



Technology Insight Report

Multi-Touch Technology

Patent iNSIGHT Pro
Transform Patents to Intelligence

We have seen it before in movies such as *Minority Report*, *The Island*, *Quantum of Solace* and *Avatar* and marveled at the thought of using our fingers to manage our information needs. Touch technology has existed for decades now but 2009 and 2010 have seen this technology emerge like never before and pose a serious threat to the keyboard, the mouse and computing as we know it. From multi-touch phones, tablet pc's, information kiosks, GPS devices, monitors, e-book readers to just about anything which is making waves with consumers around the world, the chances are multi-touch technology is playing a key role in its success.

Overview

Introduction to Multi-Touch

Multi-touch is a method of interacting with a computer screen or smart phone. Instead of using a mouse or stylus pen, multi-touch allows the user to interact with the device by placing two or more fingers directly onto the surface of the screen. The movement of the fingers across the screen creates gestures, which send commands to the device.

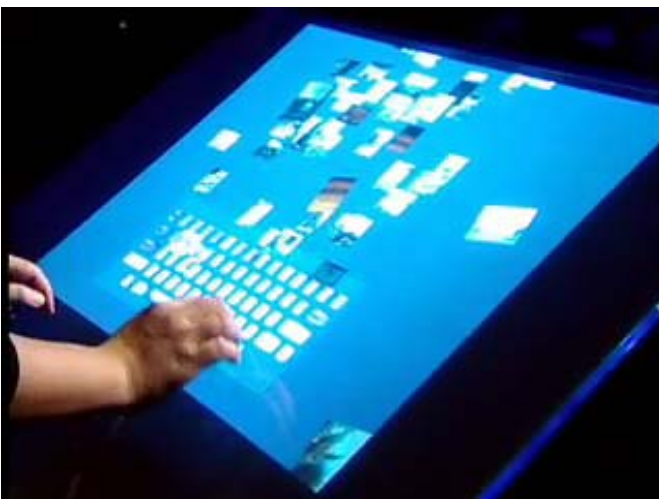
Multi-touch has been implemented in several different ways, depending on the size and type of interface. Both touch-tables and touch walls project an image through acrylic or glass, and then backlight the image with LED's. When a finger or an object touches the surface, causing the light to scatter, the reflection is caught with sensors or cameras that send the data to software which dictates response to the touch, depending on the type of reflection measured.

Touch surfaces can also be made pressure-sensitive by the addition of a pressure-sensitive coating that flexes differently depending on how firmly it is pressed, altering the reflection. Handheld technologies use a panel that carries an electrical charge. When a finger touches the screen, the touch disrupts the panel's electrical field. The disruption is registered and sent to the software, which then initiates a response to the gesture.

In the past few years, several companies have released products that use multi-touch. In an attempt to make the expensive technology more accessible, hobbyists have also published methods of constructing DIY touch-screens.

The term multi-touch is a trademark of Apple Inc.

Source: Wikipedia link: <http://en.wikipedia.org/wiki/Multi-touch>



Food For Thought



Bill Buxton, a principal researcher at Microsoft, has been studying touch technology since the 1980s. In a recent paper entitled 'Multi-Touch Systems that I have known and loved' he dismissed the idea that touch technology would kill off the mouse.

"Those who try to replace the mouse play a fool's game. The mouse is great for many things, just not everything. The challenge with new input is to find devices that work together with the mouse (such as in the other hand), or things that are strong where the mouse is weak," he wrote.

HP's Crampton sees the TouchSmart PC and others as opening the door for software developers to start using touch in their designs.

He is sure the technology has come of age.

"I think touch technology will come to dominate the home computing environment within three to five years," he said.

Source: BBC News a link: <http://news.bbc.co.uk/2/hi/technology/6242890.stm>

A Brief History of Touch Technology

The use of touch technology to control electronic devices predates the personal computer. Early synthesizer and electronic instrument builders like Hugh Le Caine and Bob Moog experimented with using touch-sensitive capacitance sensors to control the sounds made by their instruments. IBM began building the first touch screens in the late '60's, and, in 1972, released the PLATO IV computer, a terminal used for educational purposes that employed single-touch points in a 16x16 array as its user interface.

Multi-touch technology began in 1982, when the University of Toronto's Input Research Group developed the first human-input multi-touch system. The system used a frosted-glass panel with a camera placed behind the glass. When a finger or several fingers pressed on the glass, the camera would detect the action as one or more black spots on an otherwise white background, allowing it to be registered as an input. Since the size of a dot was dependent on pressure (how hard the person was pressing on the glass), the system was somewhat pressure-sensitive as well.

In 1983, Bell Labs at Murray Hill published a comprehensive discussion of touch-screen based interfaces. In 1984, Bell Labs engineered a touch screen that could change images with more than one hand. In 1985, the University of Toronto group including Bill Buxton developed a multi-touch tablet that used capacitance rather than bulky camera-based optical sensing systems.

A breakthrough occurred in 1991, when Pierre Wellner published a paper on his multi-touch "Digital Desk", which supported multi-finger and pinching motions.

Various companies expanded upon these inventions in the beginning of the twenty-first century. Mainstream exposure to multi-touch technology occurred in the year 2007, when Microsoft released its Microsoft Surface and Apple unveiled the iPhone. Small-scale touch devices are rapidly becoming commonplace, with the amount of touch screen telephones expected to increase from 200,000 shipped in 2006 to 21 million in 2012. More robust and customizable multi-touch and gesture-based solutions are beginning to become available, with interfaces that register multiple touch-points and gestures.

Source: Wikipedia link: <http://en.wikipedia.org/wiki/Multi-touch>

Evolution of Touch Technology



IBM's Plato IV 1972



Touch Screens



Multi Touch

Touch Technology – Insights from Patents

Insight Overview

Touch technology has gathered the interest of many in recent times although it's been around for some time now. IP activity and patent data are great indicators of exactly what is happening in this space and could help uncover several insights while answering questions that manufacturers, technology enthusiasts, inventors, scientists, investors and others would seek answers to. Has touch related technology come of age?

- When did IP activity around this technology start picking up and is it still showing a strong increase?
- Who are the innovators behind the best this highly sought after technology has to offer?
- Who are the manufacturers and players showing interest in this field?
- What are the industries and markets showing interest in licensing opportunities for touch technology patents?
- What does the growth trend look like for the current year based on the first month patent filings?

To look into various touch based technologies and get a better insight into the IP activity that surrounds it, we carried out a quick analysis using Patent iNSIGHT Pro software.

The Search Strategy

The first step is to create and define a patent set that will serve as the basis of our analysis. Using the commercial patent database **PatBase** as our data source we used the following search query to create our patent set:

