced a surprising amount in areas which are not central to its mission.
  - For example, approximately 6% of the science references from patents in medical devices go to IEEE publications. This ranks IEEE third behind Elsevier and Lippincott (with 25% and 12% respectively). The latter publishers have 400+ and 100+ journals in the medical area, whereas IEEE has only a few, so the 6% figure is quite solid for a non-core area.
  - Optics is also somewhat surprising. IEEE publications receive the most references from Optics patents, and IEEE is referenced significantly more than the two large Optics Societies that would be expected to lead the area: SPIE – The International Society of Optical Engineering, and OSA – The Optical Society of America.
  - Another non-Information Technology Area in which IEEE does very well is Clocks & Timepieces. About 41% of all references from clock related patents reference articles from IEEE. No other organization receives more than 5.33% of the references from patents in this category.
  - In Measuring, Testing, and Control, IEEE gets 18.8% of all references which is just ahead of Elsevier's 14.5% while, again, Elsevier has many more journal titles in the space.
  - In the Nuclear, X-Ray, and Radiant Energy category IEEE is referenced fourth most often behind Elsevier, The American Chemical Society, and The American Institute of Physics. This is not terribly surprising since a large number of patents in this space are related to Nuclear Medicine where Elsevier has journal titles but IEEE has none.
  - In the Robotics and Intelligent Manufacturing category, 43% of the patent references are to articles published in IEEE journals or in proceedings of IEEE sponsored conferences. Second place Elsevier receives only about one-fifth as many references in the category.
  - Patents related to Power Systems and Transmission also reference IEEE publications most frequently. The 12,900+ references to IEEE journal and proceedings papers are more than the next two top referenced publishers (Elsevier and Electrochemical Society) combined.
- It has been shown that high-quality, high-impact, and valuable patents tend to be cited more frequently by later patents. Citation impact is thus often used as a quantitative measure for evaluating patents. In this study, we found that the patents

that reference IEEE papers are cited more often than patents that do not. This was shown to be true for each of the twelve technology categories we examined. This suggests that, not only do IEEE publications frequently provide the science base for new inventions, but that inventions that build upon IEEE publications are more likely to be valuable in the future than inventions that do not build upon IEEE.

- Although this study concentrates on patents in specific technology areas, it should be noted that the importance of scientific and technical literature to patented technology is increasing in all areas. Our research shows that the average US patent had only 2.76 non-patent references (NPRs) back in 1997. That number jumped to 9.06 by 2011 – a 228% increase. During those same periods, the number of references per patent to IEEE has increased by 225%. In terms of total references, NPRs to IEEE published papers have increased 546% compared with 1997. Again, these numbers are for all issued US patents and not just those in the twelve categories covered in this report.<sup>1</sup> This means that in the overall patent system, patented technologies are increasingly referencing scientific articles and that IEEE provides an increasing portion of that science base.
- Patent references from the top 25 companies to the top 20 journal publishers



<sup>1</sup> Including science intensive areas like Biotechnology, Pharmaceuticals, Chemicals, and other areas where IEEE typically has little influence.

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## I. Introduction

In previous studies, it was found that patents reference papers from IEEE journals much more often than papers from other journal publishers. In this report, we update the previous results, and study US patents issued from January 1997 through December 2011. Although this report is an update of previous results, we have made our best efforts to make this report self-contained. The aim of this report, as in previous reports, is to analyze references from patents to journal articles, conferences and standards documents, in order to assess IEEE's impact upon technological developments.

This report covers 12 subcategories of Technology where IEEE members and readers are active. Many, but not all are related to Information Technology. The categories, with patent counts are shown below in Table 1.

Table 1: Number of Patents for Each Category Covered in this Study

Category	# Patents 1997-2011
Clocks/Watches/Time Pieces	2644
Computer Hardware	195036
Computer Software	104840
Diagnosis/Surgery/Medical Instruments	109624
Information Storage	87127
Measuring, Testing and Control Devices	126628
Nuclear/X-Ray/Radiant Energy	25107
Optics/Photography/Electrophotography	105065
Power Systems	55942
Robotics and Intelligent Manufacturing	19236
Semiconductors/Solid-State Devices/Electronics	160602
Telecom and Other Communications	286018

## II. Methodology

This study is based on referencing patterns from patents to prior art documents. When an inventor files a patent for a new invention, he/she will typically reference earlier documents to show that the new invention either builds upon, or improves upon, what came earlier. The inventor's patent attorney and/or the examiner may also add prior art references to either clarify or limit the claims of the new invention.

As an example, Figure 1 shows the front page of a General Electric patent. The prior art references on this patent come in two forms - references to earlier patents, and "other references". These other references are often to scientific publications, such as those produced by IEEE. In this report we are primarily concerned with these other references, which are also sometimes called "Non-Patent References".

It has been suggested that patents with many non-patent references are likely to contain new leading-edge ideas, whereas patents that only reference earlier patents are likely to be

incremental improvements on earlier patented technologies. For a comprehensive study on various hypotheses surrounding the motivations of inventors in citing other references, see [1].

### ***Patent Sets used in the Analysis***

This study is based on two patent sets. Our analysis is based on determining the number of references from these patent sets to publications from publishers such as IEEE, Elsevier, the American Institute of Physics, and others.

The first set contains patents from the top 25 patenting companies in 2011. Analysis of this patent set provides an insight into how the top tier companies rely upon science from IEEE and other publishers. The second set contains all patents in twelve technology categories from all companies, universities, government agencies, and individuals. The twelve technology categories examined are shown in Table 1 above. Analysis of this patent set reveals the wider influence of IEEE science in these technologies.

### ***Identifying Relevant Non-Patent References***

Non-patent references can be to any published document, from comic strips and brochures, to scientific articles and standards documents. The main difficulty in identifying relevant non-patent references for a study such as this is that inventors do not use a standard form for listing references. As an example, Table 2 contains eight different variants for the IEEE Global Telecom Conference. Note that some inventors just use the GLOBECOM shorthand, while others list the entire name. Sometimes IEEE is mentioned and sometimes it is not. When abbreviation variations are included such as Telecom, Tele, Tcom, Proc., Proceed., the number of variants increases further. The same issue exists for variants in journal names and standards documents. For example there are more than 30 variant spellings of the journal title *Journal Of Thoracic And Cardiovascular Surgery* including numerous mis-spellings of thoracic and every conceivable way of abbreviating cardiovascular.

**Table 2 – Variants for IEEE Global Telecom Conference**

Proceedings of Globecom '96
IEEE Global Telecommunications Conference
GLOBECOM '90:IEEE
Proceedings of IEEE Globecom '94
Globecom '97
IEEE Globecom, Global Telecommunications Conference and Exhibiton
Proc of the Global Tele Conf, U.S. New York, IEEE

***Conference Identification*** – to identify conference proceedings among the non-patent references, we first identified references containing keywords such as meeting, symposia, conference, etc. We then used parsing software to identify 2-word and 3-word phrases that appear frequently in this set of papers. The full string was identified for these string subsequences in order to identify frequently cited conferences. In this way, we identified the top conferences referenced in the patent sets, and standardized the names of these conferences (i.e.



all of the different variants of a conference were collected under a single name). As an example, all of the variants shown in Table 2 are assigned to the name ‘<conf> IEEE Global Telecommunications Conference (GLOBECOM)’.

We then looked up each of these conferences on the web to determine who is listed as their primary sponsor. For example, many of the conferences are sponsored by organizations such as IEEE, ACM (Association for Computer Machinery) and ASME (American Society of Mechanical Engineers). Some conferences are jointly sponsored by multiple organizations and this is noted as well.

When we first started identifying conferences in the 2005 report, we looked up the top 100 most referenced conferences in order to identify the primary sponsors or hosts. In this current report we’ve identified the sponsors for the top 800+ most referenced conferences. These 800+ conferences are listed under more than 3,900 variant names.

***Standards Identification*** - There are relatively few standards referenced, and in general they are easy to identify by looking for strings such as ‘standard’ or ‘std’. Once the records containing the standards were located, it was relatively easy to identify the organization that produced each standard (ITU, IEEE, ISO, JEDEC, ANSI, etc.). Further, once the standards bodies are identified, we then identify references to other documents that do not specifically list the words ‘standard’ or ‘std.’ The latter step is necessary since some references look like this “ISO/TC97/SC21/N2066” or “IEEE802.3” without a specific mention of the word “standard.” As a consequence we also identify other non-standard documents released from these organizations including draft standards and “requests for comments” documents.

***Journal Identification*** – identifying and standardizing journal names is a very difficult process because there are so many different journals, and their names can be abbreviated in many different ways. To make the problem more manageable, we base our analysis primarily to the 16,000+ journals covered by the ISI/Thomson Scientific Database. This is not a severe limitation, since these 16,000+ journals include more than 100 IEEE journals, 1400+ Elsevier journals, and 350+ Wiley journals. In addition, we also identify publishers of about 1,000 non-ISI journals if they appear very frequently in the patent references, but do not appear in the ISI database.

Once restricted to these 17,000+ journals, we used software that transforms journal names into common abbreviations and then implements string matching. Care must be taken with string matching because, for example, searching for “Urology Journal” will also accidentally identify “Neurology Journal”. Similarly, a search for the journal “Science” would accidentally pick up any reference with ‘science’ in the paper title as well as any of the 800+ journals with science in their titles such as “Game and Wildlife Science”. Our proprietary software for journal identification deals with all of these problems along with some human intervention, so that we generate an accurate match between the patent references and 17,000+ journals. After identifying all of the relevant journals, we then used the ISI database and web research to identify the publisher of each journal

### III. Results

#### *References from Top 25 Patenting Organizations*

Table 3 shows the 25 firms that were granted the largest number of US patents in 2011. It should be noted that many of these firms consist of multiple subsidiaries, and these firms patent under many names. (For example General Electric has patents filed under 316 names, of which only a fraction contain General Electric in the name.) We identified all of the subsidiary names for each company to ensure that our patent counts are accurate.

**Table 3 – Top Patenting Firms in 2011**

Assignee	2011 US Patent Count	1997-2011 US Patent Count
International Business Machines Corp	6191	61057
Samsung Electronics Co Ltd	4916	39332
Panasonic Corporation	3187	36316
Canon Inc	2958	35380
Hitachi Ltd	2916	34471
Toshiba Corp	2721	26819
Sony Corp	2564	27104
Microsoft Corporation	2333	20086
Fujitsu Limited	2029	24314
Hon Hai Precision Ind. Co. Ltd.	1952	11540
Fuji Film Holdings Corp	1685	19461
General Electric Company	1668	21566
LG Electronics Inc.	1620	11457
Siemens Aktiengesellschaft	1597	20989
Seiko Epson Corporation	1583	14791
Hewlett-Packard Co	1362	25659
Intel Corporation	1313	21419
AT&T Inc	1295	9889
Ricoh Co. Ltd.	1274	11191
Toyota Motor Company	1197	10181
Broadcom Corp.	1170	7074
General Motors Corp	1141	8068
Qualcomm Inc	1071	6033
Sharp Corp	1053	11750
Renesas Electronic Corporation	1030	8669

We identified the top 25 patenting firms because we want to understand the extent to which the current technology leaders use IEEE science. Figure 2 shows the 20 publishers of science whose publications are referenced most frequently by the 25 firms shown in Table 3. This figure shows that patents issued to the top 25 firms between 1997 and 2011 reference IEEE papers, conferences, and standards more than 154,382 times. This is more than three times as many references as the second placed publisher (ACM-Association of Computer Machinery). Also, if conference publications that are jointly sponsored are counted, such as the conferences jointly

sponsored between IEEE and the Japanese Society of Applied Physics, or IEEE and ACM, then the number of references from the top 25 companies to IEEE increases by more than 11,800 references. The 154,000+ references to IEEE from the top 25 firms is considerably higher than the 127,000+ references in last year's report. This is due to a slight change in the lineup of the top 25 firms from last year with Honda dropping out and AT&T and Broadcom entering. As telecom firms, AT&T and Broadcom patents tend to reference IEEE papers much more frequently than Honda patents.

**Table 4 – Reference Distribution from Microsoft Patents 1997-2011**

# References	journal/conference/standard
6297	IEEE Unseparated
6204	Misc ACM
2869	<conf> ACM SIGGRAPH Computer Graphics Conf
1936	<conf> ACM Conference on Human Factors in Computing Systems (CHI)
1770	<conf> IEEE Int Conf Acous, Speech, and Sig Proc (ICASSP)
1769	ACM (Misc Transactions)
1474	<conf> USENIX Conference Proceedings
1365	<conf> Proceedings ACM SIGMOD Symp
1324	<std> ITU Telecom Standard
1270	COMMUNICATIONS OF THE ACM
1228	<conf> Proceedings of IEEE International Conference on Image Processing (ICIP)
1190	<std> IETF Std
948	<conf> IEEE Misc Conf
931	LECTURE NOTES IN COMPUTER SCIENCE
888	<conf> IEEE Comp Soc comp Vision and Pattern Recognition
885	<conf> Int Conf on Very Large Data Bases (VLDB)
789	<conf> Proceedings ACM SIGPLAN Symp
773	<conf> IEEE int conf on Distributed comp sys
750	<conf> Proceedings ACM SIGIR Symp
626	<conf> ACM UIST
599	<std> ISO Std
546	Proc SPIE
506	<conf> Proceedings ACM SIGOPS Symp
498	IEEE tr PATTERN ANALYSIS AND MACHINE INTELLIGENCE
489	BYTE Magazine
479	<std> Network Working Group RFC
469	Computer (IEEE)
456	IEEE tr Circuits and sys for Video tech
452	<conf> Proceedings ACM SIGCOMM Symp
447	IEEE tr ACOUSTICS SPEECH AND SIGNAL PROCESSING
423	SID (Soc Inf Disp) Misc
410	<conf> ACM symp on Operating sys Principles (SOSP)
407	IEEE tr IMAGE PROCESSING
406	<conf> Eurographics
404	DR DOBBS JOURNAL
395	IEEE NETWORK
395	ACM comp Surveys
390	IEEE comp soc
384	<conf> IEEE int symp on Wearable Computers
383	<conf> ACM (Misc. Conf.)
368	<conf> proc Aspect Oriented prog wrkshp at ECOOP

The change in the 25 firms also increased the overall number of science references per year. Overall, in 2011 there were 440,709 science references from the top 25 firms, which is an increase of 61,848 references over 2010.

IEEE receives about 35% of the science references from the patents of the top 25 companies. The next closest publisher (ACM - Association for Computing Machinery) has 11% of the total and IEEE's share of references is about the same as the next 11 publishers combined.

About 1/3 of the 154,000+ patent references to IEEE are to IEEE sponsored conferences. If conference proceedings were removed, the ACM would fall to third place and the IEEE still would have 3-fold lead over second place Reed/Elsevier.

Table 4 illustrates the reference distribution of Microsoft, one of the top 25 firms. This reference distribution is fairly typical of the top 25 firms. The references from Microsoft to IEEE are actually to a number of different IEEE journals and conferences. In this table, IEEE journals are highlighted in yellow and IEEE conferences are highlighted in orange. The top overall reference is to IEEE Unseparated, which will be discussed in a moment. The top specified IEEE journals are *IEEE Computer Magazine* and *IEEE Transactions on Pattern Analysis and Machine Intelligence*, and the top referenced IEEE sponsored conference is the *IEEE ICASSP Conference*.

Notice that 14 of the top 40 journals and conferences referenced by Microsoft are published or sponsored by IEEE. Eleven of the top 40 journals and conferences are published or sponsored by ACM. As a software firm, Microsoft tends to reference ACM much more than most of the top 25 firms. The reader may notice the large number of references to 'IEEE Unseparated'. These are articles that reference IEEE, but the inventor has not given name specific enough to identify the proper journal or conference. A few examples can be found in Table 5 below. These are relatively complete references; it's not clear why the inventors were not more careful about listing the full journal names.

### ***References from Companies in Twelve Technology Categories***

In the previous section, we analyzed the use of IEEE science by the top patenting organizations. Out of all science publishers, IEEE was cited most often by these organizations by a wide margin. However, looking only at the top companies tells an incomplete story. IEEE publishes journals and runs conferences mainly in information technology, electronic and other areas. It is therefore useful to examine the extent to which IEEE science is referenced by all organizations that patent in specific technologies and not just the leading companies.

As mentioned in the methodology section, we identified all patents in the twelve technology categories shown above in Table 1. 1790 Analytics has developed a classification scheme that categorizes all patents into 50 broad technology areas, and this scheme was used to identify all relevant patents for this part of the analysis.

Table 5 – Examples of References Mapped to “IEEE Unseparated”

Patent	NPR #	NPR Text
05692177	3	Lewis et al. "Hashing for dynamic and static internal tables." IEEE, pp. 45-56 Oct. 1988.
05699518	4	"The Design and Implementation of a Reliable Distributed Operating System--ROSE", Ng, IEEE, pp. 2-11, Apr. 1990.
05699518	5	"A service Platform for Distributed Applications", Popescu-Zeletin et al, IEEE, pp. 11-17, Jul. 1992.
05709219	5	Kotoku, Tetsuo et al., "Environment Modeling for the Interactive Display (EMID) Used in Telerobotic Systems," IEEE Nov. 3-5 1991, pp. 999-1004.
05709219	6	Kotoku, Tetsuo, "A Predictive Display with Force Feedback and Its Application to Remote Manipulation System with Transmission Time Delay," IEEE Jul. 7-10 1992, pp. 239-246.
05709219	8	Burdea, Grigore et al., "Distributed Virtual Force Feedback," IEEE May 2, 1993, Atlanta, GA, pp. 25-44.

We examined each of the twelve technology areas separately, and the results are summarized in Figures 3-14. The first category shown (in Figure 3) is Clocks, Watches, and Timepieces. We identified all non-patent references on patents related to this technology issued between 1997 and 2011. We then determined the science publishers responsible for the largest number of these non-patent references. Figure 3 shows the result of this analysis, namely that IEEE science is referenced far more by clock and watch related patents than science from any other publisher. Forty one percent of all science references from these patents go to IEEE journal papers or IEEE sponsored conference papers (the graphs also include standards documents, but the vast majority of the references are to journal or conference papers).

Figures 4 and 5 are analogous to Figure 3 except they show referencing patterns from Computer Hardware and Software patents. Here IEEE once again receives far more references than the other publishers. In both cases, ACM is the second most referenced publisher, but it receives about half of the references that papers published by IEEE receive.

Figure 6 examines the top referenced publishers in the Medical Device field, which covers devices as well as diagnostic tools and surgical instruments. Here, IEEE is a respectable third in an area that is somewhat outside its core competency. When we first started covering this category in our 2005 report, the top publisher in this area was Lippincott Williams and Wilkins, which publishes more than 100 health and diagnostic related journals, including *Circulation*, *Neurosurgery*, *Investigative Radiology*, *Anesthesiology*, and *Annals of Surgery*. In recent years Lippincott had been surpassed by Elsevier, which has more than 400 journals in the field, such as *Annals of Thoracic Surgery*, and the *Journal of the American College of Cardiology*. In this report, we see that Elsevier’s lead in references has further increased so that Lippincott now has less than half as many references as Elsevier in the category.

The huge increase in references to Elsevier in this (and other) categories is due to several factors. First, the number of science references in the medical field is much higher for recent patents than for older patents, so a leading publisher in 2006 is likely to have a larger lead in 2011. Secondly,

Elsevier has been rather acquisitive in recent years and continues to acquire other publishers. Finally, Elsevier has a lot of journal titles, so that as ISI/Thomson has increased the number of journals it covers in its database, Elsevier has benefited the most.

Figure 7 shows the results for the information storage category. In this area, IEEE is particularly dominant. Almost half (45%) of all of the science references from patents in information storage are to papers in IEEE journals or conferences. IEEE's 37,879 references in this category are about 5 times as many as second place Elsevier.

Figure 8 shows the results of patents covering Measuring, Testing, and Control technology. Patents in this category are related to measuring or testing, force, pressure, weight, etc. as well as chemically measuring substances (e.g. measuring CO<sub>2</sub> levels). The category also contains control devices since these technologies are often combined. For example a patent might be related to a valve that adjusts at a certain pressure or at a certain pollution level. Since this type of measuring can be done both mechanically, magnetically, electrically, or chemically, it is not too surprising to see both IEEE and Elsevier and the Optical and Chemical Societies all near the top of Figure 8. IEEE receives the most references, but the lead is not as dominant as in the Information Technology related technology areas.

Figure 9 contains reference counts for Nuclear and X-Ray technology patents. Much of the patenting in this category is related to Nuclear Medicine so it is not surprising that the top referenced publisher is Elsevier. IEEE is fourth in referencing in this category behind the American Chemical Society and the American Institute of Physics.

The results for the Optics category can be found in Figure 10. This is another area that is slightly outside the IEEE core. IEEE still has a substantial lead over the second and third place publishers – the Optical Society of America (OSA) and the International Society of Optical Engineering (SPIE). Since these latter two societies are Optical societies, it would be reasonable to assume that one of these societies would lead in the category but IEEE strong journals and conferences in the area receive more references from optics patents.

Figure 11 shows reference counts for the patents related to power generation and transmission. Although this is a non-information technology category, IEEE leads in references in this category as well. 33% of science references from patents in this category go to IEEE publications.

Intelligent Manufacturing and Robotics contains patents related to robotics, and robotics and control systems related to manufacturing. According to Markets and Markets, the Robotics market is expected to reach \$21 billion in 2014 as a result of a population explosion in “service robots” that mow lawns, vacuum floors, and manufacture things.

As this industry grows, new innovations will be patented, and from Figure 12 it looks like those innovations will build upon ideas published in IEEE journal articles or presented at IEEE conferences. We see in Figure 12 that 42.8% of all science references from patents in this space refer to IEEE published articles. Elsevier is the second ranked publisher, but its papers receive

only 9.1% of the science references. In this category, IEEE has more references than the next 15 publishers combined.

Figure 13 shows that IEEE is also very strong in the Semiconductor category. Here, the inclusion of conferences gives IEEE a substantial boost. Approximately one-third of the references to IEEE are to conference papers. With conferences excluded, IEEE would be just slightly ahead of the American Institute of Physics in terms of science references from semiconductor patents.

The Telecommunications category is the strongest category for IEEE. There are almost 12 times as many references to IEEE conference and journal papers as to second place publisher (IET/IEE). Standards are referenced more frequently in telecommunications, but still not nearly as often as journal and conference papers. About 65% of the 528,681 total references to all publishers are to journal articles; 22% of the references are to conference papers, and about 13% are to standards documents. In terms of standards documents, the 3GPP General Partnership Project, Internet Engineering Task Force and International Telecommunication Union received the most references in the category. New telecommunications patents are referencing scientific articles to a larger extent than in the past. In this category in 2008 there were just over 118,000 references to IEEE and last year there were 168,000 references to IEEE papers. Now as we see in Figure 14, there are more than 201,000 references to IEEE for telecommunications patents from 1997-2011. Thus just one more year of patents added more than 33,000 references to IEEE papers.

Standards documents are referenced increasingly often in Telecommunications patents. Four of the top 10 referenced publishers are standards bodies. Moreover of the 201,000 references to IEEE, almost 6,000 are to various IEEE standards (including 2,900+ references to the IEEE 802 standard). If these 6,000 references were considered separate from the rest of IEEE, the IEEE standards would also be amongst the top 10 publishers.

Figures 3-14 show aggregate counts of references from all patents in each technology category. Readers who wish to see the firms that reference IEEE publications in each category can consult Appendix B. This appendix contains the 100 organizations that reference IEEE most frequently in each category. Appendix C is similar, except that it contains the organizations that reference IEEE most frequently in the twelve technology categories combined.

### ***Citation Index for Patents Referencing IEEE***

In an earlier study (see [2]) it was shown that patents that reference specific IEEE journals perform better on a number of quality metrics. Moreover, it was shown that the results were statistically significant. In this report, we update a key figure from the previous study showing the citation index of patents that reference IEEE papers versus peer patents that do not reference IEEE.

The citation index is a normalized citation metric that takes the number of citations received by a particular set of patents, and divides it by the expected number of citations for patents of the same age and technology class. A random set of patents therefore should have a citation index of 1.0. Research has shown that patents cited by many later patents tend to contain important ideas

upon which the later patents are building (see [3] and [6]). Citation indicators are also the basis for the patented financial models (see [4] and [7]) invented by the two 1790 founders Breitzman and Thomas.

Figure 15 shows the Citation Index for the patents in the twelve technology categories that reference IEEE papers and conferences. Also shown is Citation Index for the set of the remaining patents in each category that do not reference IEEE. Note that the set of all patents in each category should have a citation index near 1.0. Thus we see that the patents that reference IEEE are cited 21% to 71% more than expected, while the patents that do not reference IEEE are cited 1% to 12% less often than expected. This of course does not imply that all patents that reference IEEE are likely to be more valuable than patents that do not reference IEEE, but it does suggest that in general, patented technologies that build upon IEEE published or sponsored science are more likely to be valuable than patented technologies that do not reference IEEE science.

#### **IV. Conclusions**

When a patent is filed, it must reference the prior art upon which it builds, as well as any prior art that limits the claims of the new invention. This study and prior studies show that science published by IEEE forms a significant portion of this prior art for new patents.

In this study, we examined two separate patent sets. The first patent set consisted of patents granted between 1997 and 2011 to the 25 organizations with the largest number of US patents granted in 2011. The second patent set consisted of all US patents granted between 1997 and 2011 patents in twelve key technologies: clocks, computer hardware, software, nuclear/x-ray, robotics, semiconductors, measuring and testing, medical devices, telecommunications, optics, power systems, and information storage. In both of these patent sets, IEEE is the dominant source of non-patent prior art. In other words, IEEE journals and conferences are key outlets for scientific discoveries relevant to cutting edge technology.

Finally, we conducted an analysis of citation indices for IEEE related patents and non-IEEE related patents. These types of metrics have been shown in validation studies to be good markers for the quality, impact, and potential value of patents. In this study, it was shown that patents that build upon IEEE published science tend to have higher citation indices than patents that do not reference IEEE. This suggests but does not guarantee that patents that build upon IEEE science are more likely to become high-quality, high-impact, valuable inventions than patents that do not build upon IEEE.



## V. References

- [1] Branstetter, Lee. "Is Academic Science Driving a Surge in Industrial Innovation? Evidence from Patent Citations," Columbia Business School, Discussion Paper #28.
- [2] Breitzman, Anthony. "IEEE and Patents: An Analysis of Patent Referencing to IEEE Papers, Conferences and Standards", 1790 Analytics, LLC, May 23, 2005
- [3] Breitzman, Anthony and Moguee, Mary Ellen. "The Many Applications of Patent Analysis," *of Information Science*, 28, 3, 187-205, 2002.
- [4] Breitzman, Anthony., "Method and Apparatus for Choosing a Stock Portfolio, Based on Patent Indicators," US Patent #6,175,824, Jan. 16, 2001.
- [5] Fortune Magazine, "Ten Tech Trends," January 10, 2005.
- [6] Hall, Bronwyn H., Jaffe, Adam B. and Trajtenberg, Manuel., "The NBER Patent Citations Data File: Lessons, Insights and Methodological Tools" (December 2001). CEPR Discussion Paper No. 3094.
- [7] Thomas, Patrick., "System and Method for Producing Technology-Based Price Targets for a Company Stock," US Patent #6,832,211, Dec. 14, 2004.

**Appendix A - Publishers Receiving Most References from Top 25 Companies**  
**(Top 25 Companies in terms of 2010 Patent Activity; References from 1997-2011 Patents)**

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<b>AT&amp;T Inc</b>		
IEEE	4898	45.8
ACM-Assoc Comput Mach	894	8.4
IETF Internet Eng Task Force	503	4.7
Reed/Elsevier/Pergamon/Academic Press/Saunders	385	3.6
International Telecommunication Union	316	3.0
IET/IEE	234	2.2
ISO/IEC	193	1.8
ISCA (International Speech Communication Association)	184	1.7
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	169	1.6
ATM Forum Standards Body	150	1.4
European Telecom Standards Institute (ETSI)	140	1.3
Kluwer Academic/Plenm Publishing	140	1.3
Springer/Springer Wien/Springer-Verlag	141	1.3
OSA-Opt Soc Amer	115	1.1
IEICE-Inst Elec Info Comm Eng	115	1.1
Network Working Group RFC	102	1.0
Joint IEEE and ACM	109	1.0
EIA/TIA Std	110	1.0
138 others with less than 1% each	1794	15.5
<b>Broadcom Corp.</b>		
IEEE	11027	57.5
International Telecommunication Union	967	5.0
IHS Publishing Group	747	3.9
Cahners-Denver Pub	565	2.9
SMTA-Surface Mount Technology Association	518	2.7
IPC - Institute of Interconnecting and Packaging Electronic Circuits	438	2.3
GSM Association (standards org)	398	2.1
ACM-Assoc Comput Mach	384	2.0
Network Working Group RFC	297	1.5
Miller Freeman	242	1.3
IET/IEE	234	1.2
Joint IEEE and ACM	216	1.1
UP Media	198	1.0
Springer/Springer Wien/Springer-Verlag	183	1.0
118 others with less than 1% each	2751	13.8

**Appendix A - Publishers Receiving Most References from Top 25 Companies**  
**(Top 25 Companies in terms of 2010 Patent Activity; References from 1997-2011 Patents)**

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<b>Canon Inc</b>		
IEEE	3451	20.8
Reed/Elsevier/Pergamon/Academic Press/Saunders	2439	14.7
AVS-AIP Am Inst Physics	2196	13.2
ACS-Am Chem Soc	935	5.6
ACM-Assoc Comput Mach	643	3.9
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	578	3.5
SPIE-Int Soc Opt Engineering	570	3.4
Nature Publishing Group	405	2.4
Inst Pure Applied Physics	401	2.4
SID-Society for Information Display	295	1.8
OSA-Opt Soc Amer	281	1.7
Electrochemical Society	277	1.7
Springer/Springer Wien/Springer-Verlag	231	1.4
Vac Soc JPN	232	1.4
AAAS-Am Assoc Advancement Sci	239	1.4
Am Physical Soc	200	1.2
AMER SOC MICROBIOLOGY, 1752 N ST NW, WASHINGTON, USA, DC, 20036-2904	189	1.1
CRC Press/Taylor & Francis	183	1.1
IEICE-Inst Elec Info Comm Eng	182	1.1
IET/IEE	185	1.1
248 others with less than 1% each	2498	12.5
<b>Fuji Film Holdings Corp</b>		
IEEE	1120	16.3
ACM-Assoc Comput Mach	863	12.6
Reed/Elsevier/Pergamon/Academic Press/Saunders	691	10.1
ACS-Am Chem Soc	529	7.7
AVS-AIP Am Inst Physics	417	6.1
SPIE-Int Soc Opt Engineering	404	5.9
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	242	3.5
OSA-Opt Soc Amer	198	2.9
IEICE-Inst Elec Info Comm Eng	138	2.0
Springer/Springer Wien/Springer-Verlag	125	1.8
Nature Publishing Group	126	1.8
Inst Pure Applied Physics	116	1.7
AAAS-Am Assoc Advancement Sci	106	1.5
Royal Soc Chem	87	1.3
IET/IEE	92	1.3
CRC Press/Taylor & Francis	71	1.0
226 others with less than 1% each	1526	21.1

**Appendix A - Publishers Receiving Most References from Top 25 Companies**  
**(Top 25 Companies in terms of 2010 Patent Activity; References from 1997-2011 Patents)**

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<b>Fujitsu Limited</b>		
IEEE	5859	43.5
IET/IEE	805	6.0
IEICE-Inst Elec Info Comm Eng	729	5.4
OSA-Opt Soc Amer	674	5.0
ACM-Assoc Comput Mach	568	4.2
AVS-AIP Am Inst Physics	540	4.0
Reed/Elsevier/Pergamon/Academic Press/Saunders	512	3.8
Joint IEEE and ACM	434	3.2
ATM Forum Standards Body	357	2.7
IETF Internet Eng Task Force	267	2.0
SPIE-Int Soc Opt Engineering	185	1.4
International Telecommunication Union	172	1.3
Inst Pure Applied Physics	148	1.1
199 others with less than 1% each	2209	15.0
<b>General Electric Company</b>		
US Dept of Energy	10467	30.6
General Electric Co.	3433	10.0
Reed/Elsevier/Pergamon/Academic Press/Saunders	3375	9.9
IEEE	3386	9.9
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1792	5.2
ACS-Am Chem Soc	1406	4.1
AVS-AIP Am Inst Physics	797	2.3
Lippincott Williams & Wilkins	640	1.9
Am Physical Soc	475	1.4
Springer/Springer Wien/Springer-Verlag	425	1.2
Nature Publishing Group	383	1.1
SPIE-Int Soc Opt Engineering	342	1.0
Radiological Soc North Am	358	1.0
397 others with less than 1% each	6978	17.2

**Appendix A - Publishers Receiving Most References from Top 25 Companies**  
**(Top 25 Companies in terms of 2010 Patent Activity; References from 1997-2011 Patents)**

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<b>General Motors Corp</b>		
IEEE	623	27.3
SAE-Society of Automobile Engineers	362	15.8
Reed/Elsevier/Pergamon/Academic Press/Saunders	343	15.0
ACS-Am Chem Soc	158	6.9
ASME-Am Soc Mech Eng	81	3.5
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	68	3.0
Electrochemical Society	63	2.8
AVS-AIP Am Inst Physics	60	2.6
Springer/Springer Wien/Springer-Verlag	41	1.8
Royal Soc Chem	29	1.3
New York Times	30	1.3
American Automatic Control Council (AACC)	27	1.2
ACM-Assoc Comput Mach	28	1.2
OSA-Opt Soc Amer	27	1.2
IET/IEE	25	1.1
Nature Publishing Group	26	1.1
Pention Media	23	1.0
79 others with less than 1% each	272	10.6
<b>Hewlett-Packard Co</b>		
IEEE	6582	31.3
ACM-Assoc Comput Mach	2616	12.4
Reed/Elsevier/Pergamon/Academic Press/Saunders	1152	5.5
IETF Internet Eng Task Force	816	3.9
AVS-AIP Am Inst Physics	725	3.4
Joint IEEE and ACM	601	2.9
SPIE-Int Soc Opt Engineering	575	2.7
ACS-Am Chem Soc	420	2.0
The USENIX Association	398	1.9
Springer/Springer Wien/Springer-Verlag	398	1.9
Hewlett Packard Inc.	351	1.7
OSA-Opt Soc Amer	289	1.4
AAAS-Am Assoc Advancement Sci	282	1.3
Am Physical Soc	250	1.2
Miller Freeman	232	1.1
Ziff-Davis	239	1.1
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	241	1.1
International Telecommunication Union	229	1.1
Network Working Group RFC	219	1.0
IET/IEE	200	1.0
304 others with less than 1% each	4211	17.9

**Appendix A - Publishers Receiving Most References from Top 25 Companies**  
**(Top 25 Companies in terms of 2010 Patent Activity; References from 1997-2011 Patents)**

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<b>Hitachi Ltd</b>		
IEEE	5511	31.2
AVS-AIP Am Inst Physics	1466	8.3
Reed/Elsevier/Pergamon/Academic Press/Saunders	1243	7.0
ACM-Assoc Comput Mach	951	5.4
IEICE-Inst Elec Info Comm Eng	643	3.6
ACS-Am Chem Soc	433	2.5
IETF Internet Eng Task Force	349	2.0
SID-Society for Information Display	341	1.9
Inst Pure Applied Physics	301	1.7
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	299	1.7
Am Physical Soc	289	1.6
SPIE-Int Soc Opt Engineering	249	1.4
IET/IEE	255	1.4
Network Working Group RFC	230	1.3
Springer/Springer Wien/Springer-Verlag	217	1.2
International Telecommunication Union	188	1.1
IBM Corp	190	1.1
IEEE/JPN Soc App Phys	193	1.1
Nature Publishing Group	180	1.0
OSA-Opt Soc Amer	179	1.0
300 others with less than 1% each	3946	20.7
<b>Hon Hai Precision Ind. Co. Ltd.</b>		
Am Physical Soc	106	14.2
ACS-Am Chem Soc	97	13.0
AAAS-Am Assoc Advancement Sci	96	12.9
IEEE	95	12.7
AVS-AIP Am Inst Physics	72	9.7
Nature Publishing Group	71	9.5
Reed/Elsevier/Pergamon/Academic Press/Saunders	63	8.4
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	30	4.0
ROYAL SOC LONDON	28	3.8
ACM-Assoc Comput Mach	11	1.5
Springer/Springer Wien/Springer-Verlag	11	1.5
IOP Publishing	10	1.3
OSA-Opt Soc Amer	8	1.1
25 others with less than 1% each	48	6.0

**Appendix A - Publishers Receiving Most References from Top 25 Companies**  
**(Top 25 Companies in terms of 2010 Patent Activity; References from 1997-2011 Patents)**

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<b>Intel Corporation</b>		
IEEE	14421	49.6
ACM-Assoc Comput Mach	2553	8.8
Joint IEEE and ACM	1397	4.8
Reed/Elsevier/Pergamon/Academic Press/Saunders	1069	3.7
AVS-AIP Am Inst Physics	894	3.1
SPIE-Int Soc Opt Engineering	529	1.8
IEEE/JPN Soc App Phys	418	1.4
IET/IEE	407	1.4
ACS-Am Chem Soc	389	1.3
IETF Internet Eng Task Force	367	1.3
The USENIX Association	367	1.3
Springer/Springer Wien/Springer-Verlag	296	1.0
Intel Corp	297	1.0
252 others with less than 1% each	5674	17.6
<b>International Business Machines Corp</b>		
IEEE	23246	38.0
ACM-Assoc Comput Mach	10757	17.6
Reed/Elsevier/Pergamon/Academic Press/Saunders	3259	5.3
AVS-AIP Am Inst Physics	2351	3.8
Joint IEEE and ACM	1624	2.7
IBM Corp	1430	2.3
Springer/Springer Wien/Springer-Verlag	1216	2.0
SPIE-Int Soc Opt Engineering	1054	1.7
Very Large Data Base Endowment Inc. (VLDB Endowment)	898	1.5
ACS-Am Chem Soc	930	1.5
The USENIX Association	826	1.3
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	695	1.1
IEEE/JPN Soc App Phys	633	1.0
377 others with less than 1% each	12311	18.0

**Appendix A - Publishers Receiving Most References from Top 25 Companies**  
**(Top 25 Companies in terms of 2010 Patent Activity; References from 1997-2011 Patents)**

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<b>LG Electronics Inc.</b>		
IEEE	2415	34.1
3GPP General Partnership Project Standards Body	1387	19.6
AUDIO ENGINEERING SOC, 60 E 42ND ST, NEW YORK, USA, NY, 10165-2520	328	4.6
ISO/IEC	306	4.3
European Telecom Standards Institute (ETSI)	293	4.1
ISO-International Standards Organization	274	3.9
International Telecommunication Union	267	3.8
ATSC Std	176	2.5
AVS-AIP Am Inst Physics	170	2.4
MPEG.org	118	1.7
IETF Internet Eng Task Force	110	1.6
SID-Society for Information Display	116	1.6
Reed/Elsevier/Pergamon/Academic Press/Saunders	92	1.3
SPIE-Int Soc Opt Engineering	95	1.3
ELECTRONICS TELECOMMUNICATIONS RESEARCH INST, 161 KAJONG-DONG, YUSO	90	1.3
Inst Pure Applied Physics	86	1.2
ACM-Assoc Comput Mach	79	1.1
82 others with less than 1% each	687	9.0

**Microsoft Corporation**

IEEE	25613	30.7
ACM-Assoc Comput Mach	24396	29.3
Reed/Elsevier/Pergamon/Academic Press/Saunders	3675	4.4
Springer/Springer Wien/Springer-Verlag	2666	3.2
The USENIX Association	1826	2.2
IETF Internet Eng Task Force	1463	1.8
International Telecommunication Union	1324	1.6
SPIE-Int Soc Opt Engineering	1154	1.4
Miller Freeman	1079	1.3
Joint IEEE and ACM	1054	1.3
Very Large Data Base Endowment Inc. (VLDB Endowment)	885	1.1
334 others with less than 1% each	18250	19.8



## *Appendix A - Publishers Receiving Most References from Top 25 Companies*

### *(Top 25 Companies in terms of 2010 Patent Activity; References from 1997-2011 Patents)*

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<b><i>Panasonic Corporation</i></b>		
IEEE	5714	34.7
Reed/Elsevier/Pergamon/Academic Press/Saunders	1349	8.2
AVS-AIP Am Inst Physics	1015	6.2
Inst Pure Applied Physics	819	5.0
IEICE-Inst Elec Info Comm Eng	789	4.8
3GPP General Partnership Project Standards Body	547	3.3
Electrochemical Society	334	2.0
ACM-Assoc Comput Mach	332	2.0
International Telecommunication Union	329	2.0
IET/IEEE	332	2.0
IETF Internet Eng Task Force	316	1.9
SPIE-Int Soc Opt Engineering	305	1.9
JPN Soc App Phys	254	1.5
IEEE/JPN Soc App Phys	213	1.3
ACS-Am Chem Soc	209	1.3
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	208	1.3
ISO/IEC	216	1.3
Springer/Springer Wien/Springer-Verlag	190	1.2
ISO-International Standards Organization	178	1.1
SID-Society for Information Display	186	1.1
OSA-Opt Soc Amer	170	1.0
233 others with less than 1% each	2466	12.9
<b><i>Qualcomm Inc</i></b>		
IEEE	6118	49.7
3GPP General Partnership Project Standards Body	773	6.3
SID-Society for Information Display	727	5.9
EIA/TIA Std	432	3.5
IETF Internet Eng Task Force	403	3.3
SPIE-Int Soc Opt Engineering	381	3.1
Reed/Elsevier/Pergamon/Academic Press/Saunders	379	3.1
Network Working Group RFC	302	2.5
ACM-Assoc Comput Mach	274	2.2
OSA-Opt Soc Amer	233	1.9
AVS-AIP Am Inst Physics	223	1.8
IET/IEEE	182	1.5
European Telecom Standards Institute (ETSI)	167	1.4
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	141	1.1
112 others with less than 1% each	1572	11.9

## *Appendix A - Publishers Receiving Most References from Top 25 Companies (Top 25 Companies in terms of 2010 Patent Activity; References from 1997-2011 Patents)*

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<b><i>Renesas Electronic Corporation</i></b>		
IEEE	2324	66.2
IEEE/JPN Soc App Phys	275	7.8
AVS-AIP Am Inst Physics	137	3.9
IEICE-Inst Elec Info Comm Eng	80	2.3
JPN Soc App Phys	66	1.9
Reed/Elsevier/Pergamon/Academic Press/Saunders	64	1.8
SPIE-Int Soc Opt Engineering	59	1.7
ACM-Assoc Comput Mach	43	1.2
Electrochemical Society	39	1.1
Pention Media	36	1.0
55 others with less than 1% each	387	10.7
<b><i>Ricoh Co. Ltd.</i></b>		
IEEE	3595	44.1
ACM-Assoc Comput Mach	1404	17.2
SPIE-Int Soc Opt Engineering	579	7.1
Reed/Elsevier/Pergamon/Academic Press/Saunders	405	5.0
International Association for Pattern Recognition (IAPR)	246	3.0
Springer/Springer Wien/Springer-Verlag	218	2.7
ISO-International Standards Organization	130	1.6
IEICE-Inst Elec Info Comm Eng	120	1.5
AVS-AIP Am Inst Physics	99	1.2
I S & T - SOC IMAGING SCIENCE TECHNOLOGY	82	1.0
117 others with less than 1% each	1273	14.6
<b><i>Samsung Electronics Co Ltd</i></b>		
IEEE	5358	44.8
SID-Society for Information Display	951	8.0
Reed/Elsevier/Pergamon/Academic Press/Saunders	629	5.3
AVS-AIP Am Inst Physics	467	3.9
ACS-Am Chem Soc	383	3.2
3GPP General Partnership Project Standards Body	342	2.9
ACM-Assoc Comput Mach	271	2.3
SPIE-Int Soc Opt Engineering	255	2.1
IET/IEE	212	1.8
AAAS-Am Assoc Advancement Sci	156	1.3
IEEE/JPN Soc App Phys	158	1.3
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	148	1.2
Inst Pure Applied Physics	121	1.0
ISO/IEC	124	1.0
227 others with less than 1% each	2373	18.1

**Appendix A - Publishers Receiving Most References from Top 25 Companies**  
**(Top 25 Companies in terms of 2010 Patent Activity; References from 1997-2011 Patents)**

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<b>Seiko Epson Corporation</b>		
IEEE	2500	37.8
Joint IEEE and ACM	587	8.9
SID-Society for Information Display	527	8.0
ACM-Assoc Comput Mach	433	6.5
AVS-AIP Am Inst Physics	421	6.4
Reed/Elsevier/Pergamon/Academic Press/Saunders	392	5.9
IBM Corp	145	2.2
Inst Pure Applied Physics	109	1.6
SPIE-Int Soc Opt Engineering	96	1.5
IEEE/JPN Soc App Phys	102	1.5
ACS-Am Chem Soc	96	1.5
IEICE-Inst Elec Info Comm Eng	82	1.2
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	65	1.0
Korean Information Display Society (KIDS)	64	1.0
113 others with less than 1% each	994	13.6
<b>Sharp Corp</b>		
IEEE	2818	30.2
SID-Society for Information Display	983	10.5
AVS-AIP Am Inst Physics	941	10.1
ISO/IEC	484	5.2
ACM-Assoc Comput Mach	465	5.0
Reed/Elsevier/Pergamon/Academic Press/Saunders	451	4.8
SPIE-Int Soc Opt Engineering	375	4.0
Inst Pure Applied Physics	288	3.1
IEICE-Inst Elec Info Comm Eng	187	2.0
3GPP General Partnership Project Standards Body	176	1.9
IETF Internet Eng Task Force	166	1.8
International Telecommunication Union	147	1.6
ACS-Am Chem Soc	133	1.4
CRC Press/Taylor & Francis	128	1.4
IET/IEEE	113	1.2
MRS-Materials Research Soc	110	1.2
JPN Soc App Phys	108	1.2
OSA-Opt Soc Amer	99	1.1
134 others with less than 1% each	1159	11.3

## ***Appendix A - Publishers Receiving Most References from Top 25 Companies (Top 25 Companies in terms of 2010 Patent Activity; References from 1997-2011 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<b>Siemens Aktiengesellschaft</b>		
IEEE	5541	27.1
Reed/Elsevier/Pergamon/Academic Press/Saunders	3015	14.7
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	712	3.5
AVS-AIP Am Inst Physics	710	3.5
SPIE-Int Soc Opt Engineering	525	2.6
Springer/Springer Wien/Springer-Verlag	461	2.3
ACM-Assoc Comput Mach	469	2.3
ACS-Am Chem Soc	440	2.2
Nature Publishing Group	319	1.6
Acoust Soc Amer/Amer Inst Physics	319	1.6
Natl Acad Sciences	308	1.5
AMER SOC MICROBIOLOGY, 1752 N ST NW, WASHINGTON, USA, DC, 20036-2904	282	1.4
IET/IEE	287	1.4
Lippincott Williams & Wilkins	264	1.3
AMER ASSOC CLINICAL CHEMISTRY, 2101 L STREET NW, SUITE 202, WASHINGTON,	245	1.2
IOP Publishing	242	1.2
Radiological Soc North Am	235	1.1
AAAS-Am Assoc Advancement Sci	226	1.1
Kluwer Academic/Plenm Publishing	234	1.1
OSA-Opt Soc Amer	203	1.0
DYNAMEDIA INC	196	1.0
376 others with less than 1% each	5214	21.6
<b>Sony Corp</b>		
IEEE	6495	47.4
ACM-Assoc Comput Mach	1282	9.4
Reed/Elsevier/Pergamon/Academic Press/Saunders	867	6.3
SPIE-Int Soc Opt Engineering	438	3.2
AVS-AIP Am Inst Physics	343	2.5
Springer/Springer Wien/Springer-Verlag	217	1.6
IET/IEE	201	1.5
IEICE-Inst Elec Info Comm Eng	175	1.3
ACS-Am Chem Soc	173	1.3
IETF Internet Eng Task Force	163	1.2
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	138	1.0
Inst Pure Applied Physics	141	1.0
234 others with less than 1% each	3067	20.6

## *Appendix A - Publishers Receiving Most References from Top 25 Companies*

### *(Top 25 Companies in terms of 2010 Patent Activity; References from 1997-2011 Patents)*

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<b><i>Toshiba Corp</i></b>		
IEEE	5707	42.1
AVS-AIP Am Inst Physics	889	6.6
Reed/Elsevier/Pergamon/Academic Press/Saunders	828	6.1
IEEE/JPN Soc App Phys	529	3.9
IEICE-Inst Elec Info Comm Eng	432	3.2
Am Physical Soc	415	3.1
ACM-Assoc Comput Mach	402	3.0
SPIE-Int Soc Opt Engineering	354	2.6
Inst Pure Applied Physics	333	2.5
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	318	2.3
International Telecommunication Union	249	1.8
JPN Soc App Phys	175	1.3
IET/IEE	169	1.2
Joint IEEE and ACM	139	1.0
246 others with less than 1% each	2624	16.6
<b><i>Toyota Motor Company</i></b>		
Reed/Elsevier/Pergamon/Academic Press/Saunders	367	18.8
IEEE	345	17.7
SAE-Society of Automobile Engineers	139	7.1
ACS-Am Chem Soc	136	7.0
Am Soc Biochemistry Molec Biology	94	4.8
Cahners-Denver Pub	72	3.7
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	55	2.8
Springer/Springer Wien/Springer-Verlag	47	2.4
AVS-AIP Am Inst Physics	47	2.4
AMER SOC MICROBIOLOGY, 1752 N ST NW, WASHINGTON, USA, DC, 20036-2904	42	2.2
Natl Acad Sciences	39	2.0
IET/IEE	31	1.6
JAPANESE BIOCHEMICAL SOC, ISHIKAWA BLDG-3F, 25-16 HONGO-5-CHOME, BUNKY	26	1.3
IEICE-Inst Elec Info Comm Eng	25	1.3
Electrochemical Society	24	1.2
Royal Soc Chem	24	1.2
Pention Media	21	1.1
Nature Publishing Group	20	1.0
SPIE-Int Soc Opt Engineering	19	1.0
108 others with less than 1% each	375	22.3

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Clocks/Watches/Time Pieces</i>										
1	Weatherford International Ltd	58	63	92.1	IEEE	58	92.1	CRC Press/Taylor & Francis	4	6.3
2	Teradyne Inc.	16	20	80.0	IEEE	16	80.0	AVS-AIP Am Inst Physics	2	10.0
3	STMicroelectronics	10	10	100.0	IEEE	10	100.0			
4	Xilinx Inc.	10	10	100.0	IEEE	10	100.0			
5	International Business Machi	8	45	17.8	AVS-AIP Am Inst Physics	15	33.3	IEEE	8	17.8
6	Alacritech Inc	6	9	66.7	IEEE	6	66.7	United Business Media	2	22.2
7	Hewlett-Packard Co	6	22	27.3	ACM-Assoc Comput Mach	7	31.8	IEEE	6	27.3
8	GUIDE TECHNOLOGY INC	5	10	50.0	IEEE	5	50.0	Hewlett Packard Inc.	5	50.0
9	MOTOROLA SOLUTIONS I	4	8	50.0	IEEE	4	50.0	ACM-Assoc Comput Mach	4	50.0
10	Research in Motion Ltd.	4	8	50.0	IEEE	4	50.0	European Telecom Standards Institute (ETSI)	2	25.0
11	Yamaha Corp	4	4	100.0	IEEE	4	100.0			
12	General Dynamics Corp	3	12	25.0	Network Working Group RFC	4	33.3	IEEE	3	25.0
13	Huawei Technologies Compa	3	16	18.8	Network Working Group RFC	11	68.8	IEEE	3	18.8
14	Industrial Techology Researc	3	3	100.0	IEEE	3	100.0			
15	OUTBURST TECHNOLOGI	3	7	42.9	IEEE	3	42.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	1	14.3
16	Seiko Epson Corporation	3	8	37.5	IEEE	3	37.5	SID-Society for Information Display	2	25.0
17	Toshiba Corp	3	4	75.0	IEEE	3	75.0	AUDIO ENGINEERING SOC, 60 E 42ND ST, NEW YORK,	1	25.0
18	CareFusion Corp	2	2	100.0	IEEE	2	100.0			
19	Denso Corp	2	2	100.0	IEEE	2	100.0			
20	FRIEDRICH-ALEXANDER-	2	4	50.0	IEEE	2	50.0	Joint IEEE and ACM	1	25.0
21	Infineon Technologies AG	2	2	100.0	IEEE	2	100.0			
22	INVICTA NETWORKS INC	2	2	100.0	IEEE	2	100.0			
23	Koninklijke Philips Electroni	2	4	50.0	ACM-Assoc Comput Mach	2	50.0	IEEE	2	50.0
24	NEC Corp	2	2	100.0	IEEE	2	100.0			
25	Nuance Communications Inc	2	8	25.0	Reed/Elsevier/Pergamon/Academic Press/Sau	2	25.0	IEEE	2	25.0
26	Siemens Aktiengesellschaft	2	2	100.0	IEEE	2	100.0			
27	Sony Corp	2	2	100.0	IEEE	2	100.0			
28	Synopsys Inc.	2	5	40.0	Joint IEEE and ACM	3	60.0	IEEE	2	40.0
29	Texas Instruments Inc	2	3	66.7	IEEE	2	66.7	Acoust Soc Amer/Amer Inst Physics	1	33.3
30	ABB Ltd	1	1	100.0	IEEE	1	100.0			
31	Apple Inc	1	5	20.0	ION-THE INSTITUTE OF NAVIGATION	1	20.0	NASA-National Aeronautics and Space Admin	1	20.0
32	Bosch (Robert) GmbH	1	1	100.0	IEEE	1	100.0			
33	Broadcom Corp.	1	1	100.0	IEEE	1	100.0			
34	Casio Computer	1	1	100.0	IEEE	1	100.0			
35	Fraunhofer Gesellschaft	1	3	33.3	Acoust Soc Amer/Amer Inst Physics	1	33.3	IEEE	1	33.3
36	Fujitsu Limited	1	1	100.0	IEEE	1	100.0			
37	Garmin International	1	2	50.0	ASME-Am Soc Mech Eng	1	50.0	IEEE	1	50.0
38	GARMIN SWITZERLAND	1	2	50.0	ASME-Am Soc Mech Eng	1	50.0	IEEE	1	50.0
39	GENERAL SIGNAL POWE	1	1	100.0	IEEE	1	100.0			

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Intel Corporation	1	4	25.0	IETF Internet Eng Task Force	1	25.0	Joint IEEE and ACM	1	25.0
41	LeCroy Corp.	1	3	33.3	AVS-AIP Am Inst Physics	1	33.3	IEEE	1	33.3
42	LSI Corporation	1	1	100.0	IEEE	1	100.0			
43	RF Micro Devices Inc.	1	5	20.0	Pention Media	1	20.0	ESSCIRC/ESSDIRC European Solid State Circuits/Devices C	1	20.0
44	Rohde & Schwarz GmbH &	1	1	100.0	IEEE	1	100.0			
45	Swatch Group AG (The)	1	6	16.7	Reed/Elsevier/Pergamon/Academic Press/Sau	2	33.3	NASA-National Aeronautics and Space Admin	1	16.7
46	TELECOM SOLUTIONS IN	1	2	50.0	BUREAU INT POIDS MESURES, B1 PM P	1	50.0	IEEE	1	50.0
47	VTech Holdings :td	1	1	100.0	IEEE	1	100.0			
48	WIMM LABS	1	1	100.0	IEEE	1	100.0			

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Computer Hardware</i>										
1	International Business Machi	6662	17915	37.2	IEEE	6662	37.2	ACM-Assoc Comput Mach	4419	24.7
2	Microsoft Corporation	5324	22617	23.5	ACM-Assoc Comput Mach	8555	37.8	IEEE	5324	23.5
3	Intel Corporation	3658	7601	48.1	IEEE	3658	48.1	ACM-Assoc Comput Mach	1169	15.4
4	Oracle Corporation	3650	11424	32.0	ACM-Assoc Comput Mach	4062	35.6	IEEE	3650	32.0
5	Cadence Design Systems Inc	2559	6913	37.0	IEEE	2559	37.0	Joint IEEE and ACM	2037	29.5
6	Immersion Corp.	2558	7176	35.6	IEEE	2558	35.6	ACM-Assoc Comput Mach	804	11.2
7	Sony Corp	2548	5143	49.5	IEEE	2548	49.5	ACM-Assoc Comput Mach	672	13.1
8	Hewlett-Packard Co	2035	6446	31.6	IEEE	2035	31.6	ACM-Assoc Comput Mach	1211	18.8
9	Ricoh Co. Ltd.	1926	3750	51.4	IEEE	1926	51.4	ACM-Assoc Comput Mach	578	15.4
10	MICROUNITY SYSTEMS E	1412	1994	70.8	IEEE	1412	70.8	ACM-Assoc Comput Mach	188	9.4
11	Broadcom Corp.	1411	2344	60.2	IEEE	1411	60.2	ACM-Assoc Comput Mach	129	5.5
12	Seiko Epson Corporation	1342	3139	42.8	IEEE	1342	42.8	Joint IEEE and ACM	461	14.7
13	Fujitsu Limited	1250	2769	45.1	IEEE	1250	45.1	ACM-Assoc Comput Mach	335	12.1
14	Canon Inc	1195	3466	34.5	IEEE	1195	34.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	412	11.9
15	Panasonic Corporation	1112	2375	46.8	IEEE	1112	46.8	ACM-Assoc Comput Mach	177	7.5
16	Rambus Inc.	1035	1406	73.6	IEEE	1035	73.6	IEEE/JPN Soc App Phys	73	5.2
17	Alcatel-Lucent	1017	2121	47.9	IEEE	1017	47.9	ACM-Assoc Comput Mach	298	14.0
18	NEC Corp	972	1819	53.4	IEEE	972	53.4	ACM-Assoc Comput Mach	133	7.3
19	Motorola Solutions Inc.	971	1539	63.1	IEEE	971	63.1	ACM-Assoc Comput Mach	101	6.6
20	Xilinx Inc.	958	1388	69.0	IEEE	958	69.0	Joint IEEE and ACM	149	10.7
21	Samsung Electronics Co Ltd	945	2594	36.4	IEEE	945	36.4	SID-Society for Information Display	802	30.9
22	Advanced Micro Devices Inc	937	2212	42.4	IEEE	937	42.4	ACM-Assoc Comput Mach	229	10.4
23	Toshiba Corp	886	1829	48.4	IEEE	886	48.4	ACM-Assoc Comput Mach	159	8.7
24	Micron Technology Inc.	863	1515	57.0	IEEE	863	57.0	IEEE/JPN Soc App Phys	109	7.2
25	SRC Computers Inc.	808	895	90.3	IEEE	808	90.3	Sci American Inc	21	2.3
26	Hitachi Ltd	798	2421	33.0	IEEE	798	33.0	ACM-Assoc Comput Mach	398	16.4
27	Cisco Systems Inc.	775	2617	29.6	IEEE	775	29.6	IETF Internet Eng Task Force	444	17.0
28	Synopsys Inc.	772	1881	41.0	IEEE	772	41.0	SPIE-Int Soc Opt Engineering	341	18.1
29	Apple Inc	764	2894	26.4	ACM-Assoc Comput Mach	1116	38.6	IEEE	764	26.4
30	Texas Instruments Inc	752	1318	57.1	IEEE	752	57.1	Pention Media	120	9.1
31	STMicroelectronics	692	1118	61.9	IEEE	692	61.9	ACM-Assoc Comput Mach	67	6.0
32	AT&T Inc	650	1419	45.8	IEEE	650	45.8	ACM-Assoc Comput Mach	183	12.9
33	LSI Corporation	638	1028	62.1	IEEE	638	62.1	Joint IEEE and ACM	101	9.8
34	MIPS Technologies Inc.	635	1531	41.5	IEEE	635	41.5	ACM-Assoc Comput Mach	330	21.6
35	Mitsubishi Electric Corp	592	1172	50.5	IEEE	592	50.5	ACM-Assoc Comput Mach	198	16.9
36	Tabula Inc	591	1537	38.5	ACM-Assoc Comput Mach	639	41.6	IEEE	591	38.5
37	Xerox Corp	580	2614	22.2	ACM-Assoc Comput Mach	792	30.3	IEEE	580	22.2
38	Honeywell International Inc.	579	1842	31.4	IEEE	579	31.4	SID-Society for Information Display	144	7.8
39	Silverbrook Pty Ltd	538	1523	35.3	IEEE	538	35.3	Springer/Springer Wien/Springer-Verlag	410	26.9



## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Sap AG	518	1573	32.9	IEEE	518	32.9	ACM-Assoc Comput Mach	447	28.4
41	Siemens Aktiengesellschaft	517	1203	43.0	IEEE	517	43.0	ACM-Assoc Comput Mach	169	14.0
42	Massachusetts Institute of Te	488	1107	44.1	IEEE	488	44.1	ACM-Assoc Comput Mach	145	13.1
43	PACT XPP TECHNOLOGIE	470	751	62.6	IEEE	470	62.6	ACM-Assoc Comput Mach	81	10.8
44	Netapp Inc	459	1611	28.5	ACM-Assoc Comput Mach	526	32.7	IEEE	459	28.5
45	Koninklijke Philips Electroni	452	906	49.9	IEEE	452	49.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	70	7.7
46	Personalized Media Commun	442	3011	14.7	Soc Motion Picture TV Eng Inc	1031	34.2	IEEE	442	14.7
47	Cypress Semiconductor Corp.	440	682	64.5	IEEE	440	64.5	Joint IEEE and ACM	61	8.9
48	University of California	436	1628	26.8	IEEE	436	26.8	ACM-Assoc Comput Mach	244	15.0
49	Qualcomm Inc	430	795	54.1	IEEE	430	54.1	SID-Society for Information Display	81	10.2
50	Altera Corp.	419	835	50.2	IEEE	419	50.2	ACM-Assoc Comput Mach	126	15.1
51	Mentor Graphics Corp.	404	786	51.4	IEEE	404	51.4	Joint IEEE and ACM	238	30.3
52	Sharp Corp	389	1457	26.7	IEEE	389	26.7	SID-Society for Information Display	300	20.6
53	SRI International	389	711	54.7	IEEE	389	54.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	55	7.7
54	EMC Corp.	384	1095	35.1	IEEE	384	35.1	ACM-Assoc Comput Mach	244	22.3
55	National Instruments Corp.	381	672	56.7	IEEE	381	56.7	ACM-Assoc Comput Mach	79	11.8
56	Fuji Film Holdings Corp	368	1137	32.4	IEEE	368	32.4	ACM-Assoc Comput Mach	300	26.4
57	Nokia Corp	336	939	35.8	IEEE	336	35.8	ACM-Assoc Comput Mach	137	14.6
58	General Electric Company	305	750	40.7	IEEE	305	40.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	72	9.6
59	Nortel Networks Patent Portf	298	610	48.9	IEEE	298	48.9	Network Working Group RFC	64	10.5
60	Ericsson	297	626	47.4	IEEE	297	47.4	ACM-Assoc Comput Mach	61	9.7
61	Google Inc.	294	1416	20.8	ACM-Assoc Comput Mach	537	37.9	IEEE	294	20.8
62	Digimarc Corp.	284	793	35.8	IEEE	284	35.8	SPIE-Int Soc Opt Engineering	84	10.6
63	Pioneer Corp.	274	385	71.2	IEEE	274	71.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	16	4.2
64	LG Electronics Inc.	271	649	41.8	IEEE	271	41.8	AUDIO ENGINEERING SOC, 60 E 42ND ST, NEW YORK,	97	14.9
65	Tangis Corp	269	393	68.4	IEEE	269	68.4	ACM-Assoc Comput Mach	81	20.6
66	MOSAID Technologies Inc.	259	336	77.1	IEEE	259	77.1	Joint IEEE and ACM	18	5.4
67	Infineon Technologies AG	258	443	58.2	IEEE	258	58.2	Joint IEEE and ACM	28	6.3
68	CA Technologies	250	583	42.9	IEEE	250	42.9	ACM-Assoc Comput Mach	88	15.1
69	ParkerVision Inc	246	509	48.3	IEEE	246	48.3	IET/IEE	130	25.5
70	Tessera Technologies Inc.	237	349	67.9	IEEE	237	67.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	24	6.9
71	Washington University in St.	237	522	45.4	IEEE	237	45.4	ACM-Assoc Comput Mach	72	13.8
72	Raytheon Co.	232	538	43.1	IEEE	232	43.1	ACM-Assoc Comput Mach	47	8.7
73	Cray Inc	228	853	26.7	ACM-Assoc Comput Mach	345	40.4	IEEE	228	26.7
74	Research in Motion Ltd.	228	627	36.4	IEEE	228	36.4	ACM-Assoc Comput Mach	79	12.6
75	NCR Corp.	218	572	38.1	IEEE	218	38.1	ACM-Assoc Comput Mach	120	21.0
76	Interuniversity MicroElectron	217	360	60.3	IEEE	217	60.3	ACM-Assoc Comput Mach	32	8.9
77	Power-One Inc	217	380	57.1	IEEE	217	57.1	IVI Foundation/SCPI Consortium	93	24.5
78	Applied Materials Inc.	216	388	55.7	IEEE	216	55.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	32	8.2
79	NVIDIA Corp.	212	480	44.2	IEEE	212	44.2	ACM-Assoc Comput Mach	155	32.3
80	Silicon Graphics Internationa	210	544	38.6	IEEE	210	38.6	ACM-Assoc Comput Mach	177	32.5

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Nippon Telegraph & Telepho	207	627	33.0	IEEE	207	33.0	IEICE-Inst Elec Info Comm Eng	84	13.4
82	Verizon Communications Inc	205	389	52.7	IEEE	205	52.7	ACM-Assoc Comput Mach	42	10.8
83	Invensys Plc.	201	1576	12.8	I S A-INSTRUM SYS AUTOMATION SOC	369	23.4	IEEE	201	12.8
84	Sensable Technologies Inc	197	431	45.7	IEEE	197	45.7	ACM-Assoc Comput Mach	123	28.5
85	SanDisk Corp.	196	368	53.3	IEEE	196	53.3	ISO-International Standards Organization	32	8.7
86	Emerson Electric Co.	195	853	22.9	IEEE	195	22.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	69	8.1
87	National Semiconductor Corp	195	342	57.0	IEEE	195	57.0	C M P Media	21	6.1
88	Siemens Enterprise Communi	193	330	58.5	IEEE	193	58.5	ACM-Assoc Comput Mach	48	14.5
89	Safran S.A.	186	460	40.4	IEEE	186	40.4	SPIE-Int Soc Opt Engineering	58	12.6
90	Renesas Electronic Corporati	185	350	52.9	IEEE	185	52.9	ACM-Assoc Comput Mach	27	7.7
91	ARITHMATICA LTD	183	225	81.3	IEEE	183	81.3	IEICE-Inst Elec Info Comm Eng	10	4.4
92	Netlogic Microsystems Inc.	181	339	53.4	IEEE	181	53.4	ACM-Assoc Comput Mach	86	25.4
93	Agilent Technologies Inc	180	302	59.6	IEEE	180	59.6	ACM-Assoc Comput Mach	16	5.3
94	Honda Motor Co. Ltd.(Giken	177	398	44.5	IEEE	177	44.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	52	13.1
95	Symantec Corp.	176	680	25.9	IEEE	176	25.9	ACM-Assoc Comput Mach	100	14.7
96	Via Technologies Inc.	176	277	63.5	IEEE	176	63.5	Joint IEEE and ACM	31	11.2
97	Commvault Systems Inc.	175	242	72.3	IEEE	175	72.3	ACM-Assoc Comput Mach	36	14.9
98	Arm Holdings Plc	174	309	56.3	IEEE	174	56.3	Joint IEEE and ACM	45	14.6
99	Lockheed Martin Corp.	174	414	42.0	IEEE	174	42.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	43	10.4
100	Citrix Systems Inc	162	541	29.9	IEEE	162	29.9	ACM-Assoc Comput Mach	52	9.6

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Computer Software</i>										
1	Microsoft Corporation	12482	39921	31.3	IEEE	12482	31.3	ACM-Assoc Comput Mach	11660	29.2
2	International Business Machi	6264	18119	34.6	IEEE	6264	34.6	ACM-Assoc Comput Mach	4646	25.6
3	Oracle Corporation	2819	8981	31.4	ACM-Assoc Comput Mach	3282	36.5	IEEE	2819	31.4
4	Hewlett-Packard Co	1688	4334	38.9	IEEE	1688	38.9	ACM-Assoc Comput Mach	867	20.0
5	Alcatel-Lucent	1533	2913	52.6	IEEE	1533	52.6	ACM-Assoc Comput Mach	377	12.9
6	Intel Corporation	1506	3458	43.6	IEEE	1506	43.6	ACM-Assoc Comput Mach	779	22.5
7	Cadence Design Systems Inc	1342	2686	50.0	IEEE	1342	50.0	Joint IEEE and ACM	531	19.8
8	Ricoh Co. Ltd.	1324	2783	47.6	IEEE	1324	47.6	ACM-Assoc Comput Mach	437	15.7
9	Siemens Aktiengesellschaft	1171	2500	46.8	IEEE	1171	46.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	274	11.0
10	Digimarc Corp.	1161	2846	40.8	IEEE	1161	40.8	SPIE-Int Soc Opt Engineering	331	11.6
11	Applied Materials Inc.	1141	1823	62.6	IEEE	1141	62.6	AVS-AIP Am Inst Physics	159	8.7
12	Sony Corp	1133	2282	49.6	IEEE	1133	49.6	ACM-Assoc Comput Mach	352	15.4
13	AT&T Inc	1099	2682	41.0	IEEE	1099	41.0	ACM-Assoc Comput Mach	373	13.9
14	NEC Corp	1001	2005	49.9	IEEE	1001	49.9	ACM-Assoc Comput Mach	233	11.6
15	Xerox Corp	899	3315	27.1	IEEE	899	27.1	ACM-Assoc Comput Mach	871	26.3
16	Koninklijke Philips Electroni	860	2680	32.1	IEEE	860	32.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	300	11.2
17	Synopsys Inc.	844	3312	25.5	SPIE-Int Soc Opt Engineering	1125	34.0	IEEE	844	25.5
18	LSI Corporation	814	1362	59.8	IEEE	814	59.8	Joint IEEE and ACM	215	15.8
19	MICROUNITY SYSTEMS E	799	1132	70.6	IEEE	799	70.6	ACM-Assoc Comput Mach	107	9.5
20	PHOENIX SOLUTIONS INC	745	2024	36.8	IEEE	745	36.8	ISCA (International Speech Communication Association)	315	15.6
21	Motorola Solutions Inc.	718	1030	69.7	IEEE	718	69.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	31	3.0
22	Sap AG	678	2367	28.6	IEEE	678	28.6	ACM-Assoc Comput Mach	590	24.9
23	Panasonic Corporation	677	1300	52.1	IEEE	677	52.1	ACM-Assoc Comput Mach	89	6.8
24	LG Electronics Inc.	631	1120	56.3	IEEE	631	56.3	AUDIO ENGINEERING SOC, 60 E 42ND ST, NEW YORK,	103	9.2
25	Google Inc.	609	2202	27.7	ACM-Assoc Comput Mach	672	30.5	IEEE	609	27.7
26	Apple Inc	606	1539	39.4	IEEE	606	39.4	ACM-Assoc Comput Mach	393	25.5
27	Nokia Corp	601	1489	40.4	IEEE	601	40.4	IETF Internet Eng Task Force	147	9.9
28	Cisco Systems Inc.	585	2251	26.0	IEEE	585	26.0	IETF Internet Eng Task Force	453	20.1
29	Advanced Micro Devices Inc	555	1026	54.1	IEEE	555	54.1	ACM-Assoc Comput Mach	134	13.1
30	Tessera Technologies Inc.	555	897	61.9	IEEE	555	61.9	ACM-Assoc Comput Mach	78	8.7
31	STMicroelectronics	531	839	63.3	IEEE	531	63.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	55	6.6
32	Fujitsu Limited	509	1098	46.4	IEEE	509	46.4	Joint IEEE and ACM	128	11.7
33	Canon Inc	508	1163	43.7	IEEE	508	43.7	ACM-Assoc Comput Mach	165	14.2
34	ParkerVision Inc	487	993	49.0	IEEE	487	49.0	IET/IEE	259	26.1
35	Honda Motor Co. Ltd.(Giken	471	1069	44.1	IEEE	471	44.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	145	13.6
36	BT Group PLC	470	936	50.2	IEEE	470	50.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	84	9.0
37	Mitsubishi Electric Corp	470	1094	43.0	IEEE	470	43.0	ACM-Assoc Comput Mach	304	27.8
38	Honeywell International Inc.	469	882	53.2	IEEE	469	53.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	83	9.4
39	Broadcom Corp.	455	754	60.3	IEEE	455	60.3	International Telecommunication Union	53	7.0

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	General Electric Company	452	1101	41.1	IEEE	452	41.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	97	8.8
41	Texas Instruments Inc	435	587	74.1	IEEE	435	74.1	ACM-Assoc Comput Mach	32	5.5
42	Eastman Kodak Company	429	959	44.7	IEEE	429	44.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	117	12.2
43	Hitachi Ltd	422	1453	29.0	IEEE	422	29.0	ACM-Assoc Comput Mach	242	16.7
44	Sharp Corp	413	925	44.6	IEEE	413	44.6	ACM-Assoc Comput Mach	107	11.6
45	Silicon Graphics Internationa	405	1341	30.2	IEEE	405	30.2	ACM-Assoc Comput Mach	373	27.8
46	Accenture Ltd.	401	1414	28.4	IEEE	401	28.4	ACM-Assoc Comput Mach	307	21.7
47	Xilinx Inc.	393	589	66.7	IEEE	393	66.7	Joint IEEE and ACM	73	12.4
48	Georgia Institute of Technolo	363	468	77.6	IEEE	363	77.6	ISCA (International Speech Communication Association)	32	6.8
49	Massachusetts Institute of Te	359	1797	20.0	IEEE	359	20.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	229	12.7
50	Ericsson	342	745	45.9	IEEE	342	45.9	ACM-Assoc Comput Mach	87	11.7
51	Nuance Communications Inc	342	836	40.9	IEEE	342	40.9	ISCA (International Speech Communication Association)	119	14.2
52	Toshiba Corp	341	828	41.2	IEEE	341	41.2	ACM-Assoc Comput Mach	131	15.8
53	Dolby Laboratories Inc	328	565	58.1	IEEE	328	58.1	AUDIO ENGINEERING SOC, 60 E 42ND ST, NEW YORK,	128	22.7
54	Seiko Epson Corporation	326	593	55.0	IEEE	326	55.0	Joint IEEE and ACM	85	14.3
55	AVISTAR COMMUNICATI	324	652	49.7	IEEE	324	49.7	ACM-Assoc Comput Mach	182	27.9
56	Cognex Corp.	322	593	54.3	IEEE	322	54.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	87	14.7
57	NVIDIA Corp.	317	1070	29.6	ACM-Assoc Comput Mach	452	42.2	IEEE	317	29.6
58	Qualcomm Inc	302	486	62.1	IEEE	302	62.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	32	6.6
59	University of California	302	1727	17.5	IEEE	302	17.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	258	14.9
60	Raytheon Co.	301	577	52.2	IEEE	301	52.2	ISCA (International Speech Communication Association)	38	6.6
61	Adobe Systems Inc.	294	998	29.5	ACM-Assoc Comput Mach	382	38.3	IEEE	294	29.5
62	Verizon Communications Inc	293	723	40.5	IEEE	293	40.5	IETF Internet Eng Task Force	113	15.6
63	EMC Corp.	288	791	36.4	IEEE	288	36.4	ACM-Assoc Comput Mach	134	16.9
64	Commvault Systems Inc.	253	332	76.2	IEEE	253	76.2	ACM-Assoc Comput Mach	48	14.5
65	Columbia University	250	761	32.9	IEEE	250	32.9	ACM-Assoc Comput Mach	95	12.5
66	Lockheed Martin Corp.	238	531	44.8	IEEE	238	44.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	68	12.8
67	eBay Inc	222	1322	16.8	IEEE	222	16.8	ACM-Assoc Comput Mach	176	13.3
68	Netapp Inc	217	1509	14.4	ACM-Assoc Comput Mach	621	41.2	The USENIX Association	333	22.1
69	Bosch (Robert) GmbH	215	2041	10.5	Springer/Springer Wien/Springer-Verlag	221	10.8	IEEE	215	10.5
70	America Online Inc	214	1054	20.3	ACM-Assoc Comput Mach	287	27.2	IEEE	214	20.3
71	Sensable Technologies Inc	214	428	50.0	IEEE	214	50.0	ACM-Assoc Comput Mach	104	24.3
72	National Instruments Corp.	212	372	57.0	IEEE	212	57.0	ACM-Assoc Comput Mach	48	12.9
73	Tabula Inc	212	570	37.2	ACM-Assoc Comput Mach	237	41.6	IEEE	212	37.2
74	SRI International	209	440	47.5	IEEE	209	47.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	33	7.5
75	CA Technologies	208	506	41.1	IEEE	208	41.1	ACM-Assoc Comput Mach	84	16.6
76	Fuji Film Holdings Corp	205	898	22.8	ACM-Assoc Comput Mach	314	35.0	IEEE	205	22.8
77	COLLABORATION PROPE	204	305	66.9	IEEE	204	66.9	ACM-Assoc Comput Mach	45	14.8
78	Interuniversity MicroElectron	203	385	52.7	IEEE	203	52.7	Joint IEEE and ACM	72	18.7
79	Harris Corp.	202	340	59.4	IEEE	202	59.4	IETF Internet Eng Task Force	54	15.9
80	SRC Computers Inc.	202	231	87.4	IEEE	202	87.4	ACM-Assoc Comput Mach	7	3.0

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Yahoo Inc	201	1355	14.8	ACM-Assoc Comput Mach	422	31.1	IEEE	201	14.8
82	Citrix Systems Inc	200	631	31.7	IEEE	200	31.7	ACM-Assoc Comput Mach	73	11.6
83	Boeing Co. (The)	199	696	28.6	IEEE	199	28.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	86	12.4
84	DIGITAL VOICE SYSTEMS	197	207	95.2	IEEE	197	95.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	7	3.4
85	PACT XPP TECHNOLOGIE	197	318	61.9	IEEE	197	61.9	ACM-Assoc Comput Mach	30	9.4
86	Research in Motion Ltd.	193	370	52.2	IEEE	193	52.2	ACM-Assoc Comput Mach	46	12.4
87	JPMorgan	191	1657	11.5	Source Media	455	27.5	ACS-Am Chem Soc	238	14.4
88	Samsung Electronics Co Ltd	191	470	40.6	IEEE	191	40.6	ACM-Assoc Comput Mach	50	10.6
89	Nippon Telegraph & Telepho	184	402	45.8	IEEE	184	45.8	IEICE-Inst Elec Info Comm Eng	41	10.2
90	Intuitive Surgical Inc.	182	296	61.5	IEEE	182	61.5	SAGES-Society of American Gastrointestinal and Endoscopic	41	13.9
91	Altera Corp.	180	303	59.4	IEEE	180	59.4	ACM-Assoc Comput Mach	47	15.5
92	Nortel Networks Patent Portf	180	493	36.5	IEEE	180	36.5	IETF Internet Eng Task Force	106	21.5
93	Immersion Corp.	179	410	43.7	IEEE	179	43.7	ASME-Am Soc Mech Eng	43	10.5
94	Pioneer Corp.	178	241	73.9	IEEE	178	73.9	Joint IEEE and ACM	12	5.0
95	Level 3 Communications	177	780	22.7	ACM-Assoc Comput Mach	263	33.7	IEEE	177	22.7
96	ENCYCLOPAEDIA BRITA	174	972	17.9	ACM-Assoc Comput Mach	510	52.5	IEEE	174	17.9
97	Amazon.com Inc.	168	1189	14.1	ACM-Assoc Comput Mach	454	38.2	IEEE	168	14.1
98	Micron Technology Inc.	167	353	47.3	IEEE	167	47.3	ACM-Assoc Comput Mach	41	11.6
99	NCR Corp.	167	613	27.2	ACM-Assoc Comput Mach	195	31.8	IEEE	167	27.2
100	MicroStrategy Inc.	162	441	36.7	IEEE	162	36.7	ACM-Assoc Comput Mach	66	15.0

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<i>Diagnosis/Surgery/Medical Instruments</i>										
1	Medtronic Inc	1713	23885	7.2	Reed/Elsevier/Pergamon/Academic Press/Sau	5730	24.0	Lippincott Williams & Wilkins	4954	20.7
2	Covidien Ltd - Bermuda	1361	8856	15.4	IEEE	1361	15.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	1213	13.7
3	Boston Scientific Corp.	1095	33352	3.3	Reed/Elsevier/Pergamon/Academic Press/Sau	12226	36.7	Lippincott Williams & Wilkins	3204	9.6
4	Siemens Aktiengesellschaft	850	2990	28.4	IEEE	850	28.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	400	13.4
5	Dexcom Inc	690	11599	5.9	Reed/Elsevier/Pergamon/Academic Press/Sau	3550	30.6	Am Diabetese Assoc	1328	11.4
6	General Electric Company	652	3956	16.5	IEEE	652	16.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	643	16.3
7	General Hospital Corporation	439	6775	6.5	OSA-Opt Soc Amer	1783	26.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	1104	16.3
8	ArthroCare Corp.	435	3198	13.6	Reed/Elsevier/Pergamon/Academic Press/Sau	1037	32.4	IEEE	435	13.6
9	Koninklijke Philips Electroni	419	5176	8.1	Lippincott Williams & Wilkins	1074	20.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	641	12.4
10	Intuitive Surgical Inc.	405	868	46.7	IEEE	405	46.7	SAGES-Society of American Gastrointestinal and Endoscopic	210	24.2
11	Masimo Corp	394	969	40.7	IEEE	394	40.7	Lippincott Williams & Wilkins	112	11.6
12	St. Jude Medical Inc.	372	8200	4.5	Reed/Elsevier/Pergamon/Academic Press/Sau	2054	25.0	Lippincott Williams & Wilkins	1397	17.0
13	Abbott Laboratories	343	12707	2.7	Reed/Elsevier/Pergamon/Academic Press/Sau	4440	34.9	ACS-Am Chem Soc	1308	10.3
14	The Invention Science Fund	308	1018	30.3	IEEE	308	30.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	152	14.9
15	Medispectra Inc	281	755	37.2	IEEE	281	37.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	158	20.9
16	Cameron Health Inc.	265	1024	25.9	IEEE	265	25.9	Blackwell Futura	255	24.9
17	Johnson & Johnson	232	11446	2.0	Reed/Elsevier/Pergamon/Academic Press/Sau	3450	30.1	Lippincott Williams & Wilkins	1593	13.9
18	Cleveland Clinic (and Found	192	1170	16.4	Reed/Elsevier/Pergamon/Academic Press/Sau	310	26.5	IEEE	192	16.4
19	SRI International	184	283	65.0	IEEE	184	65.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	23	8.1
20	BRAINGATE CO LLC	166	433	38.3	IEEE	166	38.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	69	15.9
21	University of California	165	3940	4.2	Reed/Elsevier/Pergamon/Academic Press/Sau	780	19.8	Lippincott Williams & Wilkins	436	11.1
22	St. Louis University	141	1140	12.4	Lippincott Williams & Wilkins	243	21.3	Am Assoc Neurological Surgeons	203	17.8
23	ALGODYNE LTD	135	244	55.3	IEEE	135	55.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	41	16.8
24	Massachusetts Institute of Te	133	1776	7.5	Reed/Elsevier/Pergamon/Academic Press/Sau	444	25.0	IEEE	133	7.5
25	NEUROVISTA CORP	126	793	15.9	Reed/Elsevier/Pergamon/Academic Press/Sau	215	27.1	IEEE	126	15.9
26	University of Florida	126	619	20.4	Reed/Elsevier/Pergamon/Academic Press/Sau	136	22.0	IEEE	126	20.4
27	Duke University	123	784	15.7	Reed/Elsevier/Pergamon/Academic Press/Sau	177	22.6	IEEE	123	15.7
28	BIO CONTROL MEDICAL (	121	517	23.4	IEEE	121	23.4	Lippincott Williams & Wilkins	94	18.2
29	Stanford University	119	2257	5.3	Reed/Elsevier/Pergamon/Academic Press/Sau	413	18.3	Lippincott Williams & Wilkins	290	12.8
30	University of Illinois	105	1184	8.9	OSA-Opt Soc Amer	160	13.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	153	12.9
31	University of Texas	103	2835	3.6	Reed/Elsevier/Pergamon/Academic Press/Sau	584	20.6	Lippincott Williams & Wilkins	382	13.5
32	Smith & Nephew Plc.	102	2746	3.7	Lippincott Williams & Wilkins	664	24.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	559	20.4
33	University of Wisconsin	94	1041	9.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	127	12.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	118	11.3
34	SICEL TECHNOLOGIES IN	91	503	18.1	Reed/Elsevier/Pergamon/Academic Press/Sau	131	26.0	IEEE	91	18.1
35	International Business Machi	89	126	70.6	IEEE	89	70.6	SPIE-Int Soc Opt Engineering	10	7.9
36	Palomar Medical Technologi	84	1380	6.1	AMA-Am Medical Assoc	248	18.0	Blackwell Futura	223	16.2
37	University of Minnesota (The	84	851	9.9	Reed/Elsevier/Pergamon/Academic Press/Sau	238	28.0	Lippincott Williams & Wilkins	113	13.3
38	TEAM MEDICAL LLC	82	145	56.6	IEEE	82	56.6	SIAM PUBLICATIONS, 3600 UNIV CITY SCIENCE CENT	16	11.0
39	Vanderbilt University	82	466	17.6	IEEE	82	17.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	81	17.4

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Georgia Institute of Technolo	80	453	17.7	IEEE	80	17.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	64	14.1
41	Mayo Foundation for Medica	80	835	9.6	Reed/Elsevier/Pergamon/Academic Press/Sau	185	22.2	Lippincott Williams & Wilkins	129	15.4
42	Hitachi Ltd	79	407	19.4	IEEE	79	19.4	AVS-AIP Am Inst Physics	37	9.1
43	Sonova Holding AG	78	590	13.2	Reed/Elsevier/Pergamon/Academic Press/Sau	116	19.7	IEEE	78	13.2
44	Brown University Research F	76	486	15.6	Reed/Elsevier/Pergamon/Academic Press/Sau	105	21.6	IEEE	76	15.6
45	RHYTHMIA MEDICAL INC	76	381	19.9	Lippincott Williams & Wilkins	98	25.7	IEEE	76	19.9
46	California Institute of Techno	75	791	9.5	Reed/Elsevier/Pergamon/Academic Press/Sau	137	17.3	ACS-Am Chem Soc	95	12.0
47	North Carolina State Universi	75	472	15.9	Reed/Elsevier/Pergamon/Academic Press/Sau	127	26.9	IEEE	75	15.9
48	SPECTRUM DYNAMICS L	71	190	37.4	IEEE	71	37.4	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	18	9.5
49	Case Western Reserve Univer	69	331	20.8	IEEE	69	20.8	Lippincott Williams & Wilkins	65	19.6
50	Hewlett-Packard Co	69	195	35.4	IEEE	69	35.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	41	21.0
51	Olympus Corp.	68	853	8.0	Reed/Elsevier/Pergamon/Academic Press/Sau	271	31.8	IEEE	68	8.0
52	Toshiba Corp	66	413	16.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	80	19.4	IEEE	66	16.0
53	CLINICAL DECISION SUPP	65	233	27.9	IEEE	65	27.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	56	24.0
54	Bosch (Robert) GmbH	63	731	8.6	Springer/Springer Wien/Springer-Verlag	82	11.2	Am Diabetese Assoc	70	9.6
55	Harris Corp.	63	165	38.2	IEEE	63	38.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	38	23.0
56	AngioDynamics Inc.	62	1234	5.0	Reed/Elsevier/Pergamon/Academic Press/Sau	316	25.6	Springer/Springer Wien/Springer-Verlag	114	9.2
57	University of Michigan	62	1092	5.7	Reed/Elsevier/Pergamon/Academic Press/Sau	279	25.5	Lippincott Williams & Wilkins	71	6.5
58	University of Washington	62	851	7.3	Reed/Elsevier/Pergamon/Academic Press/Sau	140	16.5	Lippincott Williams & Wilkins	74	8.7
59	BIOCONTROL MEDICAL L	60	153	39.2	IEEE	60	39.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	22	14.4
60	Bayer AG	59	479	12.3	Reed/Elsevier/Pergamon/Academic Press/Sau	78	16.3	IEEE	59	12.3
61	DUNE MEDICAL DEVICES	59	78	75.6	IEEE	59	75.6	ACM-Assoc Comput Mach	7	9.0
62	Hansen Medical Inc	58	90	64.4	IEEE	58	64.4	Springer/Springer Wien/Springer-Verlag	31	34.4
63	Impulse Dynamics N.V.	58	544	10.7	Reed/Elsevier/Pergamon/Academic Press/Sau	119	21.9	Blackwell Futura	103	18.9
64	COMPUTERIZED MEDICA	57	148	38.5	IEEE	57	38.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	34	23.0
65	TRANSSCAN MEDICAL LT	56	81	69.1	IEEE	56	69.1	PETER PEREGRINUS LTD, MICHAEL FARADAY HOUSE,	5	6.2
66	Analogic Corporation	55	131	42.0	IEEE	55	42.0	Am Assoc Physicists Med/Am Inst Physics	16	12.2
67	University of Pennsylvania	54	1343	4.0	Reed/Elsevier/Pergamon/Academic Press/Sau	254	18.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	153	11.4
68	Stereotaxis Inc.	52	156	33.3	IEEE	52	33.3	AVS-AIP Am Inst Physics	25	16.0
69	Purdue University	51	690	7.4	Reed/Elsevier/Pergamon/Academic Press/Sau	131	19.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	60	8.7
70	Zoll Medical Corp	49	770	6.4	Lippincott Williams & Wilkins	316	41.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	156	20.3
71	FIRST OPINION CORP	48	138	34.8	IEEE	48	34.8	New York Times	32	23.2
72	Varian Medical Systems Inc.	48	719	6.7	Reed/Elsevier/Pergamon/Academic Press/Sau	179	24.9	Am Assoc Physicists Med/Am Inst Physics	161	22.4
73	WIDEMED LTD	47	173	27.2	Reed/Elsevier/Pergamon/Academic Press/Sau	51	29.5	IEEE	47	27.2
74	Braun (B.) Melsungen AG	46	111	41.4	IEEE	46	41.4	Springer/Springer Wien/Springer-Verlag	12	10.8
75	Given Imaging Ltd.	46	236	19.5	Reed/Elsevier/Pergamon/Academic Press/Sau	77	32.6	IEEE	46	19.5
76	Bard (C.R.) Inc	43	2828	1.5	Reed/Elsevier/Pergamon/Academic Press/Sau	775	27.4	Lippincott Williams & Wilkins	642	22.7
77	Deutsche Telekom AG	42	62	67.7	IEEE	42	67.7	ISO/IEC	5	8.1
78	OPTOBIONICS CORP	42	192	21.9	IEEE	42	21.9	ASSOC RESEARCH VISION OPHTHALMOLOGY INC, 123	33	17.2
79	Washington University in St.	42	449	9.4	Reed/Elsevier/Pergamon/Academic Press/Sau	96	21.4	IEEE	42	9.4
80	Immersion Corp.	40	128	31.3	IEEE	40	31.3	ASME-Am Soc Mech Eng	15	11.7

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	LUMA IMAGING CORP	40	99	40.4	IEEE	40	40.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	22	22.2
82	Medinol Ltd.	39	79	49.4	IEEE	39	49.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	24	30.4
83	Pennsylvania State University	39	355	11.0	Reed/Elsevier/Pergamon/Academic Press/Sau	67	18.9	IEEE	39	11.0
84	TECHNISCAN INC	39	125	31.2	IEEE	39	31.2	SOC EXPLORATION GEOPHYSICISTS, 8801 S YALE ST,	31	24.8
85	Wake Forest University	39	749	5.2	Reed/Elsevier/Pergamon/Academic Press/Sau	157	21.0	Lippincott Williams & Wilkins	120	16.0
86	University of Rochester	38	355	10.7	Reed/Elsevier/Pergamon/Academic Press/Sau	54	15.2	OSA-Opt Soc Amer	47	13.2
87	Columbia University	37	567	6.5	Reed/Elsevier/Pergamon/Academic Press/Sau	137	24.2	Lippincott Williams & Wilkins	115	20.3
88	ADVANCED BIO PROSTH	36	242	14.9	AVS-AIP Am Inst Physics	55	22.7	International Organization on Shape Memory and Superelastic	53	21.9
89	CAMBRIDGE HEART INC	36	186	19.4	Reed/Elsevier/Pergamon/Academic Press/Sau	47	25.3	IEEE	36	19.4
90	MAKO SURGICAL CORP	35	102	34.3	Springer/Springer Wien/Springer-Verlag	46	45.1	IEEE	35	34.3
91	Minnesota Mining and Manu	35	536	6.5	Reed/Elsevier/Pergamon/Academic Press/Sau	88	16.4	ACS-Am Chem Soc	48	9.0
92	University of Notre Dame Du	34	45	75.6	IEEE	34	75.6	Lippincott Williams & Wilkins	3	6.7
93	Honda Motor Co. Ltd.(Giken	33	161	20.5	Reed/Elsevier/Pergamon/Academic Press/Sau	46	28.6	ASME-Am Soc Mech Eng	34	21.1
94	Motorola Solutions Inc.	33	103	32.0	IEEE	33	32.0	AVS-AIP Am Inst Physics	23	22.3
95	Novartis AG	33	847	3.9	Reed/Elsevier/Pergamon/Academic Press/Sau	253	29.9	OSA-Opt Soc Amer	89	10.5
96	Nuvasive Inc	32	881	3.6	Lippincott Williams & Wilkins	603	68.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	141	16.0
97	University of Virginia (and P	32	472	6.8	Reed/Elsevier/Pergamon/Academic Press/Sau	101	21.4	Lippincott Williams & Wilkins	35	7.4
98	Caliper Life Sciences Inc.	31	434	7.1	OSA-Opt Soc Amer	144	33.2	Nature Publishing Group	44	10.1
99	Safran S.A.	31	99	31.3	IEEE	31	31.3	IOP Publishing	21	21.2
100	University of Iowa	31	236	13.1	IEEE	31	13.1	Am Assoc Physicists Med/Am Inst Physics	24	10.2



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<i>Information Storage</i>										
1	Micron Technology Inc.	5971	17927	33.3	IEEE	5971	33.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	4278	23.9
2	SanDisk Corp.	2252	3174	71.0	IEEE	2252	71.0	IEEE/JPN Soc App Phys	329	10.4
3	Hitachi Ltd	1919	3905	49.1	IEEE	1919	49.1	AVS-AIP Am Inst Physics	408	10.4
4	International Business Machi	1738	3815	45.6	IEEE	1738	45.6	ACM-Assoc Comput Mach	412	10.8
5	Macronix International Co. L	1458	2277	64.0	IEEE	1458	64.0	IEEE/JPN Soc App Phys	319	14.0
6	Seagate Technology	1316	2702	48.7	IEEE	1316	48.7	AVS-AIP Am Inst Physics	481	17.8
7	Toshiba Corp	1273	2360	53.9	IEEE	1273	53.9	AVS-AIP Am Inst Physics	254	10.8
8	INNOVATIVE SILICON SA	1051	1309	80.3	IEEE	1051	80.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	57	4.4
9	MOSAID Technologies Inc.	989	1154	85.7	IEEE	989	85.7	IEEE/JPN Soc App Phys	78	6.8
10	Texas Instruments Inc	984	1387	70.9	IEEE	984	70.9	C M P Media	125	9.0
11	Rambus Inc.	925	1281	72.2	IEEE	925	72.2	Pention Media	62	4.8
12	Renesas Electronic Corporati	756	987	76.6	IEEE	756	76.6	IEEE/JPN Soc App Phys	60	6.1
13	Oracle Corporation	643	2069	31.1	ACM-Assoc Comput Mach	714	34.5	IEEE	643	31.1
14	Intel Corporation	634	1301	48.7	IEEE	634	48.7	ACM-Assoc Comput Mach	152	11.7
15	Spansion Inc.	537	614	87.5	IEEE	537	87.5	AVS-AIP Am Inst Physics	43	7.0
16	INNOVATIVE SILICON ISI	526	643	81.8	IEEE	526	81.8	IEEE/JPN Soc App Phys	28	4.4
17	Mitsubishi Electric Corp	514	783	65.6	IEEE	514	65.6	ECMA International	87	11.1
18	Western Digital Corp.	454	757	60.0	IEEE	454	60.0	AVS-AIP Am Inst Physics	157	20.7
19	Netapp Inc	452	1429	31.6	ACM-Assoc Comput Mach	500	35.0	IEEE	452	31.6
20	Fujitsu Limited	430	744	57.8	IEEE	430	57.8	AVS-AIP Am Inst Physics	68	9.1
21	Hewlett-Packard Co	407	1095	37.2	IEEE	407	37.2	ACM-Assoc Comput Mach	174	15.9
22	ANOBIT TECHNOLOGIES	382	545	70.1	IEEE	382	70.1	The USENIX Association	23	4.2
23	Infineon Technologies AG	373	580	64.3	IEEE	373	64.3	IEEE/JPN Soc App Phys	46	7.9
24	STMicroelectronics	364	534	68.2	IEEE	364	68.2	ACM-Assoc Comput Mach	28	5.2
25	BTG Plc.	358	474	75.5	IEEE	358	75.5	IEEE/JPN Soc App Phys	48	10.1
26	Sony Corp	354	702	50.4	IEEE	354	50.4	Inst Pure Applied Physics	42	6.0
27	Samsung Electronics Co Ltd	349	643	54.3	IEEE	349	54.3	IEEE/JPN Soc App Phys	35	5.4
28	TDK Corporation	315	837	37.6	IEEE	315	37.6	AVS-AIP Am Inst Physics	209	25.0
29	Netlogic Microsystems Inc.	309	431	71.7	IEEE	309	71.7	ACM-Assoc Comput Mach	53	12.3
30	Synopsys Inc.	271	647	41.9	IEEE	271	41.9	AVS-AIP Am Inst Physics	114	17.6
31	Cypress Semiconductor Corp.	268	345	77.7	IEEE	268	77.7	AVS-AIP Am Inst Physics	12	3.5
32	Cirrus Logic Inc.	263	312	84.3	IEEE	263	84.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	12	3.8
33	LSI Corporation	259	320	80.9	IEEE	259	80.9	Joint IEEE and ACM	8	2.5
34	NEC Corp	238	476	50.0	IEEE	238	50.0	AVS-AIP Am Inst Physics	62	13.0
35	Microchip Technology Inc.	225	266	84.6	IEEE	225	84.6	Pention Media	16	6.0
36	Intertrust Technologies Corp	222	1605	13.8	ACM-Assoc Comput Mach	366	22.8	IEEE	222	13.8
37	Avid Technology Inc.	218	444	49.1	IEEE	218	49.1	ACM-Assoc Comput Mach	144	32.4
38	Altera Corp.	217	390	55.6	IEEE	217	55.6	Pention Media	110	28.2
39	Advanced Micro Devices Inc	216	495	43.6	IEEE	216	43.6	Miller Freeman	42	8.5

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	EMC Corp.	203	606	33.5	IEEE	203	33.5	ACM-Assoc Comput Mach	114	18.8
41	Microsoft Corporation	203	956	21.2	ACM-Assoc Comput Mach	317	33.2	IEEE	203	21.2
42	Pioneer Corp.	203	687	29.5	SPIE-Int Soc Opt Engineering	231	33.6	IEEE	203	29.5
43	Panasonic Corporation	190	700	27.1	IEEE	190	27.1	Inst Pure Applied Physics	88	12.6
44	Xilinx Inc.	190	238	79.8	IEEE	190	79.8	Joint IEEE and ACM	9	3.8
45	Sharp Corp	186	394	47.2	IEEE	186	47.2	AVS-AIP Am Inst Physics	45	11.4
46	Freescale Semiconductor Inc.	147	199	73.9	IEEE	147	73.9	IEEE/JPN Soc App Phys	16	8.0
47	QST HOLDINGS LLC	138	245	56.3	IEEE	138	56.3	Joint IEEE and ACM	32	13.1
48	Broadcom Corp.	132	284	46.5	IEEE	132	46.5	Miller Freeman	83	29.2
49	Marvell Technology Group Lt	130	172	75.6	IEEE	130	75.6	ECMA International	13	7.6
50	NETLIST INC	127	548	23.2	IP.com's Prior Art Database	197	35.9	JEDEC Semiconductor Standards Organization	144	26.3
51	Koninklijke Philips Electroni	107	234	45.7	IEEE	107	45.7	Am Physical Soc	16	6.8
52	Koninklijke Philips Electroni	101	225	44.9	IEEE	101	44.9	ACM-Assoc Comput Mach	47	20.9
53	Hynix Semiconductor Inc	99	115	86.1	IEEE	99	86.1	IEEE/JPN Soc App Phys	9	7.8
54	Taiwan Semiconductor Manu	97	122	79.5	IEEE	97	79.5	IEEE/JPN Soc App Phys	11	9.0
55	California Institute of Techno	96	186	51.6	IEEE	96	51.6	AAAS-Am Assoc Advancement Sci	18	9.7
56	Cisco Systems Inc.	94	197	47.7	IEEE	94	47.7	ACM-Assoc Comput Mach	44	22.3
57	National Semiconductor Corp	92	131	70.2	IEEE	92	70.2	Pention Media	4	3.1
58	Commvault Systems Inc.	91	119	76.5	IEEE	91	76.5	ACM-Assoc Comput Mach	22	18.5
59	Motorola Solutions Inc.	85	133	63.9	IEEE	85	63.9	ACM-Assoc Comput Mach	5	3.8
60	Integrated Device Technolog	79	92	85.9	IEEE	79	85.9	Pennwell Pub	6	6.5
61	Carnegie Mellon University	77	164	47.0	IEEE	77	47.0	AVS-AIP Am Inst Physics	65	39.6
62	Imation Corp.	74	171	43.3	IEEE	74	43.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	20	11.7
63	Kilopass Technologies Inc	70	70	100.0	IEEE	70	100.0			
64	QST HOLDINGS INC	70	124	56.5	IEEE	70	56.5	Joint IEEE and ACM	16	12.9
65	Monolithic System Technolo	68	86	79.1	IEEE	68	79.1	SLDRAM Consortium	8	9.3
66	Seiko Epson Corporation	68	117	58.1	IEEE	68	58.1	IEEE/JPN Soc App Phys	32	27.4
67	Elpida Memory Inc	67	87	77.0	IEEE	67	77.0	IEEE/JPN Soc App Phys	11	12.6
68	Grandis Inc.	64	315	20.3	AVS-AIP Am Inst Physics	93	29.5	Am Physical Soc	83	26.3
69	Siemens Aktiengesellschaft	59	125	47.2	IEEE	59	47.2	AVS-AIP Am Inst Physics	19	15.2
70	Cadence Design Systems Inc	58	93	62.4	IEEE	58	62.4	Pention Media	20	21.5
71	Silicon Graphics Internationa	57	93	61.3	IEEE	57	61.3	ACM-Assoc Comput Mach	21	22.6
72	Nantero Inc	56	1497	3.7	ACS-Am Chem Soc	422	28.2	AVS-AIP Am Inst Physics	298	19.9
73	TILERA CORP	56	101	55.4	IEEE	56	55.4	Joint IEEE and ACM	24	23.8
74	Arm Holdings Plc	54	88	61.4	IEEE	54	61.4	Joint IEEE and ACM	8	9.1
75	Interuniversity MicroElectron	53	85	62.4	IEEE	53	62.4	ACM-Assoc Comput Mach	6	7.1
76	TELA INNOVATIONS INC	50	116	43.1	IEEE	50	43.1	SPIE-Int Soc Opt Engineering	38	32.8
77	Sap AG	49	166	29.5	IEEE	49	29.5	ACM-Assoc Comput Mach	22	13.3
78	INVOICE TECHNOLOGY I	48	52	92.3	IEEE	48	92.3	AVS-AIP Am Inst Physics	4	7.7
79	Intersil Corp.	45	53	84.9	IEEE	45	84.9	Springer/Springer Wien/Springer-Verlag	6	11.3
80	The Invention Science Fund	45	115	39.1	IEEE	45	39.1	ACM-Assoc Comput Mach	16	13.9

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Waratek	44	120	36.7	IEEE	44	36.7	ACM-Assoc Comput Mach	28	23.3
82	Commissariat A L'Energie At	43	113	38.1	IEEE	43	38.1	AVS-AIP Am Inst Physics	20	17.7
83	Massachusetts Institute of Te	43	182	23.6	AVS-AIP Am Inst Physics	48	26.4	IEEE	43	23.6
84	JFE Holdings Inc.	42	45	93.3	IEEE	42	93.3	IEEE/JPN Soc App Phys	2	4.4
85	Round Rock Research LLC	42	54	77.8	IEEE	42	77.8	IEEE/JPN Soc App Phys	5	9.3
86	Bae Systems Plc.	41	42	97.6	IEEE	41	97.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	1	2.4
87	Halo LSI Inc.	41	54	75.9	IEEE	41	75.9	JPN Soc App Phys	7	13.0
88	Fuji Film Holdings Corp	40	157	25.5	IEEE	40	25.5	IEICE-Inst Elec Info Comm Eng	25	15.9
89	Fuji Electric Holdings Co. Lt	38	63	60.3	IEEE	38	60.3	Am Physical Soc	9	14.3
90	IMPINJ Inc	37	39	94.9	IEEE	37	94.9	IET/IEE	2	5.1
91	SANDISK TECHNOLOGIES	37	55	67.3	IEEE	37	67.3	IEEE/JPN Soc App Phys	6	10.9
92	Winbond Electronics Corp.	37	45	82.2	IEEE	37	82.2	IEEE/JPN Soc App Phys	7	15.6
93	ACORN TECHNOLOGIES I	36	68	52.9	IEEE	36	52.9	American Automatic Control Council (AACC)	28	41.2
94	Oki Electric Industry Co. Ltd.	35	62	56.5	IEEE	35	56.5	ESSCIRC/ESSDIRC European Solid State Circuits/Devices C	5	8.1
95	Canon Inc	33	186	17.7	AVS-AIP Am Inst Physics	43	23.1	IEEE	33	17.7
96	Cray Inc	33	149	22.1	ACM-Assoc Comput Mach	62	41.6	IEEE	33	22.1
97	DTVG LICENSING INC	32	40	80.0	IEEE	32	80.0	IET/IEE	4	10.0
98	Honeywell International Inc.	32	44	72.7	IEEE	32	72.7	Springer/Springer Wien/Springer-Verlag	9	20.5
99	MIPS Technologies Inc.	31	74	41.9	IEEE	31	41.9	ACM-Assoc Comput Mach	25	33.8
100	Quantum Corp.	31	110	28.2	SPIE-Int Soc Opt Engineering	44	40.0	IEEE	31	28.2

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Measuring, Testing and Control Devices</i>										
1	General Hospital Corporation	2221	25175	8.8	OSA-Opt Soc Amer	10011	39.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	3684	14.6
2	Cascade Microtech Inc.	1482	2871	51.6	IEEE	1482	51.6	Nature Publishing Group	607	21.1
3	International Business Machi	998	2155	46.3	IEEE	998	46.3	ACM-Assoc Comput Mach	163	7.6
4	Mentor Graphics Corp.	817	947	86.3	IEEE	817	86.3	Joint IEEE and ACM	49	5.2
5	Texas Instruments Inc	692	921	75.1	IEEE	692	75.1	IEEE/JPN Soc App Phys	36	3.9
6	Microsoft Corporation	688	1803	38.2	IEEE	688	38.2	ACM-Assoc Comput Mach	384	21.3
7	Applied Materials Inc.	645	1321	48.8	IEEE	645	48.8	AVS-AIP Am Inst Physics	151	11.4
8	Honeywell International Inc.	598	1831	32.7	IEEE	598	32.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	268	14.6
9	Emerson Electric Co.	540	2563	21.1	IEEE	540	21.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	327	12.8
10	Siemens Aktiengesellschaft	470	1423	33.0	IEEE	470	33.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	210	14.8
11	General Electric Company	398	3824	10.4	US Dept of Energy	762	19.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	603	15.8
12	Alcatel-Lucent	360	829	43.4	IEEE	360	43.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	45	5.4
13	Intel Corporation	343	829	41.4	IEEE	343	41.4	AVS-AIP Am Inst Physics	68	8.2
14	ParkerVision Inc	329	498	66.1	IEEE	329	66.1	IET/IEE	40	8.0
15	ABB Ltd	323	448	72.1	IEEE	323	72.1	IET/IEE	30	6.7
16	California Institute of Techno	306	2696	11.4	Reed/Elsevier/Pergamon/Academic Press/Sau	504	18.7	ACS-Am Chem Soc	332	12.3
17	Honda Motor Co. Ltd.(Giken	302	678	44.5	IEEE	302	44.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	83	12.2
18	Hewlett-Packard Co	301	1121	26.9	IEEE	301	26.9	SPIE-Int Soc Opt Engineering	117	10.4
19	Intuitive Surgical Inc.	288	564	51.1	IEEE	288	51.1	SAGES-Society of American Gastrointestinal and Endoscopic	136	24.1
20	Synopsys Inc.	288	368	78.3	IEEE	288	78.3	SPIE-Int Soc Opt Engineering	28	7.6
21	Midtronics Inc.	283	848	33.4	IEEE	283	33.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	176	20.8
22	Micron Technology Inc.	281	513	54.8	IEEE	281	54.8	AVS-AIP Am Inst Physics	33	6.4
23	NEC Corp	280	569	49.2	IEEE	280	49.2	AVS-AIP Am Inst Physics	25	4.4
24	Agilent Technologies Inc	275	883	31.1	IEEE	275	31.1	AVS-AIP Am Inst Physics	115	13.0
25	Advantest Corp.	271	345	78.6	IEEE	271	78.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	16	4.6
26	Advanced Micro Devices Inc	249	579	43.0	IEEE	249	43.0	SPIE-Int Soc Opt Engineering	69	11.9
27	University of Illinois	229	2520	9.1	ACS-Am Chem Soc	381	15.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	322	12.8
28	Georgia Institute of Technolo	227	585	38.8	IEEE	227	38.8	OSA-Opt Soc Amer	115	19.7
29	Schlumberger Ltd.	220	2872	7.7	SOC EXPLORATION GEOPHYSICISTS, 88	612	21.3	SOC PETROLEUM ENG, 222 PALISADES CREEK DR., RI	329	11.5
30	Ericsson	218	352	61.9	IEEE	218	61.9	IETF Internet Eng Task Force	21	6.0
31	Koninklijke Philips Electroni	216	1215	17.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	321	26.4	Society of Magnetic Resonance in Medicine (SMRM)	260	21.4
32	Boeing Co. (The)	210	658	31.9	IEEE	210	31.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	64	9.7
33	Fujitsu Limited	208	387	53.7	IEEE	208	53.7	IETF Internet Eng Task Force	30	7.8
34	Lockheed Martin Corp.	208	1090	19.1	IEEE	208	19.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	132	12.1
35	Panasonic Corporation	205	530	38.7	IEEE	205	38.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	60	11.3
36	Hitachi Ltd	203	935	21.7	IEEE	203	21.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	149	15.9
37	LTX-Credence Corp	203	343	59.2	IEEE	203	59.2	AVS-AIP Am Inst Physics	41	12.0
38	University of Texas	203	1274	15.9	IEEE	203	15.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	180	14.1
39	Rockwell Automation Inc	195	340	57.4	IEEE	195	57.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	49	14.4

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40	LSI Corporation	194	314	61.8	IEEE	194	61.8	Joint IEEE and ACM	12	3.8
41	HRL Laboratories LLC	190	421	45.1	IEEE	190	45.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	56	13.3
42	Massachusetts Institute of Te	185	1844	10.0	Reed/Elsevier/Pergamon/Academic Press/Sau	260	14.1	ACS-Am Chem Soc	206	11.2
43	Samsung Electronics Co Ltd	183	310	59.0	IEEE	183	59.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	24	7.7
44	Toshiba Corp	180	801	22.5	IEEE	180	22.5	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	168	21.0
45	University of California	180	2968	6.1	Reed/Elsevier/Pergamon/Academic Press/Sau	478	16.1	ACS-Am Chem Soc	389	13.1
46	Current Communications Gro	178	197	90.4	IEEE	178	90.4	<std> CLC SC 105A	10	5.1
47	Immersion Corp.	173	411	42.1	IEEE	173	42.1	ASME-Am Soc Mech Eng	38	9.2
48	Stanford University	173	1356	12.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	229	16.9	IEEE	173	12.8
49	Mitsubishi Electric Corp	172	322	53.4	IEEE	172	53.4	ACM-Assoc Comput Mach	17	5.3
50	Cypress Semiconductor Corp.	171	234	73.1	IEEE	171	73.1	Joint IEEE and ACM	12	5.1
51	Infineon Technologies AG	170	279	60.9	IEEE	170	60.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	37	13.3
52	Motorola Solutions Inc.	161	1354	11.9	ACS-Am Chem Soc	491	36.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	208	15.4
53	Nintendo Co. Ltd.	154	427	36.1	IEEE	154	36.1	ACM-Assoc Comput Mach	115	26.9
54	Invensys Plc.	150	1402	10.7	Trade Press Publishing Corp	262	18.7	I S A-INSTRUM SYS AUTOMATION SOC	233	16.6
55	Analog Devices Inc.	146	209	69.9	IEEE	146	69.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	16	7.7
56	KLA-Tencor Corp.	144	2709	5.3	SPIE-Int Soc Opt Engineering	624	23.0	OSA-Opt Soc Amer	544	20.1
57	Xilinx Inc.	143	160	89.4	IEEE	143	89.4	United Business Media	4	2.5
58	Sony Corp	142	324	43.8	IEEE	142	43.8	ACS-Am Chem Soc	28	8.6
59	Xerox Corp	142	457	31.1	IEEE	142	31.1	AVS-AIP Am Inst Physics	50	10.9
60	Qualcomm Inc	141	281	50.2	IEEE	141	50.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	31	11.0
61	United States Navy	141	1018	13.9	ACS-Am Chem Soc	179	17.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	170	16.7
62	Cadence Design Systems Inc	140	218	64.2	IEEE	140	64.2	Joint IEEE and ACM	24	11.0
63	Cisco Systems Inc.	136	749	18.2	IETF Internet Eng Task Force	242	32.3	Network Working Group RFC	145	19.4
64	Duke University	136	576	23.6	IEEE	136	23.6	OSA-Opt Soc Amer	86	14.9
65	NANONEXUS INC	135	205	65.9	IEEE	135	65.9	AVS-AIP Am Inst Physics	21	10.2
66	Abbott Laboratories	134	3725	3.6	ACS-Am Chem Soc	1359	36.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	1082	29.0
67	Schweitzer Engineering Labo	132	149	88.6	IEEE	132	88.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	7	4.7
68	AT&T Inc	126	219	57.5	IEEE	126	57.5	ACM-Assoc Comput Mach	12	5.5
69	Fluidigm Corp	125	880	14.2	ACS-Am Chem Soc	144	16.4	IEEE	125	14.2
70	Halliburton Co. (Holding)	124	1911	6.5	SOC PETROLEUM ENG, 222 PALISADES	649	34.0	SPWLA-Society of Petrophysicists and Well Log Analysts	435	22.8
71	Oracle Corporation	122	203	60.1	IEEE	122	60.1	ACM-Assoc Comput Mach	17	8.4
72	Raytheon Co.	122	416	29.3	IEEE	122	29.3	SPIE-Int Soc Opt Engineering	43	10.3
73	TROXLER ELECTRONIC L	122	290	42.1	IEEE	122	42.1	AMER SOC TESTING MATERIALS, 100 BARR HARBOR	75	25.9
74	SRI International	120	458	26.2	IEEE	120	26.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	59	12.9
75	Nokia Corp	119	196	60.7	IEEE	119	60.7	ACM-Assoc Comput Mach	11	5.6
76	University of Michigan	119	557	21.4	IEEE	119	21.4	ACS-Am Chem Soc	100	18.0
77	Battelle Memorial Institute	116	527	22.0	IEEE	116	22.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	100	19.0
78	STMicroelectronics	111	171	64.9	IEEE	111	64.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	22	12.9
79	Marvell Technology Group Lt	110	149	73.8	IEEE	110	73.8	IEEE/IETF-Internet Engineering Task Force	27	18.1
80	Michigan State University	110	796	13.8	OSA-Opt Soc Amer	126	15.8	IEEE	110	13.8

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	University of Wisconsin	110	809	13.6	Reed/Elsevier/Pergamon/Academic Press/Sau	116	14.3	IEEE	110	13.6
82	BIOSCALE INC	108	685	15.8	Reed/Elsevier/Pergamon/Academic Press/Sau	169	24.7	ACS-Am Chem Soc	151	22.0
83	ICOSYSTEM CORP	108	137	78.8	IEEE	108	78.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	6	4.4
84	Nortel Networks Patent Portf	106	213	49.8	IEEE	106	49.8	IETF Internet Eng Task Force	17	8.0
85	Purdue University	103	785	13.1	Reed/Elsevier/Pergamon/Academic Press/Sau	165	21.0	ACS-Am Chem Soc	144	18.3
86	Synaptics Inc.	103	157	65.6	IEEE	103	65.6	IOP Publishing	18	11.5
87	Teradyne Inc.	103	218	47.2	IEEE	103	47.2	ASME-Am Soc Mech Eng	33	15.1
88	Bosch (Robert) GmbH	99	392	25.3	IEEE	99	25.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	51	13.0
89	Northrop Grumman Corp	98	241	40.7	IEEE	98	40.7	OSA-Opt Soc Amer	36	14.9
90	Caterpillar Inc.	96	242	39.7	IEEE	96	39.7	SAE-Society of Automobile Engineers	48	19.8
91	General Motors Corp	96	214	44.9	IEEE	96	44.9	OSA-Opt Soc Amer	25	11.7
92	Broadcom Corp.	95	125	76.0	IEEE	95	76.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	5	4.0
93	Elster Group GmbH	93	118	78.8	IEEE	93	78.8	Pention Media	10	8.5
94	University of Southern Califo	92	145	63.4	IEEE	92	63.4	Springer/Springer Wien/Springer-Verlag	12	8.3
95	Commissariat A L'Energie At	86	389	22.1	Reed/Elsevier/Pergamon/Academic Press/Sau	96	24.7	IEEE	86	22.1
96	American Express Co.	85	396	21.5	RFID Journal/YGS Group	87	22.0	IEEE	85	21.5
97	CA Technologies	85	139	61.2	IEEE	85	61.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	27	19.4
98	Nippon Telegraph & Telepho	84	176	47.7	IEEE	84	47.7	OSA-Opt Soc Amer	13	7.4
99	Sanken Electric Co. Ltd.	84	115	73.0	IEEE	84	73.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	19	16.5
100	Seagate Technology	84	169	49.7	IEEE	84	49.7	AVS-AIP Am Inst Physics	22	13.0

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Nuclear/X-Ray/Radiant Energy</i>										
1	Koninklijke Philips Electroni	245	592	41.4	IEEE	245	41.4	SOC NUCLEAR MEDICINE INC, 1850 SAMUEL MORSE	80	13.5
2	General Electric Company	196	845	23.2	IEEE	196	23.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	113	13.4
3	Siemens Aktiengesellschaft	149	668	22.3	IEEE	149	22.3	OSA-Opt Soc Amer	75	11.2
4	Dynasil Corporation of Ameri	118	226	52.2	IEEE	118	52.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	21	9.3
5	Stanford University	94	487	19.3	AVS-AIP Am Inst Physics	109	22.4	IEEE	94	19.3
6	Medispectra Inc	82	223	36.8	IEEE	82	36.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	46	20.6
7	Virgin Islands Microsystems	75	441	17.0	AVS-AIP Am Inst Physics	87	19.7	IEEE	75	17.0
8	INTEGRATED SENSORS L	73	88	83.0	IEEE	73	83.0	SPIE-Int Soc Opt Engineering	5	5.7
9	University of California	72	994	7.2	Reed/Elsevier/Pergamon/Academic Press/Sau	190	19.1	AVS-AIP Am Inst Physics	158	15.9
10	TROXLER ELECTRONIC L	64	116	55.2	IEEE	64	55.2	AMER SOC TESTING MATERIALS, 100 BARR HARBOR	34	29.3
11	University of Texas	59	246	24.0	IEEE	59	24.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	27	11.0
12	SPECTRUM DYNAMICS L	51	156	32.7	IEEE	51	32.7	IOP Publishing	14	9.0
13	Alcatel-Lucent	49	153	32.0	IEEE	49	32.0	AVS-AIP Am Inst Physics	28	18.3
14	SICEL TECHNOLOGIES IN	48	354	13.6	Reed/Elsevier/Pergamon/Academic Press/Sau	74	20.9	IEEE	48	13.6
15	University of Michigan	48	204	23.5	IEEE	48	23.5	ACS-Am Chem Soc	21	10.3
16	Boston University	47	79	59.5	IEEE	47	59.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	14	17.7
17	Hamamatsu Photonics KK	46	224	20.5	Reed/Elsevier/Pergamon/Academic Press/Sau	72	32.1	IEEE	46	20.5
18	Advio Biosciences Inc.	44	663	6.6	ACS-Am Chem Soc	350	52.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	120	18.1
19	Hitachi Ltd	44	851	5.2	AVS-AIP Am Inst Physics	192	22.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	123	14.5
20	University of Pennsylvania	44	113	38.9	IEEE	44	38.9	AVS-AIP Am Inst Physics	15	13.3
21	Stichting voor de Technische	41	119	34.5	IEEE	41	34.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	39	32.8
22	California Institute of Techno	40	270	14.8	AVS-AIP Am Inst Physics	54	20.0	IEEE	40	14.8
23	Cymer Inc.	39	952	4.1	AVS-AIP Am Inst Physics	397	41.7	SPIE-Int Soc Opt Engineering	159	16.7
24	Brookhaven Science Associat	38	118	32.2	IEEE	38	32.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	21	17.8
25	Rohm Co. Ltd.	38	594	6.4	ACS-Am Chem Soc	312	52.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	101	17.0
26	Michigan State University	36	465	7.7	OSA-Opt Soc Amer	87	18.7	Am Physical Soc	75	16.1
27	University of Washington	36	347	10.4	Reed/Elsevier/Pergamon/Academic Press/Sau	103	29.7	IEEE	36	10.4
28	International Business Machi	35	193	18.1	AVS-AIP Am Inst Physics	64	33.2	IEEE	35	18.1
29	Applied Materials Inc.	34	501	6.8	AVS-AIP Am Inst Physics	153	30.5	SPIE-Int Soc Opt Engineering	94	18.8
30	Purdue University	34	593	5.7	Reed/Elsevier/Pergamon/Academic Press/Sau	138	23.3	ACS-Am Chem Soc	123	20.7
31	BOARD OF TRUSTEES OP	33	369	8.9	OSA-Opt Soc Amer	79	21.4	Am Physical Soc	66	17.9
32	DIGIRAD CORP	33	97	34.0	IEEE	33	34.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	18	18.6
33	Micron Technology Inc.	32	195	16.4	AVS-AIP Am Inst Physics	40	20.5	IEEE	32	16.4
34	Massachusetts Institute of Te	29	440	6.6	ACS-Am Chem Soc	92	20.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	68	15.5
35	United States Navy	28	242	11.6	Reed/Elsevier/Pergamon/Academic Press/Sau	78	32.2	ACS-Am Chem Soc	52	21.5
36	JEFFERSON SCIENCE ASS	27	37	73.0	IEEE	27	73.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	9	24.3
37	KLA-Tencor Corp.	27	721	3.7	SPIE-Int Soc Opt Engineering	207	28.7	AVS-AIP Am Inst Physics	172	23.9
38	XY LLC	26	324	8.0	AMER SOC ANIMAL SCIENCE, 1111 NOR	71	21.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	70	21.6
39	Anritsu Corp.	25	35	71.4	IEEE	25	71.4	IET/IEE	5	14.3

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Duke University	24	133	18.0	OSA-Opt Soc Amer	29	21.8	IEEE	24	18.0
41	Honeywell International Inc.	23	181	12.7	Reed/Elsevier/Pergamon/Academic Press/Sau	40	22.1	OSA-Opt Soc Amer	24	13.3
42	Agilent Technologies Inc	22	402	5.5	ACS-Am Chem Soc	84	20.9	AVS-AIP Am Inst Physics	77	19.2
43	Carl-Zeiss Stiftung	22	1218	1.8	AVS-AIP Am Inst Physics	353	29.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	308	25.3
44	TECHNISCAN INC	22	56	39.3	IEEE	22	39.3	SOC EXPLORATION GEOPHYSICISTS, 8801 S YALE ST,	12	21.4
45	Washington University in St.	21	76	27.6	Reed/Elsevier/Pergamon/Academic Press/Sau	21	27.6	IEEE	21	27.6
46	William Marsh Rice Universi	21	203	10.3	AVS-AIP Am Inst Physics	39	19.2	OSA-Opt Soc Amer	28	13.8
47	Commissariat A L'Energie At	20	167	12.0	Reed/Elsevier/Pergamon/Academic Press/Sau	37	22.2	OSA-Opt Soc Amer	27	16.2
48	Xerox Corp	20	136	14.7	IEEE	20	14.7	MRS-Materials Research Soc	18	13.2
49	BOARD OF REGENTS OF T	19	128	14.8	AVS-AIP Am Inst Physics	48	37.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	32	25.0
50	Canon Inc	19	403	4.7	AVS-AIP Am Inst Physics	144	35.7	ACS-Am Chem Soc	62	15.4
51	Qinetiq Group Ltd	19	90	21.1	OSA-Opt Soc Amer	25	27.8	SPIE-Int Soc Opt Engineering	25	27.8
52	STILL RIVER SYSTEMS IN	19	92	20.7	AVS-AIP Am Inst Physics	19	20.7	IEEE	19	20.7
53	Zyvex Corp	19	70	27.1	AVS-AIP Am Inst Physics	22	31.4	IEEE	19	27.1
54	Covidien Ltd - Bermuda	18	55	32.7	IEEE	18	32.7	Lippincott Williams & Wilkins	9	16.4
55	L-3 Communications Holdin	18	63	28.6	IEEE	18	28.6	SPIE-Int Soc Opt Engineering	17	27.0
56	Sionex Corp	18	183	9.8	Reed/Elsevier/Pergamon/Academic Press/Sau	74	40.4	AVS-AIP Am Inst Physics	19	10.4
57	University of Alabama	18	241	7.5	Reed/Elsevier/Pergamon/Academic Press/Sau	99	41.1	Blackwell Futura	27	11.2
58	Panasonic Corporation	17	98	17.3	Inst Pure Applied Physics	24	24.5	IEEE	17	17.3
59	Waters Corp	17	419	4.1	ACS-Am Chem Soc	131	31.3	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	103	24.6
60	Affymetrix Inc.	16	1102	1.5	Reed/Elsevier/Pergamon/Academic Press/Sau	279	25.3	ACS-Am Chem Soc	174	15.8
61	Cornell University	16	243	6.6	ACS-Am Chem Soc	50	20.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	36	14.8
62	Lockheed Martin Corp.	16	185	8.6	Reed/Elsevier/Pergamon/Academic Press/Sau	29	15.7	ACS-Am Chem Soc	22	11.9
63	Medtronic Inc	16	183	8.7	Reed/Elsevier/Pergamon/Academic Press/Sau	35	19.1	Lippincott Williams & Wilkins	21	11.5
64	SAN DIEGO STATE UNIVE	16	20	80.0	IEEE	16	80.0	SOC NUCLEAR MEDICINE INC, 1850 SAMUEL MORSE	2	10.0
65	Charles Stark Draper Laborat	15	189	7.9	Reed/Elsevier/Pergamon/Academic Press/Sau	62	32.8	AVS-AIP Am Inst Physics	18	9.5
66	HAMMERSMITH IMANET	15	19	78.9	IEEE	15	78.9	IOP Publishing	2	10.5
67	Nippon Telegraph & Telepho	15	34	44.1	IEEE	15	44.1	IET/IEE	6	17.6
68	Schlumberger Ltd.	15	126	11.9	Reed/Elsevier/Pergamon/Academic Press/Sau	28	22.2	ACS-Am Chem Soc	27	21.4
69	The Invention Science Fund	15	174	8.6	AVS-AIP Am Inst Physics	34	19.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	21	12.1
70	University of Illinois	15	188	8.0	ACS-Am Chem Soc	42	22.3	AVS-AIP Am Inst Physics	32	17.0
71	University of Wisconsin	15	238	6.3	ACS-Am Chem Soc	52	21.8	AVS-AIP Am Inst Physics	41	17.2
72	Varian Medical Systems Inc.	15	143	10.5	Reed/Elsevier/Pergamon/Academic Press/Sau	29	20.3	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	16	11.2
73	FEI Co.	14	222	6.3	AVS-AIP Am Inst Physics	77	34.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	53	23.9
74	Intel Corporation	14	216	6.5	ACS-Am Chem Soc	44	20.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	29	13.4
75	Motorola Solutions Inc.	14	27	51.9	IEEE	14	51.9	ACS-Am Chem Soc	4	14.8
76	National Institute of Radiolog	14	18	77.8	IEEE	14	77.8	Am Assoc Physicists Med/Am Inst Physics	2	11.1
77	AMERICAN SCIENCE & E	13	34	38.2	IEEE	13	38.2	OSA-Opt Soc Amer	4	11.8
78	Corning Inc.	13	85	15.3	OSA-Opt Soc Amer	23	27.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	19	22.4
79	University of Central Florida	13	92	14.1	AVS-AIP Am Inst Physics	26	28.3	IEEE	13	14.1
80	ASML Holding NV	12	188	6.4	SPIE-Int Soc Opt Engineering	73	38.8	AVS-AIP Am Inst Physics	26	13.8



## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	AT&T Inc	12	16	75.0	IEEE	12	75.0	OSA-Opt Soc Amer	3	18.8
82	Compagnie de Saint-Gobain	12	37	32.4	Reed/Elsevier/Pergamon/Academic Press/Sau	13	35.1	IEEE	12	32.4
83	CRYSTAL PHOTONICS IN	12	17	70.6	IEEE	12	70.6	AVS-AIP Am Inst Physics	3	17.6
84	GAMMA MEDICA-IDEAS I	12	15	80.0	IEEE	12	80.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	2	13.3
85	GUZIK TECHNICAL ENTE	12	32	37.5	IEEE	12	37.5	AVS-AIP Am Inst Physics	6	18.8
86	IDC Llc	12	33	36.4	IEEE	12	36.4	SID-Society for Information Display	6	18.2
87	Korea Advanced Institute for	12	20	60.0	IEEE	12	60.0	IET/IEE	3	15.0
88	MICROSAIC SYSTEMS LT	12	73	16.4	Reed/Elsevier/Pergamon/Academic Press/Sau	18	24.7	ACS-Am Chem Soc	14	19.2
89	NEXGEN SEMI HOLDING I	12	371	3.2	AVS-AIP Am Inst Physics	245	66.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	48	12.9
90	Nippon Kayaku Co. Ltd.	12	70	17.1	AVS-AIP Am Inst Physics	18	25.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	13	18.6
91	Safran S.A.	12	49	24.5	IEEE	12	24.5	SPIE-Int Soc Opt Engineering	11	22.4
92	SYMMETRICA LTD	12	19	63.2	IEEE	12	63.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	6	31.6
93	Toshiba Corp	12	188	6.4	AVS-AIP Am Inst Physics	39	20.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	29	15.4
94	University of Hong Kong	12	58	20.7	IEEE	12	20.7	SPIE-Int Soc Opt Engineering	11	19.0
95	UT-Battelle LLC	12	247	4.9	Reed/Elsevier/Pergamon/Academic Press/Sau	57	23.1	ACS-Am Chem Soc	41	16.6
96	Axcelis Technologies Inc.	11	32	34.4	IEEE	11	34.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	10	31.3
97	Boeing Co. (The)	11	89	12.4	Reed/Elsevier/Pergamon/Academic Press/Sau	29	32.6	IEEE	11	12.4
98	Brown University Research F	11	182	6.0	AVS-AIP Am Inst Physics	70	38.5	Am Physical Soc	33	18.1
99	Eastman Kodak Company	11	77	14.3	SPIE-Int Soc Opt Engineering	15	19.5	IEEE	11	14.3
100	Electronics and Telecommuni	11	39	28.2	IEEE	11	28.2	AVS-AIP Am Inst Physics	5	12.8

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Optics/Photography/Electrophotography</i>										
1	Infinera Corporation	1289	2074	62.2	IEEE	1289	62.2	IET/IEE	394	19.0
2	Qualcomm Inc	817	2129	38.4	IEEE	817	38.4	SID-Society for Information Display	422	19.8
3	IDC Llc	614	1527	40.2	IEEE	614	40.2	SID-Society for Information Display	272	17.8
4	Alcatel-Lucent	588	1940	30.3	IEEE	588	30.3	IET/IEE	297	15.3
5	Hoya Corp	513	1241	41.3	IEEE	513	41.3	AVS-AIP Am Inst Physics	252	20.3
6	Corning Inc.	511	2292	22.3	IEEE	511	22.3	OSA-Opt Soc Amer	505	22.0
7	General Hospital Corporation	494	5783	8.5	OSA-Opt Soc Amer	2354	40.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	848	14.7
8	Massachusetts Institute of Te	460	1880	24.5	IEEE	460	24.5	AVS-AIP Am Inst Physics	306	16.3
9	Lightsmyth Technologies Inc	455	943	48.3	IEEE	455	48.3	OSA-Opt Soc Amer	215	22.8
10	Kotura Inc	413	981	42.1	IEEE	413	42.1	IET/IEE	267	27.2
11	Synopsys Inc.	405	3007	13.5	SPIE-Int Soc Opt Engineering	1438	47.8	Inst Pure Applied Physics	462	15.4
12	Dainippon Screen Manufactu	371	1351	27.5	IEEE	371	27.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	215	15.9
13	Intel Corporation	354	920	38.5	IEEE	354	38.5	SPIE-Int Soc Opt Engineering	157	17.1
14	LG Nortel Co Ltd	344	1102	31.2	OSA-Opt Soc Amer	513	46.6	IEEE	344	31.2
15	Cheetah Omni LLC	286	938	30.5	IEEE	286	30.5	OSA-Opt Soc Amer	192	20.5
16	JDS Uniphase Corp	269	864	31.1	IEEE	269	31.1	OSA-Opt Soc Amer	187	21.6
17	Nikon Corp.	264	1702	15.5	SPIE-Int Soc Opt Engineering	863	50.7	IEEE	264	15.5
18	SiPix Imaging Inc.	256	903	28.3	SID-Society for Information Display	405	44.9	IEEE	256	28.3
19	Minnesota Mining and Manu	234	2877	8.1	OSA-Opt Soc Amer	468	16.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	270	9.4
20	Siemens Aktiengesellschaft	213	540	39.4	IEEE	213	39.4	IET/IEE	43	8.0
21	United States of America De	201	568	35.4	IEEE	201	35.4	IET/IEE	149	26.2
22	Finisar Corp	197	571	34.5	IEEE	197	34.5	SPIE-Int Soc Opt Engineering	90	15.8
23	Texas Instruments Inc	197	777	25.4	IEEE	197	25.4	AVS-AIP Am Inst Physics	127	16.3
24	Fujitsu Limited	191	818	23.3	IEEE	191	23.3	IET/IEE	149	18.2
25	University of California	185	990	18.7	IEEE	185	18.7	OSA-Opt Soc Amer	142	14.3
26	Princeton University	174	376	46.3	IEEE	174	46.3	AVS-AIP Am Inst Physics	44	11.7
27	Nortel Networks Patent Portf	169	344	49.1	IEEE	169	49.1	OSA-Opt Soc Amer	59	17.2
28	STEYPHI SERVICES DE LL	165	307	53.7	IEEE	165	53.7	OSA-Opt Soc Amer	66	21.5
29	Electronics and Telecommuni	163	315	51.7	IEEE	163	51.7	IET/IEE	44	14.0
30	OMNIGUIDE COMMUNIC	159	484	32.9	IEEE	159	32.9	OSA-Opt Soc Amer	95	19.6
31	Sumitomo Electric Industries	151	749	20.2	IET/IEE	208	27.8	OSA-Opt Soc Amer	190	25.4
32	LIGHTCHIP INC	146	439	33.3	IEEE	146	33.3	IET/IEE	113	25.7
33	Emcore Corp.	142	158	89.9	IEEE	142	89.9	IET/IEE	8	5.1
34	International Business Machi	133	1182	11.3	SPIE-Int Soc Opt Engineering	331	28.0	IEEE	133	11.3
35	Nippon Telegraph & Telepho	125	480	26.0	IET/IEE	130	27.1	IEEE	125	26.0
36	PTS Corporation	125	232	53.9	IEEE	125	53.9	OSA-Opt Soc Amer	34	14.7
37	Stanford University	125	817	15.3	OSA-Opt Soc Amer	221	27.1	IEEE	125	15.3
38	Cubic Wafer Inc	124	220	56.4	IEEE	124	56.4	SPIE-Int Soc Opt Engineering	42	19.1
39	Georgia Institute of Technolo	123	345	35.7	IEEE	123	35.7	OSA-Opt Soc Amer	77	22.3

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	California Institute of Techno	122	1022	11.9	OSA-Opt Soc Amer	372	36.4	IEEE	122	11.9
41	PIXTRONIX INC	122	595	20.5	SID-Society for Information Display	216	36.3	IEEE	122	20.5
42	Furukawa Electric Co. Ltd.	121	483	25.1	OSA-Opt Soc Amer	145	30.0	IEEE	121	25.1
43	Honeywell International Inc.	119	392	30.4	IEEE	119	30.4	SPIE-Int Soc Opt Engineering	57	14.5
44	Hewlett-Packard Co	116	629	18.4	IEEE	116	18.4	OSA-Opt Soc Amer	76	12.1
45	Motorola Solutions Inc.	114	410	27.8	IEEE	114	27.8	AVS-AIP Am Inst Physics	93	22.7
46	Prysmian SPA	113	413	27.4	IET/IEE	117	28.3	IEEE	113	27.4
47	Micron Technology Inc.	112	1197	9.4	SPIE-Int Soc Opt Engineering	270	22.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	178	14.9
48	Xerox Corp	110	867	12.7	ACS-Am Chem Soc	149	17.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	129	14.9
49	NEC Corp	108	604	17.9	IEEE	108	17.9	TECHNICAL ASSOC PHOTOPOLYMERS,JAPAN, CHIBA	75	12.4
50	KOTUSA INC	94	228	41.2	IEEE	94	41.2	IET/IEE	57	25.0
51	Calient Technologies Inc.	91	171	53.2	IEEE	91	53.2	OSA-Opt Soc Amer	27	15.8
52	CIRREX SYSTEMS LLC	91	253	36.0	IEEE	91	36.0	IET/IEE	36	14.2
53	Ericsson	89	187	47.6	IEEE	89	47.6	IET/IEE	42	22.5
54	ASML Holding NV	88	3488	2.5	SPIE-Int Soc Opt Engineering	1333	38.2	AVS-AIP Am Inst Physics	571	16.4
55	Mitsubishi Electric Corp	85	272	31.3	IEEE	85	31.3	SPIE-Int Soc Opt Engineering	51	18.8
56	University of Colorado ( The	84	600	14.0	OSA-Opt Soc Amer	236	39.3	IEEE	84	14.0
57	Applied Materials Inc.	79	449	17.6	SPIE-Int Soc Opt Engineering	97	21.6	IEEE	79	17.6
58	Lockheed Martin Corp.	79	513	15.4	OSA-Opt Soc Amer	179	34.9	IEEE	79	15.4
59	Northrop Grumman Corp	78	251	31.1	IEEE	78	31.1	OSA-Opt Soc Amer	57	22.7
60	Eastman Kodak Company	76	973	7.8	ACS-Am Chem Soc	131	13.5	SPIE-Int Soc Opt Engineering	124	12.7
61	Siemens Enterprise Communi	76	137	55.5	IEEE	76	55.5	ACM-Assoc Comput Mach	21	15.3
62	The Invention Science Fund	76	273	27.8	IEEE	76	27.8	Am Physical Soc	35	12.8
63	Neophotonics Corporation	73	228	32.0	IEEE	73	32.0	OSA-Opt Soc Amer	47	20.6
64	Hitachi Ltd	71	372	19.1	IEEE	71	19.1	AVS-AIP Am Inst Physics	51	13.7
65	OMM INC	69	177	39.0	IEEE	69	39.0	SPIE-Int Soc Opt Engineering	43	24.3
66	TE Connectivity Ltd	69	128	53.9	IEEE	69	53.9	IWCS Inc.	14	10.9
67	NANOOPTO CORP	68	327	20.8	AVS-AIP Am Inst Physics	111	33.9	IEEE	68	20.8
68	Prime View International Co	67	2256	3.0	SID-Society for Information Display	1336	59.2	Nature Publishing Group	168	7.4
69	Columbia University	65	163	39.9	IEEE	65	39.9	AVS-AIP Am Inst Physics	20	12.3
70	Analog Devices Inc.	64	121	52.9	IEEE	64	52.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	23	19.0
71	Adobe Systems Inc.	63	162	38.9	IEEE	63	38.9	ACM-Assoc Comput Mach	45	27.8
72	Panasonic Corporation	63	501	12.6	SPIE-Int Soc Opt Engineering	106	21.2	IEEE	63	12.6
73	General Electric Company	62	308	20.1	IEEE	62	20.1	OSA-Opt Soc Amer	61	19.8
74	HRL Laboratories LLC	61	156	39.1	IEEE	61	39.1	OSA-Opt Soc Amer	28	17.9
75	Canon Inc	60	865	6.9	SPIE-Int Soc Opt Engineering	169	19.5	OSA-Opt Soc Amer	111	12.8
76	Current Communications Gro	60	67	89.6	IEEE	60	89.6	ANSI/IEEE	2	3.0
77	Oclaro Inc	60	233	25.8	IEEE	60	25.8	OSA-Opt Soc Amer	56	24.0
78	Iowa State University	59	139	42.4	IEEE	59	42.4	AVS-AIP Am Inst Physics	13	9.4
79	University of Texas	58	523	11.1	AVS-AIP Am Inst Physics	84	16.1	OSA-Opt Soc Amer	65	12.4
80	Volcano Corporation	58	128	45.3	IEEE	58	45.3	IET/IEE	20	15.6

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Agilent Technologies Inc	56	270	20.7	IEEE	56	20.7	OSA-Opt Soc Amer	50	18.5
82	CONFLUENT PHOTONICS	56	181	30.9	IEEE	56	30.9	IET/IEE	41	22.7
83	LSI Corporation	56	194	28.9	SPIE-Int Soc Opt Engineering	58	29.9	IEEE	56	28.9
84	Fujikara Ltd.	54	322	16.8	OSA-Opt Soc Amer	91	28.3	IEICE-Inst Elec Info Comm Eng	65	20.2
85	MICRON OPTICS INC	54	153	35.3	IEEE	54	35.3	OSA-Opt Soc Amer	39	25.5
86	United States Navy	54	299	18.1	OSA-Opt Soc Amer	67	22.4	IEEE	54	18.1
87	Olympus Corp.	53	338	15.7	OSA-Opt Soc Amer	106	31.4	IEEE	53	15.7
88	MOLECULAR OPTOELEC	51	257	19.8	IET/IEE	79	30.7	OSA-Opt Soc Amer	64	24.9
89	NETWORK PHOTONICS IN	51	110	46.4	IEEE	51	46.4	OSA-Opt Soc Amer	24	21.8
90	VASCULAR IMAGING CO	51	93	54.8	IEEE	51	54.8	IET/IEE	26	28.0
91	OLUMA INC	49	215	22.8	OSA-Opt Soc Amer	84	39.1	IEEE	49	22.8
92	Microsoft Corporation	48	233	20.6	ACM-Assoc Comput Mach	123	52.8	IEEE	48	20.6
93	Xtera Communications Inc.	47	109	43.1	IEEE	47	43.1	IET/IEE	30	27.5
94	AT&T Inc	46	66	69.7	IEEE	46	69.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	7	10.6
95	OMNIGUIDE INC	46	290	15.9	OSA-Opt Soc Amer	86	29.7	IEEE	46	15.9
96	Ohio State University	45	187	24.1	OSA-Opt Soc Amer	62	33.2	IEEE	45	24.1
97	Infineon Technologies AG	44	224	19.6	SPIE-Int Soc Opt Engineering	63	28.1	IEEE	44	19.6
98	RONDEL TECHNOLOGY F	44	103	42.7	IEEE	44	42.7	Pennwell Pub	23	22.3
99	Brigham Young University	43	248	17.3	IEEE	43	17.3	OSA-Opt Soc Amer	42	16.9
100	KVH INDUSTRIES INC	43	107	40.2	IEEE	43	40.2	OSA-Opt Soc Amer	32	29.9

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Power Systems</i>										
1	Cirrus Logic Inc.	806	861	93.6	IEEE	806	93.6	ISO-International Standards Organization	31	3.6
2	ABB Ltd	635	1015	62.6	IEEE	635	62.6	CIGRE-International Council on Large Electric Systems	65	6.4
3	Flextronics International LTD	440	472	93.2	IEEE	440	93.2	United Business Media	21	4.4
4	National Semiconductor Corp	305	342	89.2	IEEE	305	89.2	IET/IEE	9	2.6
5	SYNQOR INC	302	363	83.2	IEEE	302	83.2	Pention Media	27	7.4
6	Emerson Electric Co.	268	365	73.4	IEEE	268	73.4	IET/IEE	31	8.5
7	General Electric Company	234	1427	16.4	US Dept of Energy	773	54.2	General Electric Co.	260	18.2
8	University of Wisconsin	210	239	87.9	IEEE	210	87.9	EPE Association	8	3.3
9	Vicor Corp	183	258	70.9	IEEE	183	70.9	Center for Power Electronics Systems (Virginia Tech)	37	14.3
10	Intel Corporation	181	232	78.0	IEEE	181	78.0	IEEE/JPN Soc App Phys	12	5.2
11	Alcatel-Lucent	175	213	82.2	IEEE	175	82.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	8	3.8
12	Power-One Inc	174	345	50.4	IEEE	174	50.4	IVI Foundation/SCPI Consortium	94	27.2
13	Toshiba Corp	172	361	47.6	IEEE	172	47.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	82	22.7
14	Exar Corp.	151	158	95.6	IEEE	151	95.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	3	1.9
15	Linear Technology Corp.	141	724	19.5	Cahners-Denver Pub	396	54.7	IEEE	141	19.5
16	Siemens Aktiengesellschaft	131	234	56.0	IEEE	131	56.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	15	6.4
17	AMPT LLC	126	166	75.9	IEEE	126	75.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	14	8.4
18	Rockwell Automation Inc	117	121	96.7	IEEE	117	96.7	IET/IEE	4	3.3
19	Micron Technology Inc.	114	169	67.5	IEEE	114	67.5	IEEE/JPN Soc App Phys	21	12.4
20	Midtronics Inc.	111	350	31.7	IEEE	111	31.7	Springer/Springer Wien/Springer-Verlag	69	19.7
21	University of Illinois	110	572	19.2	Reed/Elsevier/Pergamon/Academic Press/Sau	281	49.1	IEEE	110	19.2
22	SRI International	109	603	18.1	SPIE-Int Soc Opt Engineering	119	19.7	IEEE	109	18.1
23	STMicroelectronics	107	153	69.9	IEEE	107	69.9	Pention Media	9	5.9
24	Analog Devices Inc.	99	115	86.1	IEEE	99	86.1	IET/IEE	4	3.5
25	Texas Instruments Inc	99	114	86.8	IEEE	99	86.8	IET/IEE	5	4.4
26	Lockheed Martin Corp.	98	178	55.1	IEEE	98	55.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	29	16.3
27	Power Integrations Inc.	95	168	56.5	IEEE	95	56.5	Pention Media	42	25.0
28	Schneider Electric S.A.	90	107	84.1	IEEE	90	84.1	ACM-Assoc Comput Mach	6	5.6
29	Silicon Laboratories Inc	88	102	86.3	IEEE	88	86.3	SAE-Society of Automobile Engineers	12	11.8
30	Eaton Corp.	85	103	82.5	IEEE	85	82.5	Texas Instruments	4	3.9
31	O2Micro International Ltd.	85	142	59.9	IEEE	85	59.9	Texas Instruments	33	23.2
32	Marvell Technology Group Lt	83	111	74.8	IEEE	83	74.8	Texas Instruments	16	14.4
33	Mitsubishi Electric Corp	83	133	62.4	IEEE	83	62.4	IEEE/JPN Soc App Phys	16	12.0
34	International Business Machi	80	104	76.9	IEEE	80	76.9	ACM-Assoc Comput Mach	4	3.8
35	MOSAID Technologies Inc.	80	85	94.1	IEEE	80	94.1	Pention Media	2	2.4
36	SanDisk Corp.	79	81	97.5	IEEE	79	97.5	NEXUS MEDIA COMMUNICATIONS LTD, MEDIA HOUS	1	1.2
37	Massachusetts Institute of Te	77	468	16.5	Reed/Elsevier/Pergamon/Academic Press/Sau	119	25.4	IEEE	77	16.5
38	General Motors Corp	75	315	23.8	Reed/Elsevier/Pergamon/Academic Press/Sau	89	28.3	IEEE	75	23.8
39	Avago Technologies Ltd	74	90	82.2	IEEE	74	82.2	AVS-AIP Am Inst Physics	7	7.8

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Enpirion Inc	72	72	100.0	IEEE	72	100.0			
41	Hitachi Ltd	71	233	30.5	IEEE	71	30.5	IET/IEE	69	29.6
42	Raytheon Co.	69	86	80.2	IEEE	69	80.2	AIAA-Am Inst Aero Astro	8	9.3
43	Delta Electronics Inc	68	75	90.7	IEEE	68	90.7	Texas Instruments	2	2.7
44	Infineon Technologies AG	68	76	89.5	IEEE	68	89.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	2	2.6
45	United Technologies Corp	68	139	48.9	IEEE	68	48.9	SAE-Society of Automobile Engineers	40	28.8
46	University of California	66	305	21.6	IEEE	66	21.6	Electrochemical Society	47	15.4
47	University of Colorado ( The	65	67	97.0	IEEE	65	97.0	<conf> Int Conf Phys Semi (ICPS)	2	3.0
48	Renesas Electronic Corporati	64	85	75.3	IEEE	64	75.3	IEEE/JPN Soc App Phys	8	9.4
49	Freescale Semiconductor Inc.	63	78	80.8	IEEE	63	80.8	IET/IEE	4	5.1
50	Sony Corp	63	199	31.7	IEEE	63	31.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	38	19.1
51	Current Communications Gro	61	67	91.0	IEEE	61	91.0	ANSI/IEEE	2	3.0
52	Microsemi Corp	59	76	77.6	IEEE	59	77.6	CRC Press/Taylor & Francis	4	5.3
53	CPG TECHNOLOGIES LLC	56	107	52.3	IEEE	56	52.3	AVS-AIP Am Inst Physics	12	11.2
54	MOJO MOBILITY INC	56	70	80.0	IEEE	56	80.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	6	8.6
55	Panasonic Corporation	56	753	7.4	Reed/Elsevier/Pergamon/Academic Press/Sau	266	35.3	Electrochemical Society	230	30.5
56	Honeywell International Inc.	54	143	37.8	IEEE	54	37.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	35	24.5
57	Procter & Gamble Co.	53	544	9.7	Reed/Elsevier/Pergamon/Academic Press/Sau	205	37.7	Electrochemical Society	121	22.2
58	Intersil Corp.	52	61	85.2	IEEE	52	85.2	Springer/Springer Wien/Springer-Verlag	2	3.3
59	Toyota Motor Company	50	293	17.1	Cahners-Denver Pub	72	24.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	56	19.1
60	Industrial Technology Researc	48	59	81.4	IEEE	48	81.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	4	6.8
61	Koninklijke Philips Electroni	48	102	47.1	IEEE	48	47.1	ILLUMINAT ENG SOC NORTH AMER, 120 WALL ST, 17T	5	4.9
62	Ericsson	47	62	75.8	IEEE	47	75.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	3	4.8
63	PTS Corporation	47	71	66.2	IEEE	47	66.2	IET/IEE	6	8.5
64	MOTOR EXCELLENCE LL	46	58	79.3	IEEE	46	79.3	IEEE/ASME	12	20.7
65	Motorola Solutions Inc.	45	95	47.4	IEEE	45	47.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	14	14.7
66	Apple Inc	43	103	41.7	IEEE	43	41.7	ACM-Assoc Comput Mach	27	26.2
67	Atmel Corp.	42	51	82.4	IEEE	42	82.4	IEICE-Inst Elec Info Comm Eng	9	17.6
68	Iwatt Inc	42	68	61.8	IEEE	42	61.8	ONLINE INC, 213 DANBURY RD, WILTON, USA, CT, 068	18	26.5
69	SUSTAINABLE ENERGY T	41	42	97.6	IEEE	41	97.6	EPE Association	1	2.4
70	Advanced Energy Industries I	40	40	100.0	IEEE	40	100.0			
71	Cornell University	40	122	32.8	IEEE	40	32.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	20	16.4
72	Continental AG (Germany Fe	39	48	81.3	IEEE	39	81.3	IET/IEE	6	12.5
73	Georgia Institute of Technolo	39	71	54.9	IEEE	39	54.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	10	14.1
74	RF Micro Devices Inc.	38	78	48.7	IEEE	38	48.7	Cahners-Denver Pub	27	34.6
75	Samsung Electronics Co Ltd	38	61	62.3	IEEE	38	62.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	10	16.4
76	SOLAREEDGE LTD	37	55	67.3	IEEE	37	67.3	WIP-Renewable Energies	15	27.3
77	Fujitsu Limited	36	69	52.2	IEEE	36	52.2	Joint IEEE and ACM	8	11.6
78	INFINITE POWER SOLUTI	36	208	17.3	AVS-AIP Am Inst Physics	50	24.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	41	19.7
79	ADVANCED MAGNET LA	35	40	87.5	IEEE	35	87.5	IEEE/APS	5	12.5
80	Hydro-Quebec	35	653	5.4	Reed/Elsevier/Pergamon/Academic Press/Sau	273	41.8	Electrochemical Society	197	30.2

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Johnson Controls Inc	35	83	42.2	IEEE	35	42.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	26	31.3
82	LSI Corporation	34	50	68.0	IEEE	34	68.0	ESSCIRC/ESSDIRC European Solid State Circuits/Devices C	3	6.0
83	Xerox Corp	34	101	33.7	IEEE	34	33.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	17	16.8
84	Cypress Semiconductor Corp.	33	37	89.2	IEEE	33	89.2	IEEE/JPN Soc App Phys	4	10.8
85	FLYBACK ENERGY INC	33	35	94.3	IEEE	33	94.3	ACM-Assoc Comput Mach	2	5.7
86	Hewlett-Packard Co	33	118	28.0	IEEE	33	28.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	30	25.4
87	Virginia Tech University	33	40	82.5	IEEE	33	82.5	MATERIALS RESEARCH SOC, 506 KEYSTONE DR, WAR	2	5.0
88	American Superconductor Co	32	45	71.1	IEEE	32	71.1	IET/IEE	6	13.3
89	Coherent Inc.	32	48	66.7	IEEE	32	66.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	6	12.5
90	Commissariat A L'Energie At	32	91	35.2	IEEE	32	35.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	28	30.8
91	Harman International Industri	32	36	88.9	IEEE	32	88.9	AUDIO ENGINEERING SOC, 60 E 42ND ST, NEW YORK,	2	5.6
92	Hong Kong University of Sci	32	34	94.1	IEEE	32	94.1	Joint IEEE and ACM	1	2.9
93	University of Michigan	31	62	50.0	IEEE	31	50.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	11	17.7
94	Fairchild Semiconductor Inte	30	45	66.7	IEEE	30	66.7	Pention Media	8	17.8
95	On Semiconductor Corporati	30	32	93.8	IEEE	30	93.8	Cahners-Denver Pub	1	3.1
96	Alstom	29	69	42.0	IEEE	29	42.0	ASME-Am Soc Mech Eng	20	29.0
97	Calient Technologies Inc.	29	66	43.9	IEEE	29	43.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	20	30.3
98	Rambus Inc.	29	35	82.9	IEEE	29	82.9	IET/IEE	2	5.7
99	MAGNEMOTION INC	28	35	80.0	IEEE	28	80.0	IET/IEE	7	20.0
100	Queen's Univerity of Kingsto	28	28	100.0	IEEE	28	100.0			

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Robotics and Intelligent Manufacturing</i>										
1	Applied Materials Inc.	1356	2185	62.1	IEEE	1356	62.1	AVS-AIP Am Inst Physics	175	8.0
2	Intuitive Surgical Inc.	689	1299	53.0	IEEE	689	53.0	SAGES-Society of American Gastrointestinal and Endoscopic	260	20.0
3	Honda Motor Co. Ltd.(Giken	444	995	44.6	IEEE	444	44.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	134	13.5
4	Microsoft Corporation	401	1142	35.1	IEEE	401	35.1	ACM-Assoc Comput Mach	275	24.1
5	International Business Machi	366	843	43.4	IEEE	366	43.4	ACM-Assoc Comput Mach	97	11.5
6	Sony Corp	338	422	80.1	IEEE	338	80.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	15	3.6
7	Immersion Corp.	240	620	38.7	IEEE	240	38.7	ASME-Am Soc Mech Eng	67	10.8
8	Advanced Micro Devices Inc	235	463	50.8	IEEE	235	50.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	61	13.2
9	Siemens Aktiengesellschaft	193	392	49.2	IEEE	193	49.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	45	11.5
10	Amada Co. Ltd.	163	370	44.1	IEEE	163	44.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	73	19.7
11	SRI International	152	317	47.9	IEEE	152	47.9	SPIE-Int Soc Opt Engineering	40	12.6
12	Irobot Corp	126	214	58.9	IEEE	126	58.9	IEEE/RSJ	18	8.4
13	Caterpillar Inc.	124	270	45.9	IEEE	124	45.9	SAE-Society of Automobile Engineers	33	12.2
14	VistaPrintLtd	121	299	40.5	IEEE	121	40.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	120	40.1
15	HRL Laboratories LLC	115	176	65.3	IEEE	115	65.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	13	7.4
16	Cadence Design Systems Inc	114	229	49.8	IEEE	114	49.8	Joint IEEE and ACM	49	21.4
17	Fanuc Ltd.	113	137	82.5	IEEE	113	82.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	4	2.9
18	ICOSYSTEM CORP	108	137	78.8	IEEE	108	78.8	IET/IEE	6	4.4
19	INTOUCH TECHNOLOGIE	105	182	57.7	IEEE	105	57.7	Lippincott Williams & Wilkins	17	9.3
20	Emerson Electric Co.	104	467	22.3	IEEE	104	22.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	57	12.2
21	Samsung Electronics Co Ltd	102	162	63.0	IEEE	102	63.0	IEEE/RSJ	12	7.4
22	Fujitsu Limited	100	144	69.4	IEEE	100	69.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	11	7.6
23	Massachusetts Institute of Te	99	260	38.1	IEEE	99	38.1	ACM-Assoc Comput Mach	28	10.8
24	Toshiba Corp	95	145	65.5	IEEE	95	65.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	8	5.5
25	Battelle Memorial Institute	93	104	89.4	IEEE	93	89.4	European Design and Automation Assoc	7	6.7
26	University of Nebraska	93	324	28.7	IEEE	93	28.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	52	16.0
27	General Electric Company	92	173	53.2	IEEE	92	53.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	14	8.1
28	NEC Corp	87	138	63.0	IEEE	87	63.0	ACM-Assoc Comput Mach	10	7.2
29	CA Technologies	86	140	61.4	IEEE	86	61.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	27	19.3
30	ABB Ltd	85	103	82.5	IEEE	85	82.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	6	5.8
31	Hewlett-Packard Co	79	185	42.7	IEEE	79	42.7	ACM-Assoc Comput Mach	21	11.4
32	American Express Co.	77	279	27.6	IEEE	77	27.6	The USENIX Association	39	14.0
33	Panasonic Corporation	77	131	58.8	IEEE	77	58.8	IET/IEE	9	6.9
34	Sensable Technologies Inc	77	150	51.3	IEEE	77	51.3	ACM-Assoc Comput Mach	40	26.7
35	SIPCO LLC	77	122	63.1	IEEE	77	63.1	IETF Internet Eng Task Force	9	7.4
36	Evolution Robotics Inc	74	104	71.2	IEEE	74	71.2	IEEE/RSJ	8	7.7
37	Rockwell Automation Inc	74	130	56.9	IEEE	74	56.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	19	14.6
38	ALOFT MEDIA LLC	73	87	83.9	IEEE	73	83.9	ASCE-AMER SOC CIVIL ENGINEERS, 1801 ALEXANDER	6	6.9
39	Lockheed Martin Corp.	73	145	50.3	IEEE	73	50.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	11	7.6



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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Cirrus Logic Inc.	67	85	78.8	IEEE	67	78.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	10	11.8
41	Tokyo Electron Limited	66	186	35.5	IEEE	66	35.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	23	12.4
42	Health Discovery Corp	64	228	28.1	IEEE	64	28.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	25	11.0
43	ROY-G-BIV CORP	64	242	26.4	IEEE	64	26.4	ISO-International Standards Organization	60	24.8
44	Xerox Corp	63	141	44.7	IEEE	63	44.7	ACM-Assoc Comput Mach	18	12.8
45	Motorola Solutions Inc.	62	91	68.1	IEEE	62	68.1	Springer/Springer Wien/Springer-Verlag	3	3.3
46	University of Southern Califo	62	103	60.2	IEEE	62	60.2	IEEE/RSJ	7	6.8
47	AUREON LABORATORIES	60	237	25.3	IEEE	60	25.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	47	19.8
48	Oracle Corporation	60	98	61.2	IEEE	60	61.2	ACM-Assoc Comput Mach	17	17.3
49	TEST ADVANTAGE INC	60	68	88.2	IEEE	60	88.2	SPIE-Int Soc Opt Engineering	3	4.4
50	Honeywell International Inc.	58	138	42.0	IEEE	58	42.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	21	15.2
51	Taiwan Semiconductor Manu	57	102	55.9	IEEE	57	55.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	9	8.8
52	Texas Instruments Inc	57	92	62.0	IEEE	57	62.0	Cahners-Denver Pub	11	12.0
53	United Technologies Corp	57	73	78.1	IEEE	57	78.1	American Automatic Control Council (AACC)	3	4.1
54	INTUITION INTELLIGENC	50	59	84.7	IEEE	50	84.7	Springer/Springer Wien/Springer-Verlag	3	5.1
55	HURCO COMPANIES INC	48	118	40.7	IEEE	48	40.7	Springer/Springer Wien/Springer-Verlag	16	13.6
56	Hitachi Ltd	47	110	42.7	IEEE	47	42.7	ASME-Am Soc Mech Eng	10	9.1
57	Ford Motor Co.	46	132	34.8	IEEE	46	34.8	Winter Simulation Conference Board of Directors	18	13.6
58	Georgia Institute of Technolo	46	95	48.4	IEEE	46	48.4	American Automatic Control Council (AACC)	21	22.1
59	Sap AG	46	162	28.4	IEEE	46	28.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	37	22.8
60	California Institute of Techno	45	63	71.4	IEEE	45	71.4	Am Physical Soc	4	6.3
61	Boeing Co. (The)	44	159	27.7	IEEE	44	27.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	43	27.0
62	FTL SYSTEMS INC	43	50	86.0	IEEE	43	86.0	ACM-Assoc Comput Mach	7	14.0
63	Delphi Corp	42	118	35.6	IEEE	42	35.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	38	32.2
64	Kuka AG	40	44	90.9	IEEE	40	90.9	EMERALD GROUP PUBLISHING LIMITED, 60/62 TOLLE	1	2.3
65	Micron Technology Inc.	40	63	63.5	IEEE	40	63.5	AVS-AIP Am Inst Physics	7	11.1
66	France Telecom S.A.	39	54	72.2	IEEE	39	72.2	Joint IEEE and ACM	6	11.1
67	Accenture Ltd.	37	131	28.2	IEEE	37	28.2	ACM-Assoc Comput Mach	30	22.9
68	Procter & Gamble Co.	37	51	72.5	IEEE	37	72.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	5	9.8
69	ASML Holding NV	36	125	28.8	SPIE-Int Soc Opt Engineering	79	63.2	IEEE	36	28.8
70	AT&T Inc	36	70	51.4	IEEE	36	51.4	Bellcore	13	18.6
71	Fuji Film Holdings Corp	36	71	50.7	IEEE	36	50.7	CRC Press/Taylor & Francis	4	5.6
72	Fraunhofer Gesellschaft	35	49	71.4	IEEE	35	71.4	MIT/MIT Press	3	6.1
73	KNOWMTECH LLC	34	317	10.7	ACS-Am Chem Soc	59	18.6	AVS-AIP Am Inst Physics	58	18.3
74	NUMENTA INC	34	116	29.3	IEEE	34	29.3	Springer/Springer Wien/Springer-Verlag	18	15.5
75	Purdue University	34	57	59.6	IEEE	34	59.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	16	28.1
76	University of Michigan	34	74	45.9	IEEE	34	45.9	INST MEASUREMENT CONTROL, 87 GOWER STREET, L	10	13.5
77	Auburn University	33	39	84.6	IEEE	33	84.6	IBM Corp	4	10.3
78	New York University	32	53	60.4	IEEE	32	60.4	ACM-Assoc Comput Mach	8	15.1
79	Cascade Microtech Inc.	31	52	59.6	IEEE	31	59.6	Nature Publishing Group	7	13.5
80	Drexel University	31	57	54.4	IEEE	31	54.4	ACM-Assoc Comput Mach	5	8.8

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Tangis Corp	31	53	58.5	IEEE	31	58.5	ACM-Assoc Comput Mach	13	24.5
82	Alcatel-Lucent	30	57	52.6	IEEE	30	52.6	IET/IEE	5	8.8
83	Newport Corp.	30	32	93.8	IEEE	30	93.8	URBAN & FISCHER VERLAG, BRANCH OFFICE JENA, P	1	3.1
84	Harris Corp.	29	30	96.7	IEEE	29	96.7	ASME-Am Soc Mech Eng	1	3.3
85	Koninklijke Philips Electroni	29	47	61.7	IEEE	29	61.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	4	8.5
86	Mitsubishi Electric Corp	29	62	46.8	IEEE	29	46.8	ACM-Assoc Comput Mach	6	9.7
87	Agilent Technologies Inc	27	34	79.4	IEEE	27	79.4	AIAA-Am Inst Aero Astro	2	5.9
88	Dassault Systemes SA	27	114	23.7	Reed/Elsevier/Pergamon/Academic Press/Sau	27	23.7	IEEE	27	23.7
89	IMMERSION HUMAN INT	27	59	45.8	IEEE	27	45.8	SPIE-Int Soc Opt Engineering	7	11.9
90	JINICHI YAMAGUCHI	27	28	96.4	IEEE	27	96.4	IEEE/RSJ	1	3.6
91	LSI Corporation	27	53	50.9	IEEE	27	50.9	SPIE-Int Soc Opt Engineering	11	20.8
92	Sharper Image (The)	27	37	73.0	IEEE	27	73.0	FORBES INC, 60 FIFTH AVE, NEW YORK, USA, NY, 1001	5	13.5
93	Canon Inc	26	62	41.9	IEEE	26	41.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	11	17.7
94	EXEGY INC	26	53	49.1	IEEE	26	49.1	ACM-Assoc Comput Mach	11	20.8
95	L'Air Liquide S.A.	26	61	42.6	IEEE	26	42.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	17	27.9
96	MICROSCRIBE LLC	26	44	59.1	IEEE	26	59.1	ACM-Assoc Comput Mach	5	11.4
97	Stanford University	26	49	53.1	IEEE	26	53.1	ACM-Assoc Comput Mach	4	8.2
98	Cognex Corp.	25	44	56.8	IEEE	25	56.8	SPIE-Int Soc Opt Engineering	5	11.4
99	NEUROSCIENCES RESEA	25	111	22.5	IEEE	25	22.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	14	12.6
100	Energizer Holdings Inc.	24	38	63.2	IEEE	24	63.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	6	15.8

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<i>Semiconductors/Solid-State Devices/Electronics</i>										
1	Micron Technology Inc.	16628	63964	26.0	IEEE	16628	26.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	13424	21.0
2	International Business Machi	3762	8133	46.3	IEEE	3762	46.3	AVS-AIP Am Inst Physics	1342	16.5
3	Intel Corporation	2583	4868	53.1	IEEE	2583	53.1	AVS-AIP Am Inst Physics	501	10.3
4	Macronix International Co. L	2489	4492	55.4	IEEE	2489	55.4	IEEE/JPN Soc App Phys	716	15.9
5	Taiwan Semiconductor Manu	2216	5043	43.9	IEEE	2216	43.9	AVS-AIP Am Inst Physics	965	19.1
6	Amberwave Inc	2198	6471	34.0	IEEE	2198	34.0	AVS-AIP Am Inst Physics	1675	25.9
7	SanDisk Corp.	2129	3362	63.3	IEEE	2129	63.3	AVS-AIP Am Inst Physics	326	9.7
8	Semiconductor Energy Labor	1792	10936	16.4	AVS-AIP Am Inst Physics	2705	24.7	IEEE	1792	16.4
9	Cree Inc.	1634	4839	33.8	IEEE	1634	33.8	AVS-AIP Am Inst Physics	1212	25.0
10	Advanced Micro Devices Inc	1471	2677	54.9	IEEE	1471	54.9	AVS-AIP Am Inst Physics	282	10.5
11	Infinion Technologies AG	1432	2951	48.5	IEEE	1432	48.5	AVS-AIP Am Inst Physics	406	13.8
12	Applied Materials Inc.	1368	8262	16.6	AVS-AIP Am Inst Physics	1632	19.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	1455	17.6
13	Toshiba Corp	1362	3033	44.9	IEEE	1362	44.9	AVS-AIP Am Inst Physics	366	12.1
14	Megic Corporation	1285	1570	81.8	IEEE	1285	81.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	124	7.9
15	Freescale Semiconductor Inc.	1231	2942	41.8	IEEE	1231	41.8	AVS-AIP Am Inst Physics	572	19.4
16	Fairchild Semiconductor Inte	1120	1565	71.6	IEEE	1120	71.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	160	10.2
17	Motorola Solutions Inc.	1108	3422	32.4	IEEE	1108	32.4	AVS-AIP Am Inst Physics	842	24.6
18	Texas Instruments Inc	1027	2496	41.1	IEEE	1027	41.1	AVS-AIP Am Inst Physics	448	17.9
19	Finisar Corp	1010	2873	35.2	IEEE	1010	35.2	AVS-AIP Am Inst Physics	501	17.4
20	Panasonic Corporation	1003	3931	25.5	IEEE	1003	25.5	AVS-AIP Am Inst Physics	676	17.2
21	STMicroelectronics	973	1962	49.6	IEEE	973	49.6	Reed/Elsevier/Pergamon/Academic Press/Saunders	247	12.6
22	National Semiconductor Corp	967	1346	71.8	IEEE	967	71.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	94	7.0
23	NEC Corp	846	2134	39.6	IEEE	846	39.6	AVS-AIP Am Inst Physics	327	15.3
24	Mitsubishi Electric Corp	838	1711	49.0	IEEE	838	49.0	AVS-AIP Am Inst Physics	203	11.9
25	California Institute of Techno	819	3921	20.9	IEEE	819	20.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	685	17.5
26	TELA INNOVATIONS INC	814	2134	38.1	IEEE	814	38.1	SPIE-Int Soc Opt Engineering	724	33.9
27	Fujitsu Limited	754	2032	37.1	IEEE	754	37.1	AVS-AIP Am Inst Physics	279	13.7
28	Renesas Electronic Corporati	730	1260	57.9	IEEE	730	57.9	IEEE/JPN Soc App Phys	160	12.7
29	University of California	729	7033	10.4	AVS-AIP Am Inst Physics	1770	25.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	993	14.1
30	Samsung Electronics Co Ltd	709	2053	34.5	IEEE	709	34.5	AVS-AIP Am Inst Physics	320	15.6
31	Hitachi Ltd	657	2096	31.3	IEEE	657	31.3	AVS-AIP Am Inst Physics	375	17.9
32	Broadcom Corp.	646	3352	19.3	IHS Publishing Group	729	21.7	IEEE	646	19.3
33	University of Illinois	607	5750	10.6	AVS-AIP Am Inst Physics	1295	22.5	ACS-Am Chem Soc	857	14.9
34	Massachusetts Institute of Te	595	3775	15.8	AVS-AIP Am Inst Physics	814	21.6	IEEE	595	15.8
35	Sharp Corp	578	2523	22.9	AVS-AIP Am Inst Physics	717	28.4	IEEE	578	22.9
36	LSI Corporation	564	1177	47.9	IEEE	564	47.9	AVS-AIP Am Inst Physics	176	15.0
37	Alcatel-Lucent	521	2122	24.6	IEEE	521	24.6	AVS-AIP Am Inst Physics	403	19.0
38	HRL Laboratories LLC	518	1016	51.0	IEEE	518	51.0	AVS-AIP Am Inst Physics	182	17.9
39	Hynix Semiconductor Inc	487	888	54.8	IEEE	487	54.8	AVS-AIP Am Inst Physics	84	9.5

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	JDS Uniphase Corp	472	1510	31.3	IEEE	472	31.3	AVS-AIP Am Inst Physics	466	30.9
41	Xtera Communications Inc.	442	1040	42.5	IEEE	442	42.5	IET/IEE	310	29.8
42	Siemens Aktiengesellschaft	427	1975	21.6	AVS-AIP Am Inst Physics	458	23.2	IEEE	427	21.6
43	Synopsys Inc.	415	1187	35.0	IEEE	415	35.0	AVS-AIP Am Inst Physics	211	17.8
44	Qualcomm Inc	360	894	40.3	IEEE	360	40.3	SID-Society for Information Display	130	14.5
45	Koninklijke Philips Electroni	347	1456	23.8	AVS-AIP Am Inst Physics	381	26.2	IEEE	347	23.8
46	INNOVATIVE SILICON ISI	345	420	82.1	IEEE	345	82.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	18	4.3
47	ASM International N.V.	336	3428	9.8	Reed/Elsevier/Pergamon/Academic Press/Sau	862	25.1	AVS-AIP Am Inst Physics	724	21.1
48	Seiko Epson Corporation	314	1164	27.0	IEEE	314	27.0	AVS-AIP Am Inst Physics	207	17.8
49	Xerox Corp	313	1744	17.9	AVS-AIP Am Inst Physics	479	27.5	IEEE	313	17.9
50	University of Wisconsin	310	1166	26.6	AVS-AIP Am Inst Physics	320	27.4	IEEE	310	26.6
51	Power Integrations Inc.	307	360	85.3	IEEE	307	85.3	Inst Pure Applied Physics	45	12.5
52	Electronics and Telecommuni	306	767	39.9	IEEE	306	39.9	AVS-AIP Am Inst Physics	177	23.1
53	Canon Inc	300	2610	11.5	AVS-AIP Am Inst Physics	648	24.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	372	14.3
54	Avago Technologies Ltd	294	476	61.8	IEEE	294	61.8	AVS-AIP Am Inst Physics	66	13.9
55	Sony Corp	291	1196	24.3	IEEE	291	24.3	AVS-AIP Am Inst Physics	231	19.3
56	Commissariat A L'Energie At	285	1725	16.5	AVS-AIP Am Inst Physics	402	23.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	352	20.4
57	Novellus Systems Inc.	275	1518	18.1	AVS-AIP Am Inst Physics	337	22.2	IEEE	275	18.1
58	Spansion Inc.	268	333	80.5	IEEE	268	80.5	AVS-AIP Am Inst Physics	27	8.1
59	Interuniversity MicroElectron	262	702	37.3	IEEE	262	37.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	113	16.1
60	General Hospital Corporation	261	2953	8.8	OSA-Opt Soc Amer	1186	40.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	438	14.8
61	Coherent Inc.	255	1941	13.1	OSA-Opt Soc Amer	427	22.0	AVS-AIP Am Inst Physics	422	21.7
62	Corning Inc.	248	748	33.2	IEEE	248	33.2	IET/IEE	108	14.4
63	Hewlett-Packard Co	244	1502	16.2	AVS-AIP Am Inst Physics	334	22.2	IEEE	244	16.2
64	Cypress Semiconductor Corp.	239	530	45.1	IEEE	239	45.1	AVS-AIP Am Inst Physics	70	13.2
65	Georgia Institute of Technolo	226	573	39.4	IEEE	226	39.4	AVS-AIP Am Inst Physics	72	12.6
66	Ziptronix Inc	225	1156	19.5	AVS-AIP Am Inst Physics	322	27.9	IEEE	225	19.5
67	Vishay Intertechnology Inc.	219	352	62.2	IEEE	219	62.2	PCIM (Power Conversion, Intelligent Motion)	18	5.1
68	Honeywell International Inc.	218	799	27.3	IEEE	218	27.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	86	10.8
69	Bosch (Robert) GmbH	216	337	64.1	IEEE	216	64.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	63	18.7
70	Promos Technologies Inc.	213	288	74.0	IEEE	213	74.0	IEEE/JPN Soc App Phys	65	22.6
71	University of Michigan	213	653	32.6	IEEE	213	32.6	OSA-Opt Soc Amer	110	16.8
72	Analog Devices Inc.	210	385	54.5	IEEE	210	54.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	42	10.9
73	Industrial Techology Researc	206	443	46.5	IEEE	206	46.5	AVS-AIP Am Inst Physics	54	12.2
74	Northrop Grumman Corp	205	761	26.9	IEEE	205	26.9	AVS-AIP Am Inst Physics	148	19.4
75	United Microelectronics Corp	202	439	46.0	IEEE	202	46.0	IEEE/JPN Soc App Phys	67	15.3
76	General Electric Company	197	934	21.1	IEEE	197	21.1	AVS-AIP Am Inst Physics	163	17.5
77	SRI International	192	1021	18.8	IEEE	192	18.8	SPIE-Int Soc Opt Engineering	166	16.3
78	Raytheon Co.	188	689	27.3	IEEE	188	27.3	AVS-AIP Am Inst Physics	109	15.8
79	Tabula Inc	187	501	37.3	ACM-Assoc Comput Mach	218	43.5	IEEE	187	37.3
80	Denso Corp	186	477	39.0	IEEE	186	39.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	58	12.2

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Furukawa Electric Co. Ltd.	186	542	34.3	IEEE	186	34.3	IET/IEE	117	21.6
82	Silicon Genesis Corporation	185	941	19.7	Reed/Elsevier/Pergamon/Academic Press/Sau	240	25.5	AVS-AIP Am Inst Physics	206	21.9
83	Aisin Seiki Co. Ltd.	183	1160	15.8	OSA-Opt Soc Amer	584	50.3	IEEE	183	15.8
84	Fuji Electric Holdings Co. Lt	181	298	60.7	IEEE	181	60.7	AVS-AIP Am Inst Physics	34	11.4
85	Hong Kong University of Sci	181	313	57.8	IEEE	181	57.8	AVS-AIP Am Inst Physics	76	24.3
86	Lockheed Martin Corp.	181	1006	18.0	AVS-AIP Am Inst Physics	282	28.0	IEEE	181	18.0
87	Eastman Kodak Company	180	871	20.7	AVS-AIP Am Inst Physics	222	25.5	IEEE	180	20.7
88	North Carolina State Universi	177	2075	8.5	AVS-AIP Am Inst Physics	622	30.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	323	15.6
89	Princeton University	168	2076	8.1	AVS-AIP Am Inst Physics	594	28.6	ACS-Am Chem Soc	332	16.0
90	Sumitomo Electric Industries	162	1208	13.4	AVS-AIP Am Inst Physics	271	22.4	Reed/Elsevier/Pergamon/Academic Press/Saunders	213	17.6
91	United States Navy	162	982	16.5	AVS-AIP Am Inst Physics	288	29.3	IEEE	162	16.5
92	Microsemi Corp	161	229	70.3	IEEE	161	70.3	Pennwell Pub	11	4.8
93	Amkor Technology Inc.	158	394	40.1	IEEE	158	40.1	Pention Media	64	16.2
94	Michigan State University	157	1977	7.9	OSA-Opt Soc Amer	371	18.8	AVS-AIP Am Inst Physics	350	17.7
95	Altera Corp.	156	262	59.5	IEEE	156	59.5	ACM-Assoc Comput Mach	25	9.5
96	Nippon Telegraph & Telepho	148	608	24.3	IEEE	148	24.3	AVS-AIP Am Inst Physics	107	17.6
97	Stanford University	144	650	22.2	IEEE	144	22.2	AVS-AIP Am Inst Physics	129	19.8
98	Oki Electric Industry Co. Ltd.	143	294	48.6	IEEE	143	48.6	AVS-AIP Am Inst Physics	39	13.3
99	Teledyne Technologies Incor	140	230	60.9	IEEE	140	60.9	SPIE-Int Soc Opt Engineering	35	15.2
100	Global Foundries Inc	133	236	56.4	IEEE	133	56.4	AVS-AIP Am Inst Physics	31	13.1

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<i>Telecom and Other Communications</i>										
1	ParkerVision Inc	7440	14532	51.2	IEEE	7440	51.2	IET/IEE	3424	23.6
2	Broadcom Corp.	7402	11029	67.1	IEEE	7402	67.1	International Telecommunication Union	902	8.2
3	InterDigital Inc	5528	7806	70.8	IEEE	5528	70.8	EIA/TIA Std	349	4.5
4	Alcatel-Lucent	4874	9140	53.3	IEEE	4874	53.3	IET/IEE	555	6.1
5	Ericsson	4696	7441	63.1	IEEE	4696	63.1	IETF Internet Eng Task Force	354	4.8
6	Nortel Networks Patent Portf	4280	7632	56.1	IEEE	4280	56.1	OSA-Opt Soc Amer	631	8.3
7	Microsoft Corporation	4274	10914	39.2	IEEE	4274	39.2	ACM-Assoc Comput Mach	1617	14.8
8	Intel Corporation	3906	6281	62.2	IEEE	3906	62.2	ACM-Assoc Comput Mach	310	4.9
9	Qualcomm Inc	3761	6468	58.1	IEEE	3761	58.1	EIA/TIA Std	388	6.0
10	Sony Corp	3722	6483	57.4	IEEE	3722	57.4	ACM-Assoc Comput Mach	538	8.3
11	Personalized Media Commun	3352	21717	15.4	Soc Motion Picture TV Eng Inc	7587	34.9	IEEE	3352	15.4
12	AT&T Inc	2862	5957	48.0	IEEE	2862	48.0	ACM-Assoc Comput Mach	319	5.4
13	Cisco Systems Inc.	2748	8689	31.6	IEEE	2748	31.6	IETF Internet Eng Task Force	1750	20.1
14	Marvell Technology Group Lt	2730	3556	76.8	IEEE	2730	76.8	IEEE/IETF-Internet Engineering Task Force	274	7.7
15	Nokia Corp	2691	4989	53.9	IEEE	2691	53.9	IETF Internet Eng Task Force	397	8.0
16	Samsung Electronics Co Ltd	2523	3475	72.6	IEEE	2523	72.6	IET/IEE	101	2.9
17	International Business Machi	2459	5110	48.1	IEEE	2459	48.1	ACM-Assoc Comput Mach	553	10.8
18	Fujitsu Limited	2382	5236	45.5	IEEE	2382	45.5	ATM Forum Standards Body	408	7.8
19	Texas Instruments Inc	2289	2844	80.5	IEEE	2289	80.5	ANSI-American National Standards Institute	86	3.0
20	Panasonic Corporation	2270	4676	48.5	IEEE	2270	48.5	IEICE-Inst Elec Info Comm Eng	464	9.9
21	Motorola Solutions Inc.	2269	3474	65.3	IEEE	2269	65.3	IETF Internet Eng Task Force	134	3.9
22	University of Minnesota (The	1851	2024	91.5	IEEE	1851	91.5	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	38	1.9
23	Verizon Communications Inc	1747	3454	50.6	IEEE	1747	50.6	IETF Internet Eng Task Force	391	11.3
24	Raytheon Co.	1683	2712	62.1	IEEE	1683	62.1	Am Physical Soc	148	5.5
25	Nippon Telegraph & Telepho	1677	3660	45.8	IEEE	1677	45.8	IEICE-Inst Elec Info Comm Eng	513	14.0
26	NEC Corp	1656	3184	52.0	IEEE	1656	52.0	IEICE-Inst Elec Info Comm Eng	309	9.7
27	Digimarc Corp.	1634	3957	41.3	IEEE	1634	41.3	SPIE-Int Soc Opt Engineering	463	11.7
28	Silicon Laboratories Inc	1462	1839	79.5	IEEE	1462	79.5	Cahners-Denver Pub	97	5.3
29	DIRECTV Group Inc. (The)	1412	1977	71.4	IEEE	1412	71.4	AIAA-Am Inst Aero Astro	86	4.4
30	Micron Technology Inc.	1403	2385	58.8	IEEE	1403	58.8	IEEE/JPN Soc App Phys	150	6.3
31	TE Connectivity Ltd	1383	2045	67.6	IEEE	1383	67.6	IET/IEE	127	6.2
32	LG Electronics Inc.	1337	3015	44.3	IEEE	1337	44.3	European Telecom Standards Institute (ETSI)	285	9.5
33	Mitsubishi Electric Corp	1337	2331	57.4	IEEE	1337	57.4	IEICE-Inst Elec Info Comm Eng	184	7.9
34	Fractus SA	1336	1917	69.7	IEEE	1336	69.7	IET/IEE	233	12.2
35	LSI Corporation	1334	1700	78.5	IEEE	1334	78.5	IET/IEE	44	2.6
36	Hitachi Ltd	1295	2994	43.3	IEEE	1295	43.3	IEICE-Inst Elec Info Comm Eng	259	8.7
37	Rambus Inc.	1257	1907	65.9	IEEE	1257	65.9	International Association for Cryptologic Research (IACR)	133	7.0
38	Hewlett-Packard Co	1240	3806	32.6	IEEE	1240	32.6	IETF Internet Eng Task Force	557	14.6
39	Electronics and Telecommuni	1220	1609	75.8	IEEE	1220	75.8	IET/IEE	117	7.3

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Toshiba Corp	1164	2403	48.4	IEEE	1164	48.4	International Telecommunication Union	243	10.1
41	Sprint Nextel Corp.	1128	4741	23.8	International Telecommunication Union	1858	39.2	IEEE	1128	23.8
42	Altera Corp.	1126	1766	63.8	IEEE	1126	63.8	Pention Media	203	11.5
43	STMicroelectronics	1045	1512	69.1	IEEE	1045	69.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	52	3.4
44	University of California	1025	1743	58.8	IEEE	1025	58.8	IET/IEE	101	5.8
45	Koninklijke Philips Electroni	951	1950	48.8	IEEE	951	48.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	113	5.8
46	Oracle Corporation	950	2058	46.2	IEEE	950	46.2	ACM-Assoc Comput Mach	423	20.6
47	Infineon Technologies AG	931	1275	73.0	IEEE	931	73.0	IET/IEE	56	4.4
48	Massachusetts Institute of Te	910	1773	51.3	IEEE	910	51.3	OSA-Opt Soc Amer	175	9.9
49	HRL Laboratories LLC	908	1344	67.6	IEEE	908	67.6	IET/IEE	151	11.2
50	Tabula Inc	899	2348	38.3	ACM-Assoc Comput Mach	1010	43.0	IEEE	899	38.3
51	Sharp Corp	889	2649	33.6	IEEE	889	33.6	SID-Society for Information Display	500	18.9
52	Deutsche Telekom AG	882	1273	69.3	IEEE	882	69.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	53	4.2
53	Siemens Aktiengesellschaft	878	1934	45.4	IEEE	878	45.4	European Telecom Standards Institute (ETSI)	138	7.1
54	Intersil Corp.	857	1205	71.1	IEEE	857	71.1	IET/IEE	189	15.7
55	MOSAID Technologies Inc.	846	1504	56.3	IEEE	846	56.3	EIA/TIA Std	84	5.6
56	California Institute of Techno	832	1296	64.2	IEEE	832	64.2	SPIE-Int Soc Opt Engineering	108	8.3
57	Honeywell International Inc.	826	1499	55.1	IEEE	826	55.1	ACM-Assoc Comput Mach	70	4.7
58	Current Communications Gro	819	910	90.0	IEEE	819	90.0	<std> CLC SC 105A	31	3.4
59	Apple Inc	785	1480	53.0	IEEE	785	53.0	ISO/IEC	159	10.7
60	Harris Corp.	785	1412	55.6	IEEE	785	55.6	IETF Internet Eng Task Force	223	15.8
61	Kyocera Corp.	749	919	81.5	IEEE	749	81.5	IET/IEE	48	5.2
62	Xilinx Inc.	739	953	77.5	IEEE	739	77.5	ACM-Assoc Comput Mach	51	5.4
63	L-3 Communications Holdin	721	918	78.5	IEEE	721	78.5	IET/IEE	53	5.8
64	Industrial Techology Researc	706	974	72.5	IEEE	706	72.5	SID-Society for Information Display	28	2.9
65	Analog Devices Inc.	696	879	79.2	IEEE	696	79.2	IET/IEE	30	3.4
66	Freescale Semiconductor Inc.	691	807	85.6	IEEE	691	85.6	IET/IEE	30	3.7
67	MULTI-TECH SYSTEMS IN	653	1019	64.1	IEEE	653	64.1	International Telecommunication Union	80	7.9
68	Canon Inc	627	1485	42.2	IEEE	627	42.2	ACM-Assoc Comput Mach	70	4.7
69	Northrop Grumman Corp	593	934	63.5	IEEE	593	63.5	IET/IEE	45	4.8
70	Lockheed Martin Corp.	588	1208	48.7	IEEE	588	48.7	OSA-Opt Soc Amer	143	11.8
71	BT Group PLC	572	1129	50.7	IEEE	572	50.7	IET/IEE	115	10.2
72	Cypress Semiconductor Corp.	556	805	69.1	IEEE	556	69.1	Joint IEEE and ACM	33	4.1
73	Technicolor SA	550	1115	49.3	IEEE	550	49.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	49	4.4
74	Cirrus Logic Inc.	531	747	71.1	IEEE	531	71.1	AUDIO ENGINEERING SOC, 60 E 42ND ST, NEW YORK,	71	9.5
75	Research in Motion Ltd.	524	1163	45.1	IEEE	524	45.1	IETF Internet Eng Task Force	74	6.4
76	Siemens Enterprise Communi	520	834	62.4	IEEE	520	62.4	ACM-Assoc Comput Mach	102	12.2
77	Finisar Corp	518	776	66.8	IEEE	518	66.8	IET/IEE	164	21.1
78	Synergy Microwave Corp	516	607	85.0	IEEE	516	85.0	HORIZON HOUSE PUBLICATIONS INC	54	8.9
79	Advanced Micro Devices Inc	509	707	72.0	IEEE	509	72.0	Pention Media	41	5.8
80	National Semiconductor Corp	502	695	72.2	IEEE	502	72.2	SID-Society for Information Display	34	4.9

## Appendix B: Top 100 Organizations That Cite IEEE; (1997-2011 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Pulse Link Inc	498	605	82.3	IEEE	498	82.3	Sci American Inc	24	4.0
82	Bae Systems Plc.	472	608	77.6	IEEE	472	77.6	SPIE-Int Soc Opt Engineering	27	4.4
83	LibertyMedia	420	467	89.9	IEEE	420	89.9	SPIE-Int Soc Opt Engineering	15	3.2
84	France Telecom S.A.	412	767	53.7	IEEE	412	53.7	IET/IEE	50	6.5
85	Motorola Mobility Holdings I	412	769	53.6	IEEE	412	53.6	International Telecommunication Union	66	8.6
86	ACACIA MEDIA TECHNO	410	682	60.1	IEEE	410	60.1	ACM-Assoc Comput Mach	68	10.0
87	Commscope Inc.	404	531	76.1	IEEE	404	76.1	IET/IEE	56	10.5
88	Arraycomm Inc.	394	429	91.8	IEEE	394	91.8	SPIE-Int Soc Opt Engineering	15	3.5
89	Renesas Electronic Corporati	387	511	75.7	IEEE	387	75.7	IEEE/JPN Soc App Phys	28	5.5
90	Conexant Systems Inc.	385	595	64.7	IEEE	385	64.7	International Telecommunication Union	45	7.6
91	Fraunhofer Gesellschaft	363	686	52.9	IEEE	363	52.9	MPEG.org	74	10.8
92	Columbia University	356	580	61.4	IEEE	356	61.4	IET/IEE	48	8.3
93	United States Navy	348	739	47.1	IEEE	348	47.1	SPIE-Int Soc Opt Engineering	61	8.3
94	Boeing Co. (The)	343	739	46.4	IEEE	343	46.4	ION-THE INSTITUTE OF NAVIGATION	52	7.0
95	Intertrust Technologies Corp	342	2740	12.5	ACM-Assoc Comput Mach	549	20.0	IEEE	342	12.5
96	REARDEN LLC	341	346	98.6	IEEE	341	98.6	Kluwer Academic/Plenm Publishing	5	1.4
97	Zoran Corp	337	412	81.8	IEEE	337	81.8	Pention Media	25	6.1
98	Ciena Corp	335	577	58.1	IEEE	335	58.1	OSA-Opt Soc Amer	84	14.6
99	Juniper Networks Inc.	335	870	38.5	IEEE	335	38.5	IETF Internet Eng Task Force	211	24.3
100	Seagate Technology	331	402	82.3	IEEE	331	82.3	ACM-Assoc Comput Mach	11	2.7



## Appendix C: Top Organizations from 12 Categories Combined

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
1	Micron Technology Inc.	25489	87958	29.0	IEEE	25489	29.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	18079	20.6
2	Microsoft Corporation	22671	75453	30.0	IEEE	22671	30.0	ACM-Assoc Comput Mach	22317	29.6
3	International Business Machi	21928	56074	39.1	IEEE	21928	39.1	ACM-Assoc Comput Mach	10059	17.9
4	Intel Corporation	13075	25562	51.2	IEEE	13075	51.2	ACM-Assoc Comput Mach	2415	9.4
5	Broadcom Corp.	10083	17724	56.9	IEEE	10083	56.9	International Telecommunication Union	965	5.4
6	Alcatel-Lucent	9191	19609	46.9	IEEE	9191	46.9	IET/IEE	1094	5.6
7	ParkerVision Inc	8518	16598	51.3	IEEE	8518	51.3	IET/IEE	3887	23.4
8	Oracle Corporation	8271	24801	33.3	ACM-Assoc Comput Mach	8459	34.1	IEEE	8271	33.3
9	Texas Instruments Inc	6460	10464	61.7	IEEE	6460	61.7	AVS-AIP Am Inst Physics	604	5.8
10	Hewlett-Packard Co	6075	19230	31.6	IEEE	6075	31.6	ACM-Assoc Comput Mach	2485	12.9
11	Sony Corp	6002	12283	48.9	IEEE	6002	48.9	ACM-Assoc Comput Mach	1176	9.6
12	Qualcomm Inc	5777	10979	52.6	IEEE	5777	52.6	SID-Society for Information Display	726	6.6
13	InterDigital Inc	5684	8035	70.7	IEEE	5684	70.7	EIA/TIA Std	349	4.3
14	Ericsson	5655	9436	59.9	IEEE	5655	59.9	IETF Internet Eng Task Force	437	4.6
15	Fujitsu Limited	5580	12591	44.3	IEEE	5580	44.3	IET/IEE	779	6.2
16	Panasonic Corporation	5521	14642	37.7	IEEE	5521	37.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	1132	7.7
17	Motorola Solutions Inc.	5454	11501	47.4	IEEE	5454	47.4	AVS-AIP Am Inst Physics	1050	9.1
18	Toshiba Corp	5356	12160	44.0	IEEE	5356	44.0	AVS-AIP Am Inst Physics	754	6.2
19	Nortel Networks Patent Portf	5116	9547	53.6	IEEE	5116	53.6	OSA-Opt Soc Amer	722	7.6
20	Hitachi Ltd	5113	14663	34.9	IEEE	5113	34.9	AVS-AIP Am Inst Physics	1168	8.0
21	NEC Corp	5051	10964	46.1	IEEE	5051	46.1	AVS-AIP Am Inst Physics	602	5.5
22	Samsung Electronics Co Ltd	4917	9881	49.8	IEEE	4917	49.8	SID-Society for Information Display	932	9.4
23	AT&T Inc	4773	10346	46.1	IEEE	4773	46.1	ACM-Assoc Comput Mach	883	8.5
24	Siemens Aktiengesellschaft	4755	13323	35.7	IEEE	4755	35.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	1443	10.8
25	SanDisk Corp.	4708	7178	65.6	IEEE	4708	65.6	IEEE/JPN Soc App Phys	514	7.2
26	Cisco Systems Inc.	4360	14457	30.2	IEEE	4360	30.2	IETF Internet Eng Task Force	2816	19.5
27	Cadence Design Systems Inc	4220	10195	41.4	IEEE	4220	41.4	Joint IEEE and ACM	2626	25.8
28	Macronix International Co. L	4017	6908	58.1	IEEE	4017	58.1	IEEE/JPN Soc App Phys	1048	15.2
29	Mitsubishi Electric Corp	4004	7816	51.2	IEEE	4004	51.2	ACM-Assoc Comput Mach	667	8.5
30	Advanced Micro Devices Inc	3947	7942	49.7	IEEE	3947	49.7	AVS-AIP Am Inst Physics	434	5.5
31	LSI Corporation	3874	6133	63.2	IEEE	3874	63.2	Joint IEEE and ACM	372	6.1
32	Nokia Corp	3773	7677	49.1	IEEE	3773	49.1	IETF Internet Eng Task Force	688	9.0
33	STMicroelectronics	3713	6204	59.8	IEEE	3713	59.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	460	7.4
34	Koninklijke Philips Electroni	3643	14446	25.2	IEEE	3643	25.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	1461	10.1
35	Personalized Media Commun	3584	23469	15.3	Soc Motion Picture TV Eng Inc	8181	34.9	IEEE	3584	15.3
36	Marvell Technology Group Lt	3297	4373	75.4	IEEE	3297	75.4	IEEE/IETF-Internet Engineering Task Force	331	7.6
37	Infineon Technologies AG	3294	5847	56.3	IEEE	3294	56.3	AVS-AIP Am Inst Physics	487	8.3
38	Rambus Inc.	3283	4699	69.9	IEEE	3283	69.9	IEEE/JPN Soc App Phys	188	4.0
39	General Hospital Corporation	3270	38819	8.4	OSA-Opt Soc Amer	14457	37.2	Reed/Elsevier/Pergamon/Academic Press/Saunders	5774	14.9
40	Massachusetts Institute of Te	3234	14928	21.7	IEEE	3234	21.7	Reed/Elsevier/Pergamon/Academic Press/Saunders	1885	12.6

## Appendix C: Top Organizations from 12 Categories Combined

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
41	Ricoh Co. Ltd.	3157	6906	45.7	IEEE	3157	45.7	ACM-Assoc Comput Mach	1050	15.2
42	University of California	3153	21193	14.9	IEEE	3153	14.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	3023	14.3
43	Applied Materials Inc.	3139	12295	25.5	IEEE	3139	25.5	AVS-AIP Am Inst Physics	2170	17.6
44	Immersion Corp.	3071	8448	36.4	IEEE	3071	36.4	ACM-Assoc Comput Mach	900	10.7
45	Digimarc Corp.	3059	7544	40.5	IEEE	3059	40.5	SPIE-Int Soc Opt Engineering	867	11.5
46	Synopsys Inc.	3014	10433	28.9	IEEE	3014	28.9	SPIE-Int Soc Opt Engineering	3004	28.8
47	Honeywell International Inc.	2851	7486	38.1	IEEE	2851	38.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	702	9.4
48	Canon Inc	2810	10537	26.7	IEEE	2810	26.7	AVS-AIP Am Inst Physics	1236	11.7
49	General Electric Company	2780	15729	17.7	US Dept of Energy	2996	19.0	IEEE	2780	17.7
50	Raytheon Co.	2666	5378	49.6	IEEE	2666	49.6	OSA-Opt Soc Amer	246	4.6
51	Taiwan Semiconductor Manu	2544	5624	45.2	IEEE	2544	45.2	AVS-AIP Am Inst Physics	996	17.7
52	Xilinx Inc.	2539	3485	72.9	IEEE	2539	72.9	Joint IEEE and ACM	251	7.2
53	California Institute of Techno	2524	11432	22.1	IEEE	2524	22.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	1801	15.8
54	Sharp Corp	2464	8024	30.7	IEEE	2464	30.7	SID-Society for Information Display	947	11.8
55	Nippon Telegraph & Telepho	2431	5952	40.8	IEEE	2431	40.8	IEICE-Inst Elec Info Comm Eng	723	12.1
56	Freescale Semiconductor Inc.	2428	4619	52.6	IEEE	2428	52.6	AVS-AIP Am Inst Physics	641	13.9
57	LG Electronics Inc.	2375	5402	44.0	IEEE	2375	44.0	ISO/IEC	314	5.8
58	Xerox Corp	2371	10018	23.7	IEEE	2371	23.7	ACM-Assoc Comput Mach	1796	17.9
59	Apple Inc	2263	6132	36.9	IEEE	2263	36.9	ACM-Assoc Comput Mach	1615	26.3
60	University of Minnesota (The	2261	4449	50.8	IEEE	2261	50.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	491	11.0
61	Seiko Epson Corporation	2238	5657	39.6	IEEE	2238	39.6	Joint IEEE and ACM	538	9.5
62	MICROUNITY SYSTEMS E	2215	3145	70.4	IEEE	2215	70.4	ACM-Assoc Comput Mach	296	9.4
63	National Semiconductor Corp	2202	3080	71.5	IEEE	2202	71.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	129	4.2
64	Renesas Electronic Corporati	2199	3337	65.9	IEEE	2199	65.9	IEEE/JPN Soc App Phys	271	8.1
65	Amberwave Inc	2198	6471	34.0	IEEE	2198	34.0	AVS-AIP Am Inst Physics	1675	25.9
66	Verizon Communications Inc	2194	4438	49.4	IEEE	2194	49.4	IETF Internet Eng Task Force	485	10.9
67	Altera Corp.	2156	3639	59.2	IEEE	2156	59.2	Pention Media	378	10.4
68	MOSAID Technologies Inc.	2140	3076	69.6	IEEE	2140	69.6	IEEE/JPN Soc App Phys	96	3.1
69	Electronics and Telecommuni	2000	3368	59.4	IEEE	2000	59.4	IET/IEE	233	6.9
70	Semiconductor Energy Labor	2000	12948	15.4	AVS-AIP Am Inst Physics	2871	22.2	SID-Society for Information Display	2319	17.9
71	Tabula Inc	1991	5214	38.2	ACM-Assoc Comput Mach	2207	42.3	IEEE	1991	38.2
72	Seagate Technology	1908	3843	49.6	IEEE	1908	49.6	AVS-AIP Am Inst Physics	604	15.7
73	HRL Laboratories LLC	1887	3336	56.6	IEEE	1887	56.6	AVS-AIP Am Inst Physics	281	8.4
74	Medtronic Inc	1809	25169	7.2	Reed/Elsevier/Pergamon/Academic Press/Sau	6208	24.7	Lippincott Williams & Wilkins	4987	19.8
75	Cypress Semiconductor Corp.	1791	2773	64.6	IEEE	1791	64.6	Joint IEEE and ACM	145	5.2
76	Cirrus Logic Inc.	1767	2178	81.1	IEEE	1767	81.1	AUDIO ENGINEERING SOC	94	4.3
77	Silicon Laboratories Inc	1741	2176	80.0	IEEE	1741	80.0	Cahners-Denver Pub	105	4.8
78	Finisar Corp	1736	4227	41.1	IEEE	1736	41.1	IET/IEE	688	16.3
79	Lockheed Martin Corp.	1609	5509	29.2	IEEE	1609	29.2	OSA-Opt Soc Amer	570	10.3
80	Cree Inc.	1602	4780	33.5	IEEE	1602	33.5	AVS-AIP Am Inst Physics	1198	25.1

## Appendix C: Top Organizations from 12 Categories Combined

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	TE Connectivity Ltd	1586	2449	64.8	IEEE	1586	64.8	IET/IEE	151	6.2
82	Cascade Microtech Inc.	1490	2890	51.6	IEEE	1490	51.6	Nature Publishing Group	613	21.2
83	DIRECTV Group Inc. (The)	1459	2063	70.7	IEEE	1459	70.7	AIAA-Am Inst Aero Astro	86	4.2
84	Covidien Ltd - Bermuda	1403	9072	15.5	IEEE	1403	15.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	1228	13.5
85	Analog Devices Inc.	1396	1963	71.1	IEEE	1396	71.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	97	4.9
86	SRI International	1371	3912	35.0	IEEE	1371	35.0	Reed/Elsevier/Pergamon/Academic Press/Saunders	381	9.7
87	Georgia Institute of Technolo	1369	2990	45.8	IEEE	1369	45.8	Reed/Elsevier/Pergamon/Academic Press/Saunders	219	7.3
88	Infinera Corporation	1357	2235	60.7	IEEE	1357	60.7	IET/IEE	405	18.1
89	Sprint Nextel Corp.	1344	5294	25.4	International Telecommunication Union	1882	35.5	IEEE	1344	25.4
90	Fractus SA	1338	1919	69.7	IEEE	1338	69.7	IET/IEE	233	12.1
91	Mentor Graphics Corp.	1325	2340	56.6	IEEE	1325	56.6	SPIE-Int Soc Opt Engineering	343	14.7
92	University of Illinois	1311	10560	12.4	AVS-AIP Am Inst Physics	1473	13.9	ACS-Am Chem Soc	1370	13.0
93	Megic Corporation	1305	1594	81.9	IEEE	1305	81.9	Reed/Elsevier/Pergamon/Academic Press/Saunders	126	7.9
94	Emerson Electric Co.	1289	4905	26.3	IEEE	1289	26.3	Reed/Elsevier/Pergamon/Academic Press/Saunders	520	10.6
95	BT Group PLC	1272	2770	45.9	IEEE	1272	45.9	IET/IEE	265	9.6
96	Sap AG	1264	4148	30.5	IEEE	1264	30.5	ACM-Assoc Comput Mach	1059	25.5
97	ABB Ltd	1242	1957	63.5	IEEE	1242	63.5	Reed/Elsevier/Pergamon/Academic Press/Saunders	93	4.8
98	Industrial Technology Researc	1217	2094	58.1	IEEE	1217	58.1	Reed/Elsevier/Pergamon/Academic Press/Saunders	113	5.4
99	Harris Corp.	1178	2146	54.9	IEEE	1178	54.9	IETF Internet Eng Task Force	279	13.0
100	Netapp Inc	1163	4644	25.0	ACM-Assoc Comput Mach	1643	35.4	IEEE	1163	25.0

# Figure 1 – Front Page of Patent # 5,591,372

United States Patent  
Venkataramani, et al.

5,591,372  
January 7, 1997

Piezoelectric composite with anisotropic 3-3 connectivity

## Abstract

A piezoelectric or electrostrictive composite exhibiting anisotropic 3-3 connectivity with a dense ceramic phase and an infiltrate polymer phase. The ceramic phase is an interconnected ceramic lamelli structure that is arranged substantially parallel in one direction. The ceramic lamelli have greater connectivity in the z direction than in the x and y directions, while the connectivity in the x and y directions are essentially equal.

Inventors: **Venkataramani; Venkat S.** (Clifton Park, NY); **Smith; Lowell S.** (Niskayuna, NY)

Assignee: **Generla Electric Company** (Schenectady, NY)

Appl. No.: **531840**

Filed: **September 22, 1995**

**Current U.S. Class:** 252/62.9R; 252/62.9PZ; 501/32; 501/95.2; 501/136; 501/137;  
501/139

**Intern'l Class:** C04B 035/00

**Field of Search:** 252/62.9 R,62.9 PZ 428/260,272,289,290 501/32,134,136,137,95  
264/28

## References Cited

### U.S. Patent Documents

4122041	Oct., 1978	Mahler	251/449.
4330593	May., 1982	Shrout et al.	252/62.

### Other References

"Injection Molded Fine-Scale Piezoelectric Composite Transducers", LJ Bowen, et al. 1993

**Ultrasonics Symposium, 1993 IEEE**, pp. 499-503. no month.

"Modeling 1-3 Composite Piezoelectrics: Thickness-Mode Oscillations", W A Smith, B A Auld,  
**IEEE Trans. on Ultrasonics Ferroelectrics and Frequency Control**, vol. 38, No. 1, Jan. 1991.

"Properties of Composite Piezoelectric Materials for Ultrasonic Transducers", W A Smith, et al.,  
1984 **Ultrasonics Symposium, IEEE 1984**, pp. 539-544. no month.

"The Role of Piezocomposites in Ultrasonic Transducers", W A Smith, 1989 **Ultrasonics  
Symposium, 1989 IEEE**, pp. 755-766. no month.

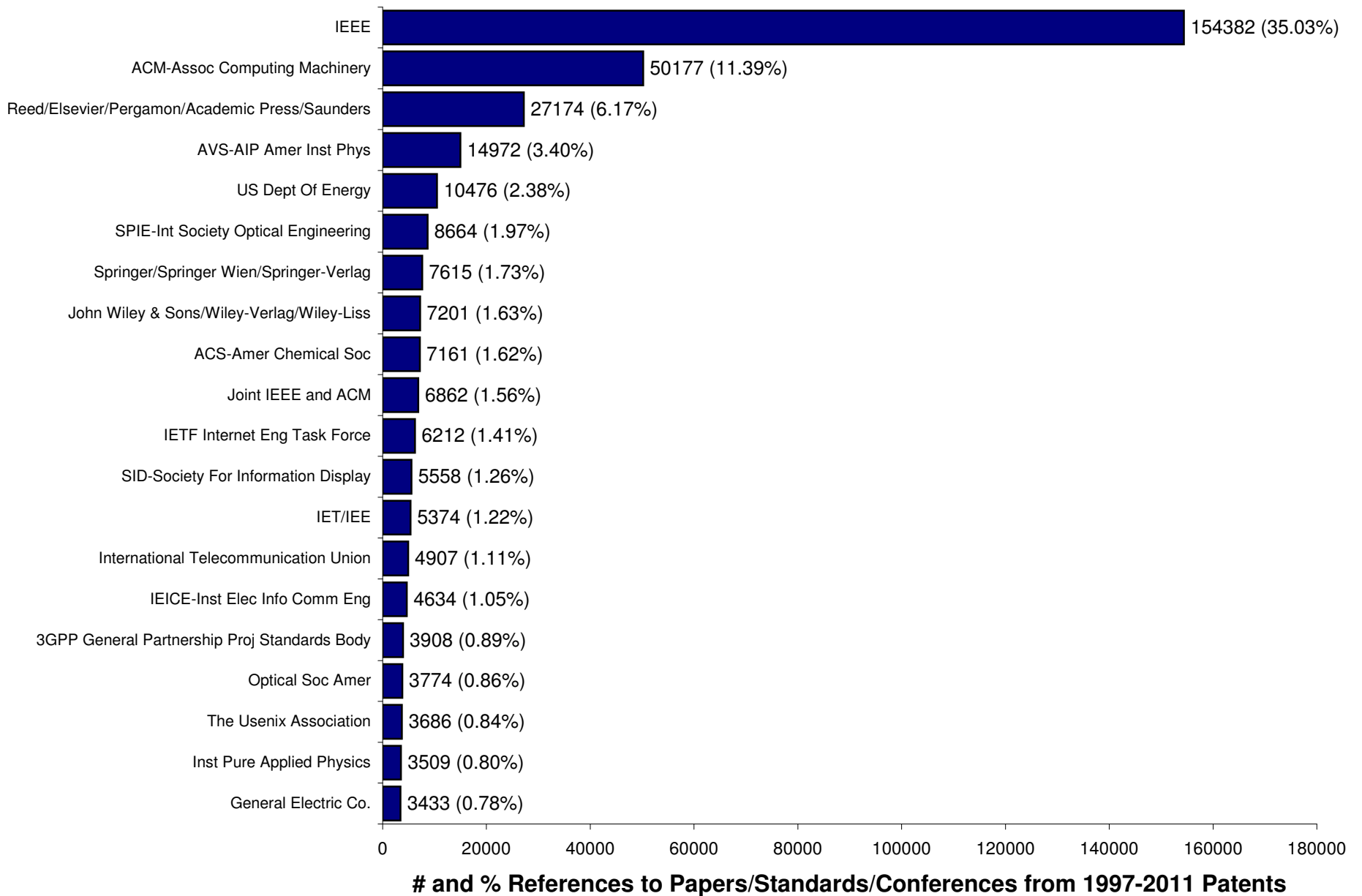
"Development of 1-3 Ceramic-Air Composite Transducers", C. Oakley, et al., SPIE vol. 1733 (1992)  
pp. 274-283. no month.

"Freeze-formed Silica Fibers", W. Hahler, et al., May 1980, Central Research & Development Dept.,  
E.I. duPont de Nemours & Company, Wilmington, Delaware.

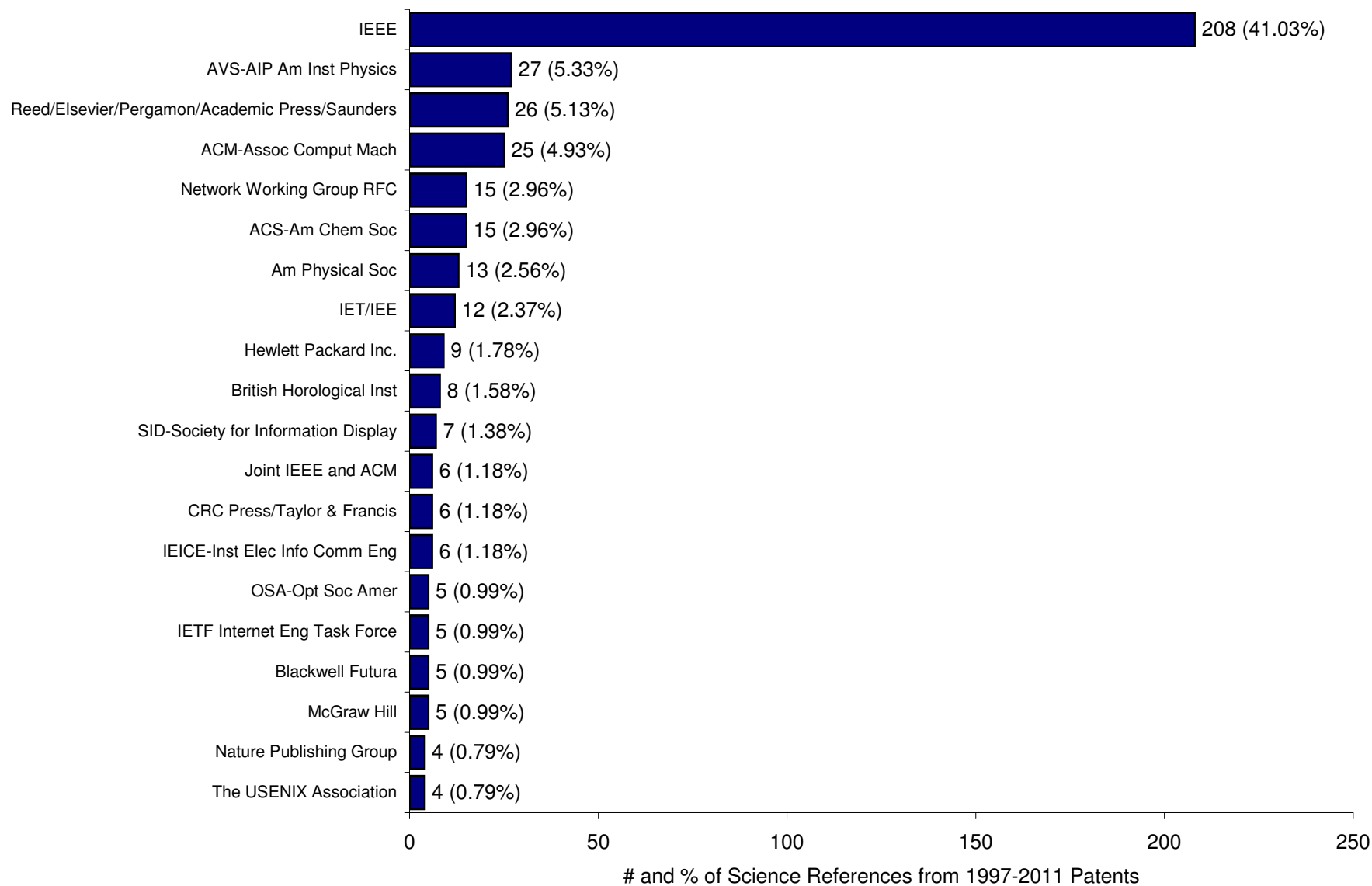
*Primary Examiner:* Bonner; Melissa

*Attorney, Agent or Firm:* Johnson; Noreen C., Pittman; William H.

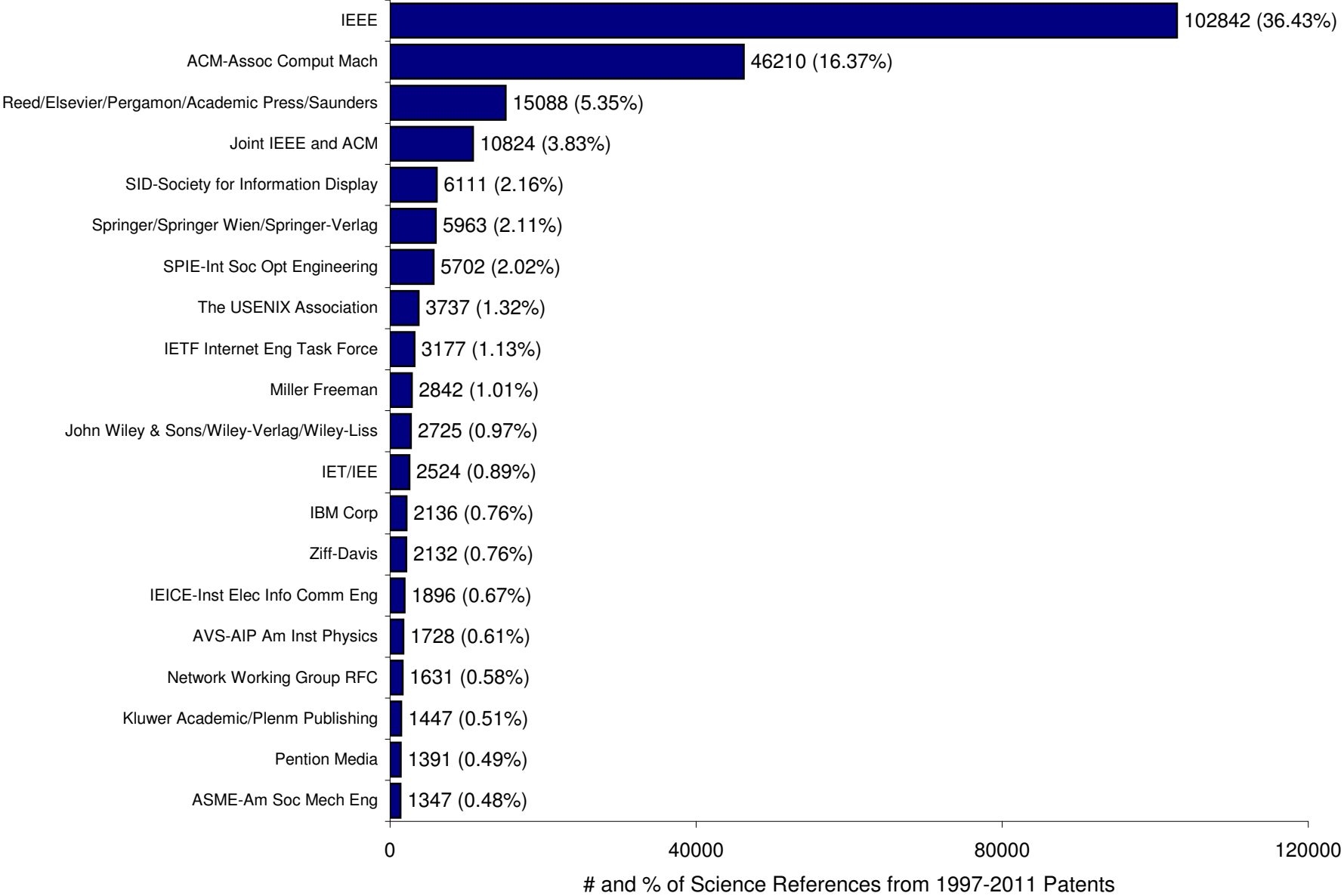
**Figure 2 - # and % of Patent References from Top 25 Companies to Top 20 Journal Publishers**



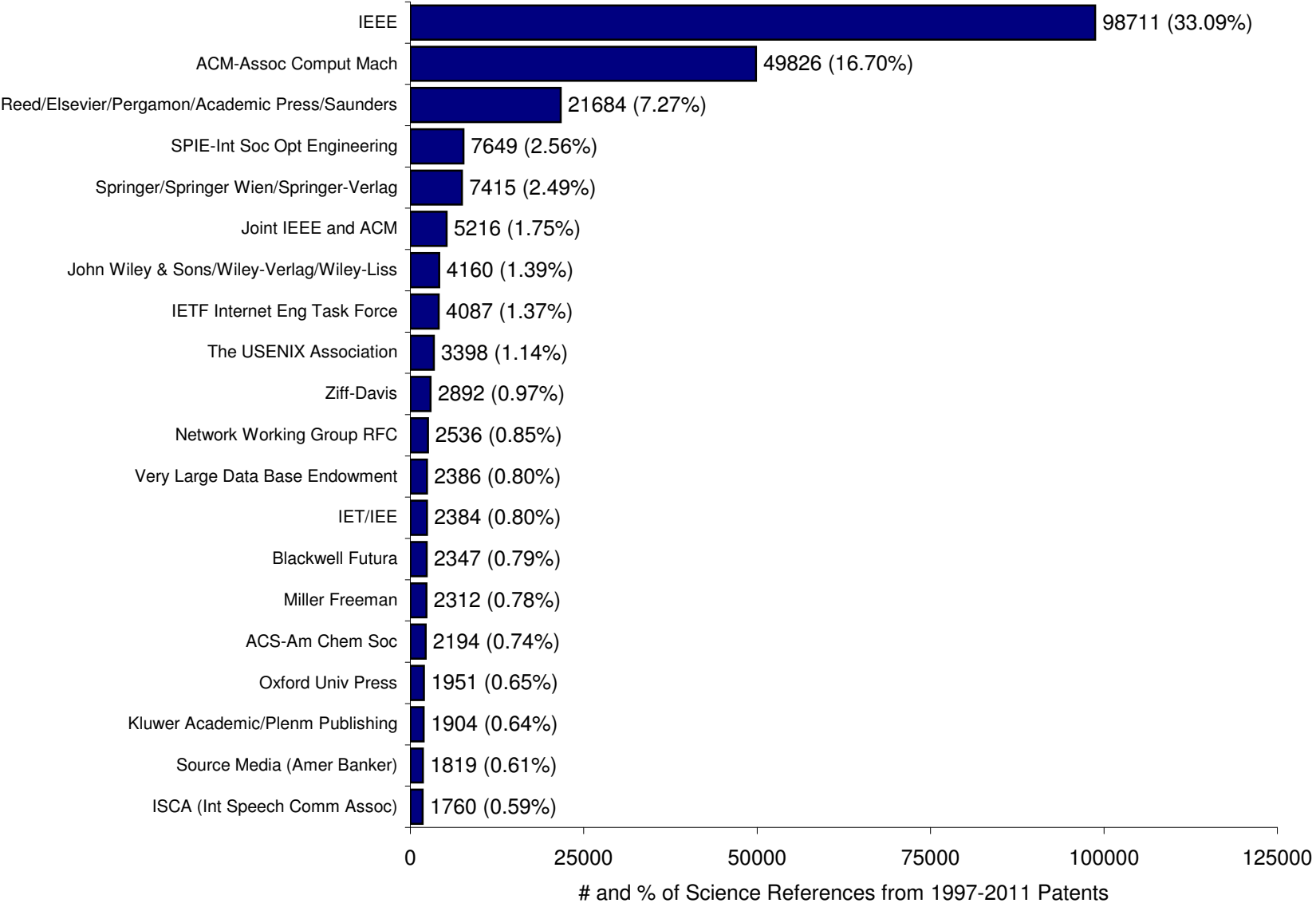
### Figure 3 - # and % of Science References from 1997-2011 Clock, Watch, and Timepiece Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations



# Figure 4 - # and % of Science References from 1997-2011 Computer Hardware Patents to Top 20 Publishers and Conference Organizers

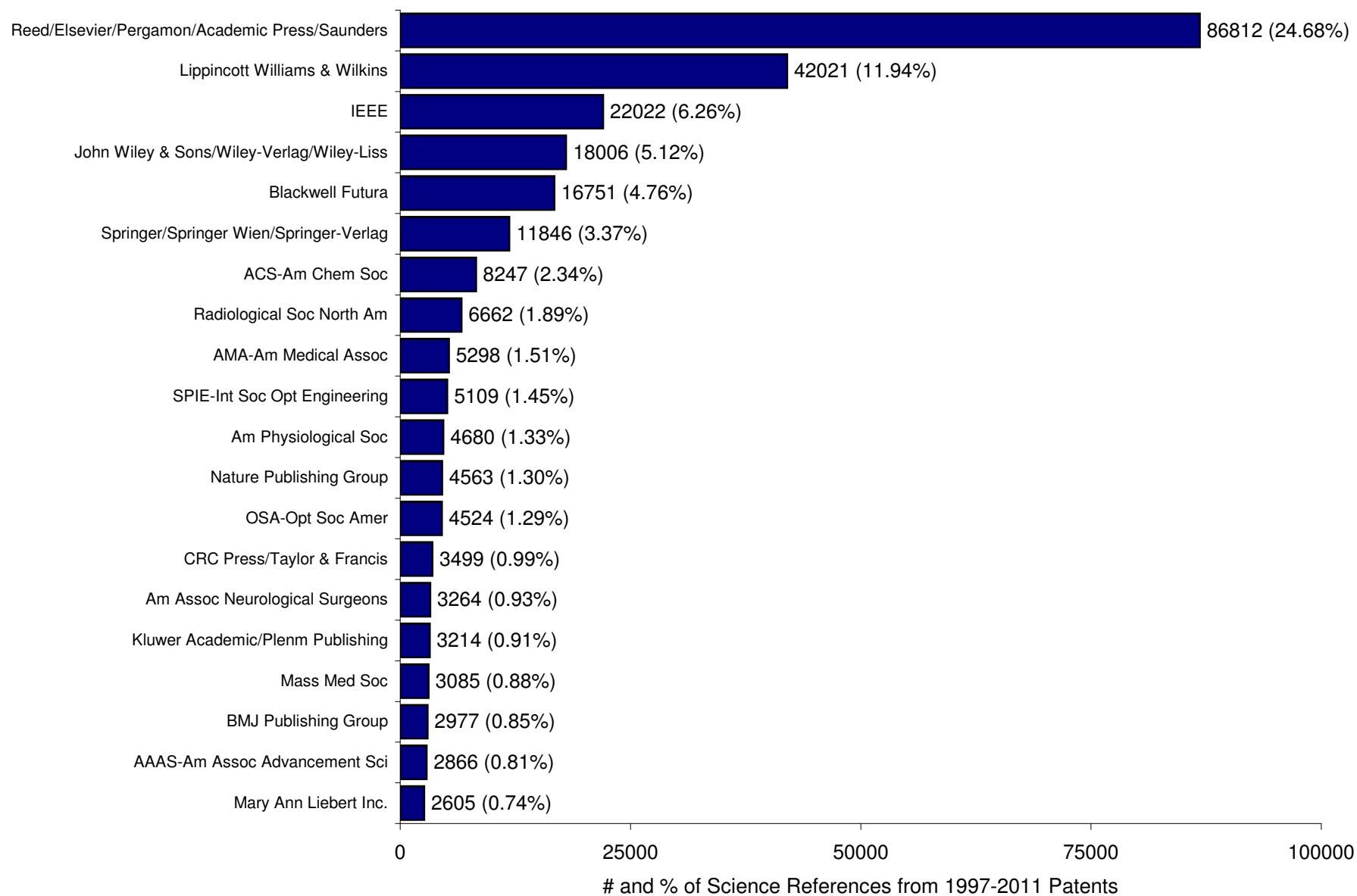


# Figure 5 - # and % of Science References from 1997-2011 Computer Software Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

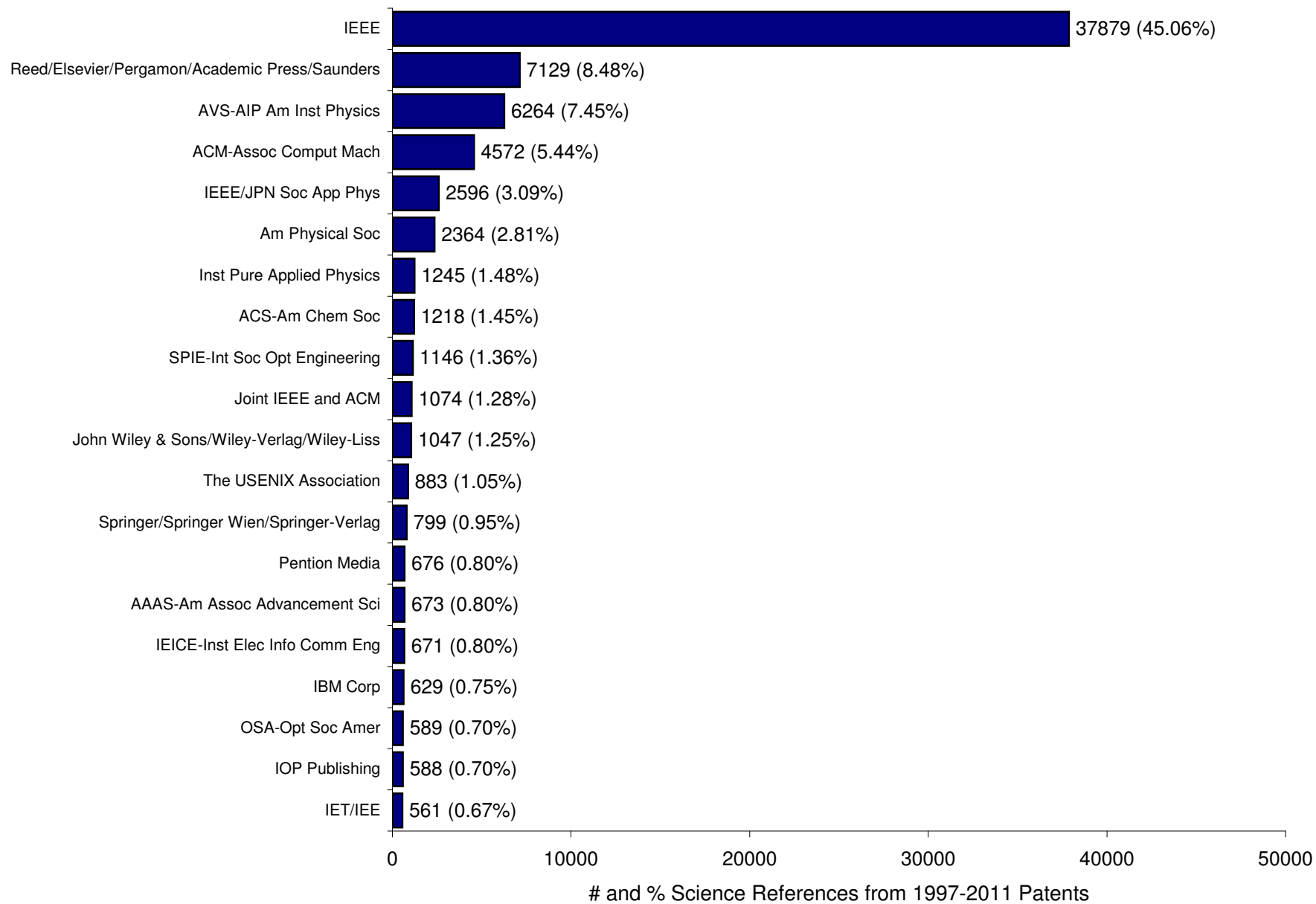




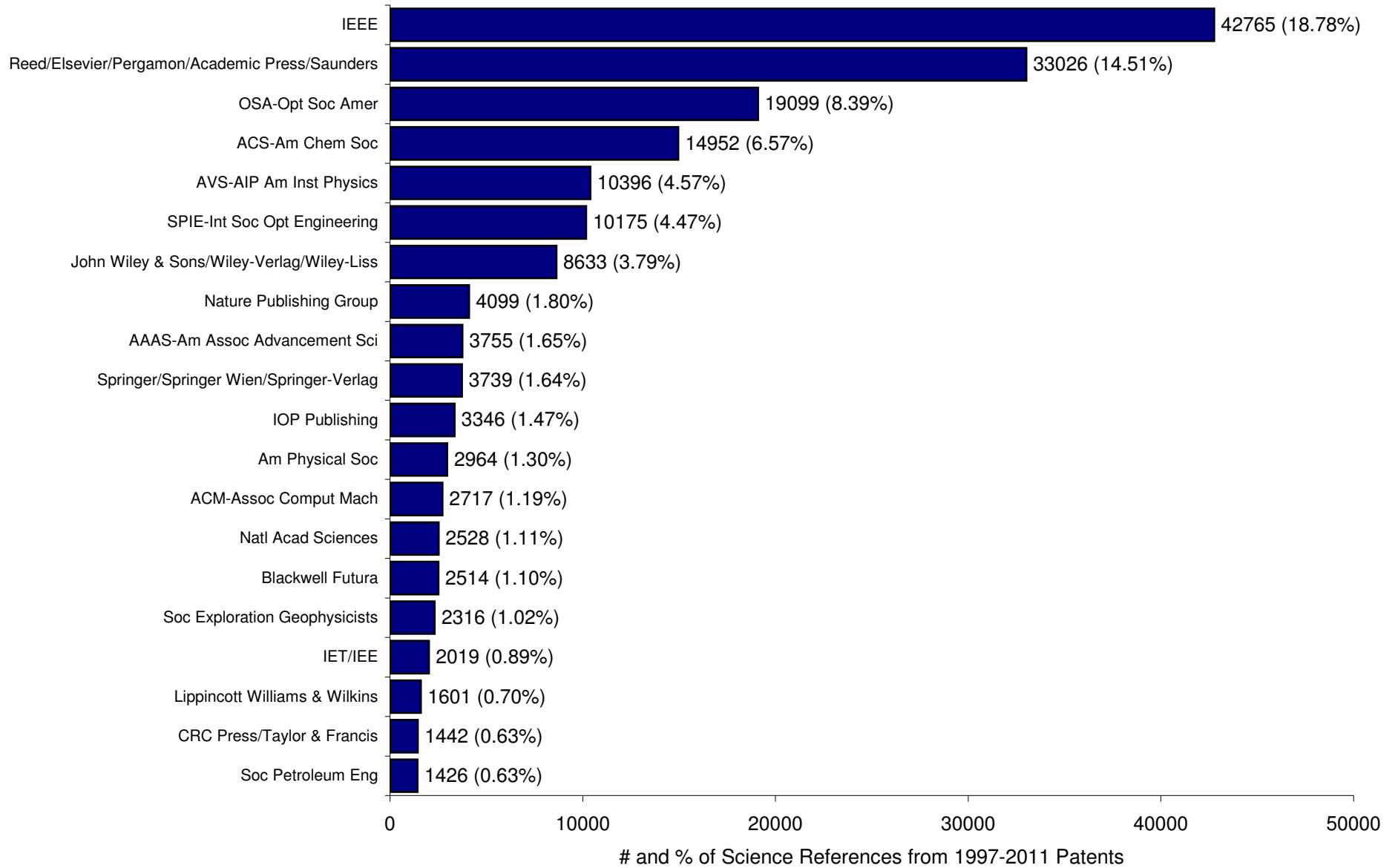
# Figure 6 - # and % of Science References from 1997-2011 Medical Device Patents to Top 20 Publishers and Conference Organizers



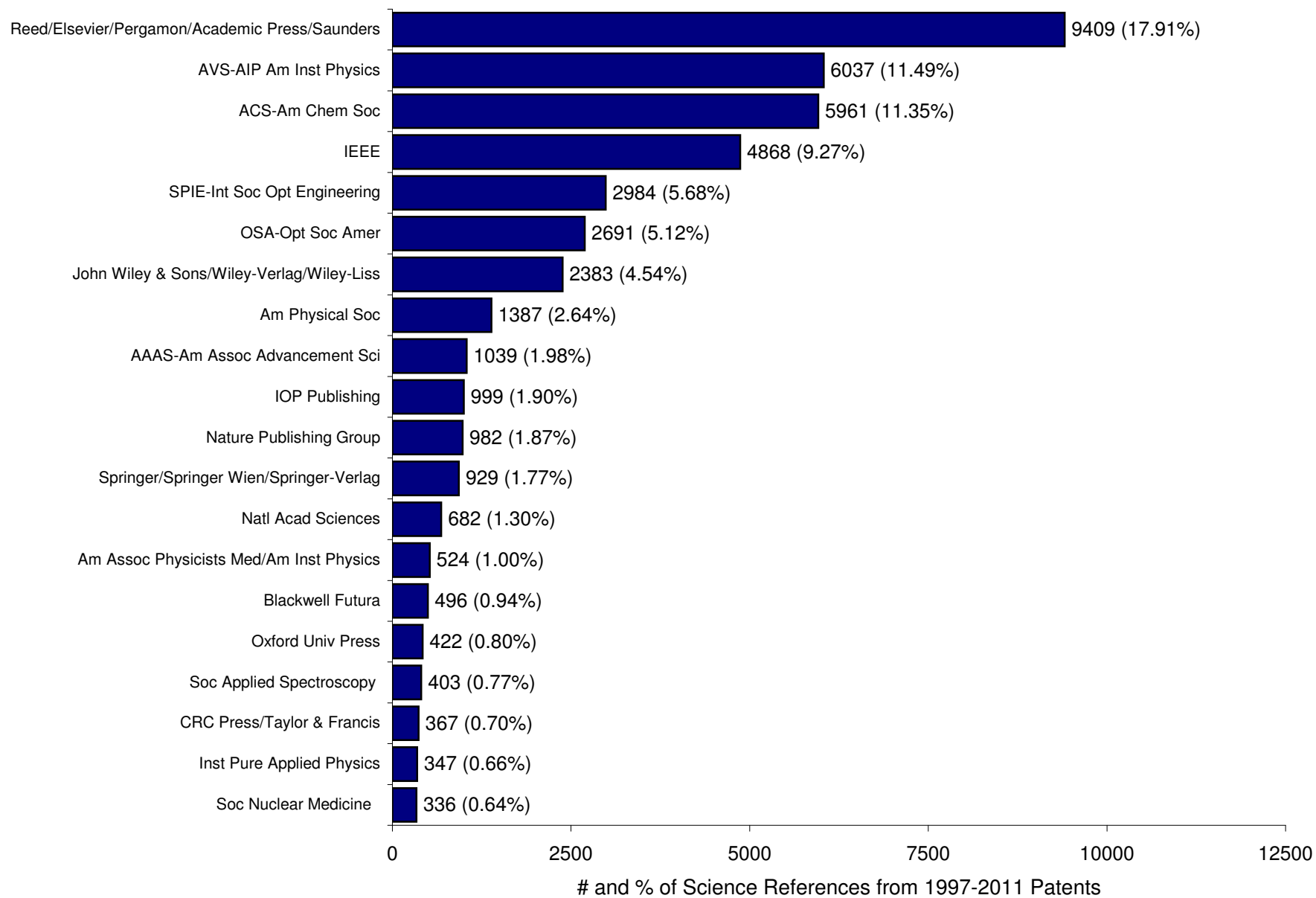
# Figure 7 - # and % of Science References from 1997-2011 Information Storage Patents to Top 20 Publishers and Conference Organizers



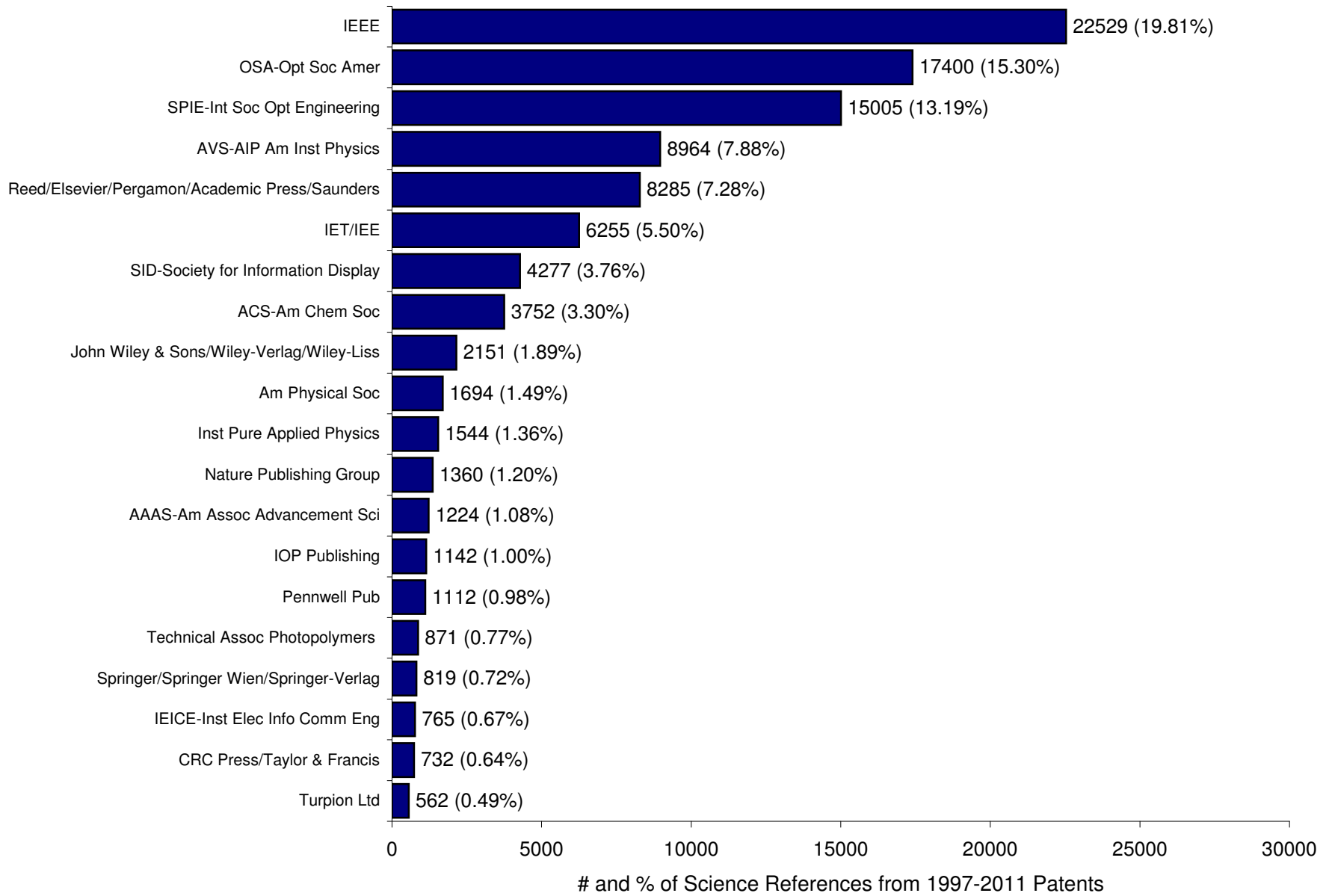
# Figure 8 - # and % of Science References from 1997-2011 Measuring/Testing/Control Patents to Top 20 Publishers and Conference Organizers



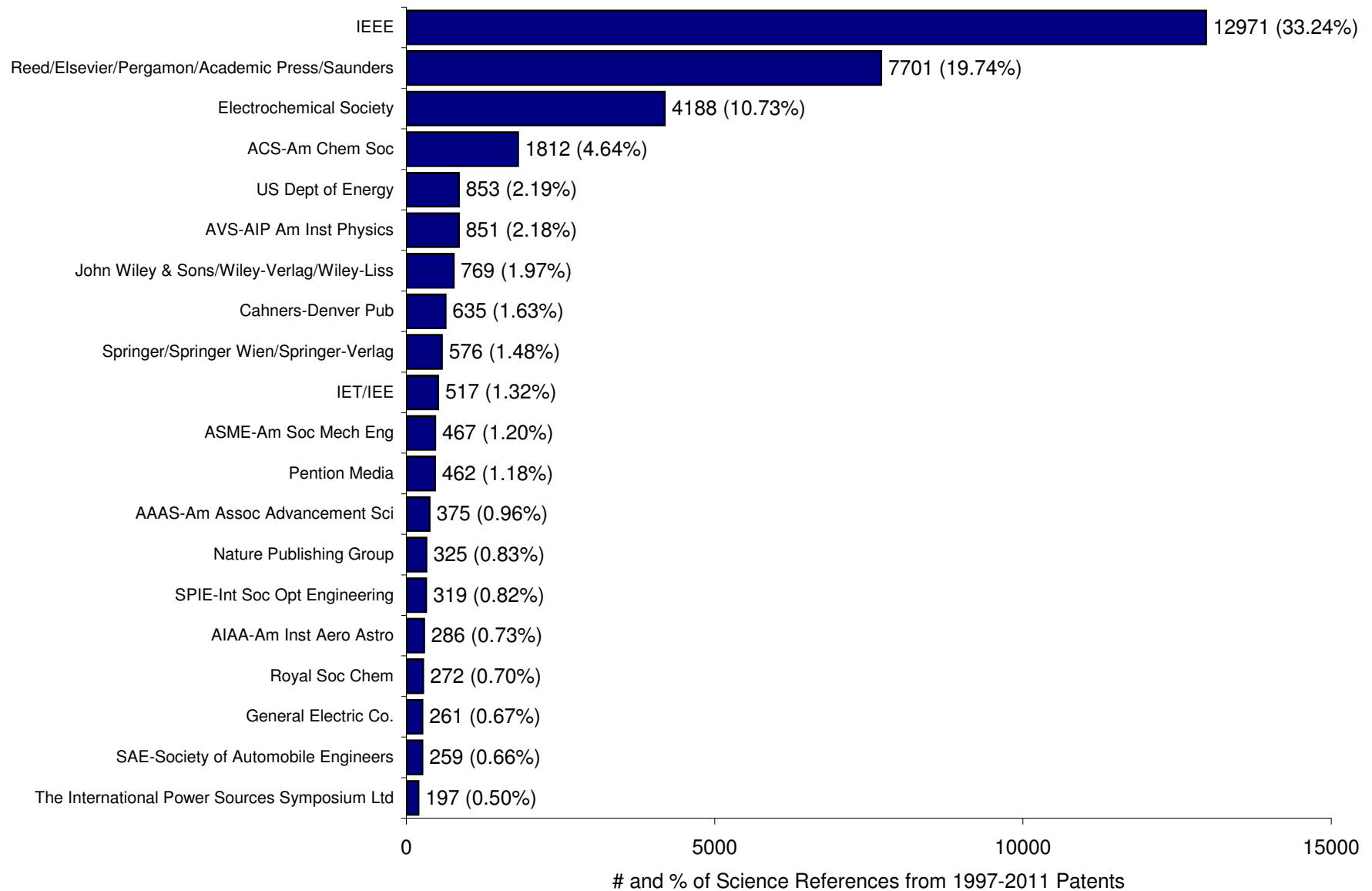
# Figure 9 - # and % of Science References from 1997-2011 Nuclear/X-Ray/Radiant Energy Patents to Top 20 Publishers and Conference Organizers



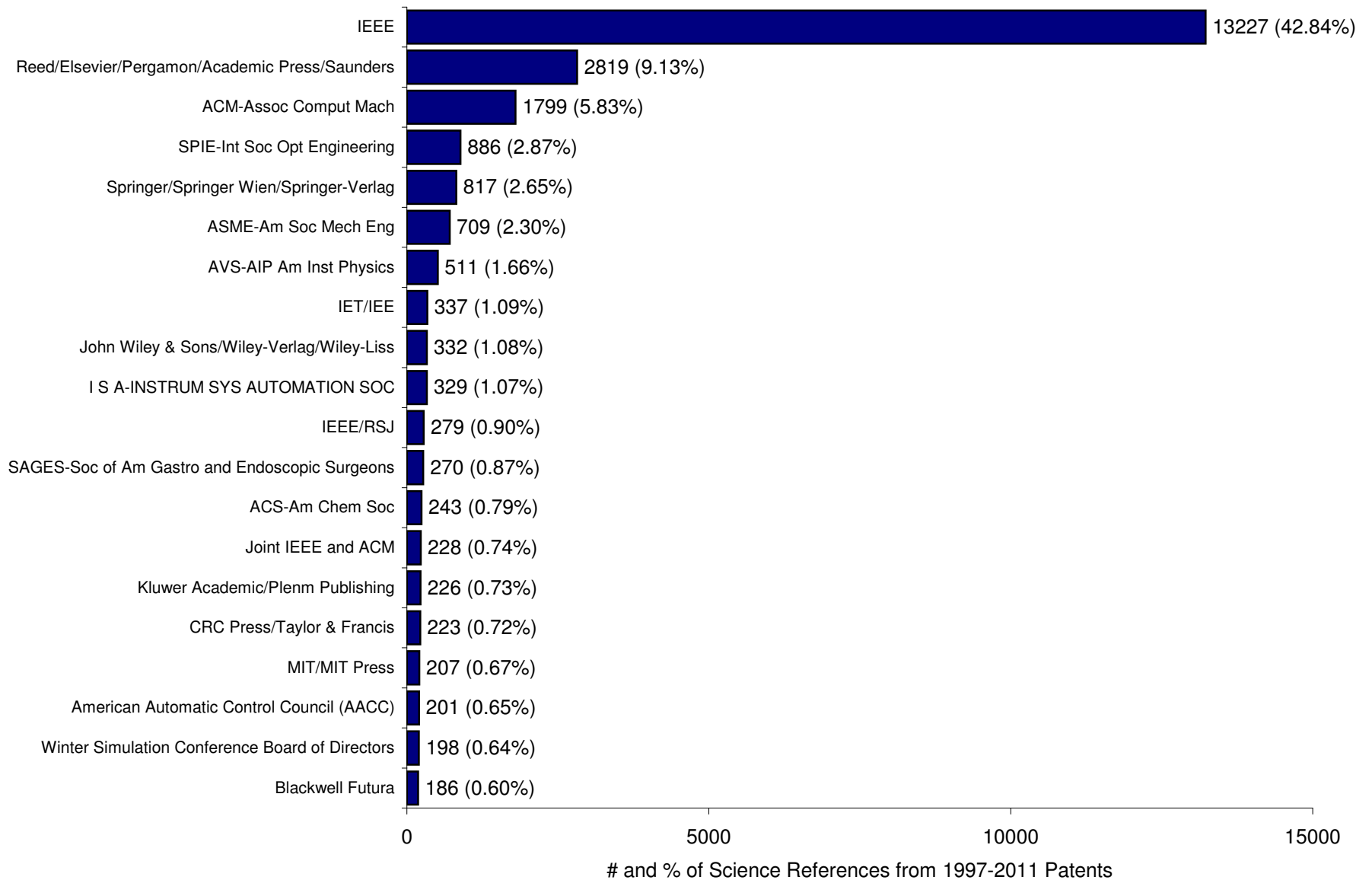
# Figure 10 - # and % of Science References from 1997-2011 Optics Patents to Top 20 Publishers and Conference Organizers



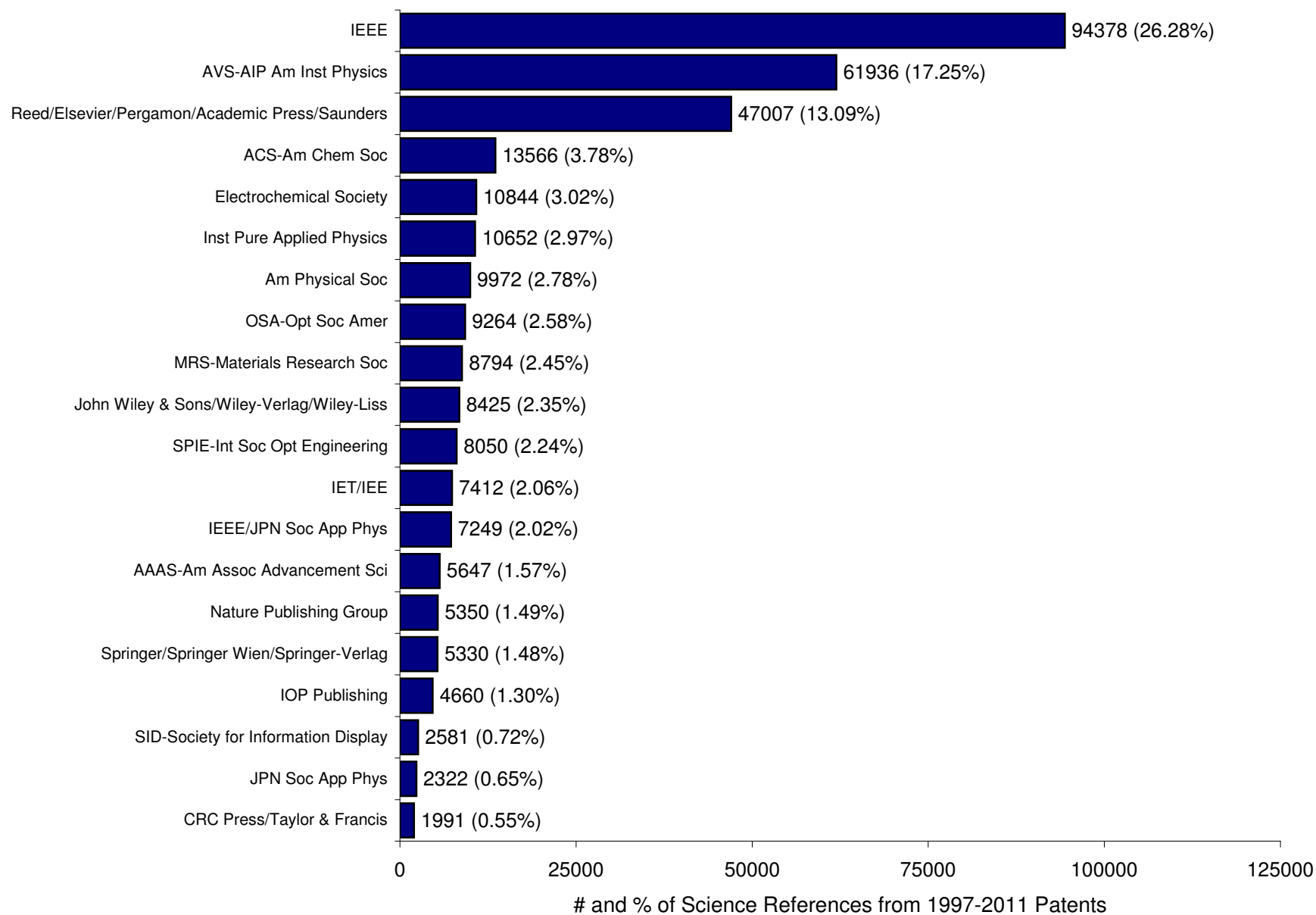
# Figure 11 - # and % of Science References from 1997-2011 Power Systems Patents to Top 20 Publishers and Conference Organizers



# Figure 12 - # and % of Science References from 1997-2011 Robotics and Intelligent Mfg Patents to Top 20 Publishers and Conference Organizers

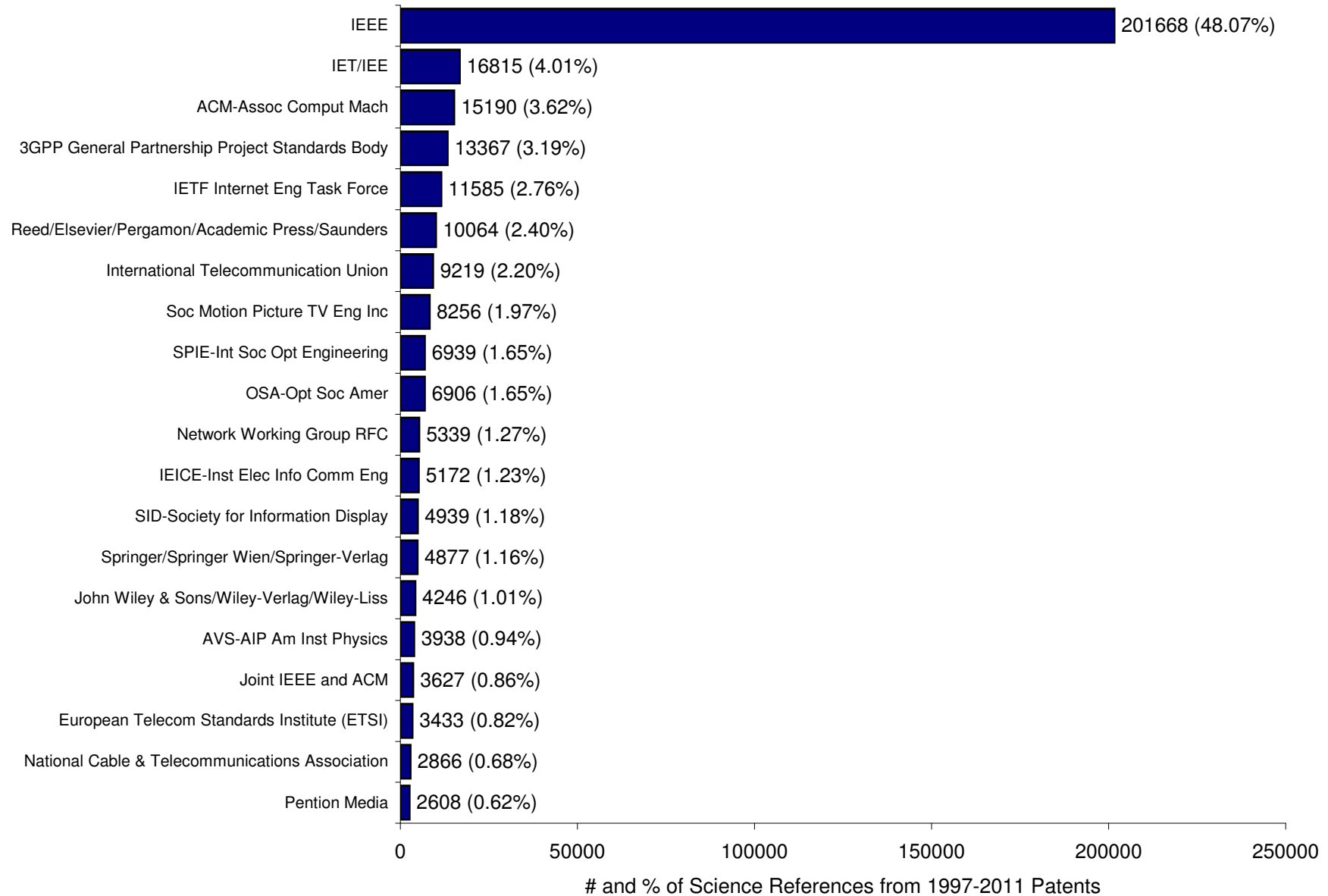


# Figure 13 - # and % of Science References from 1997-2011 Semiconductor Patents to Top 20 Publishers and Conference Organizers





# Figure 14 - # and % of Science References from 1997-2011 Telecommunications Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations



**Figure 15 - 1997-2011 Citation Index of Patents Referencing IEEE Papers and Conferences Versus Patents not Referencing IEEE for 12 Categories**

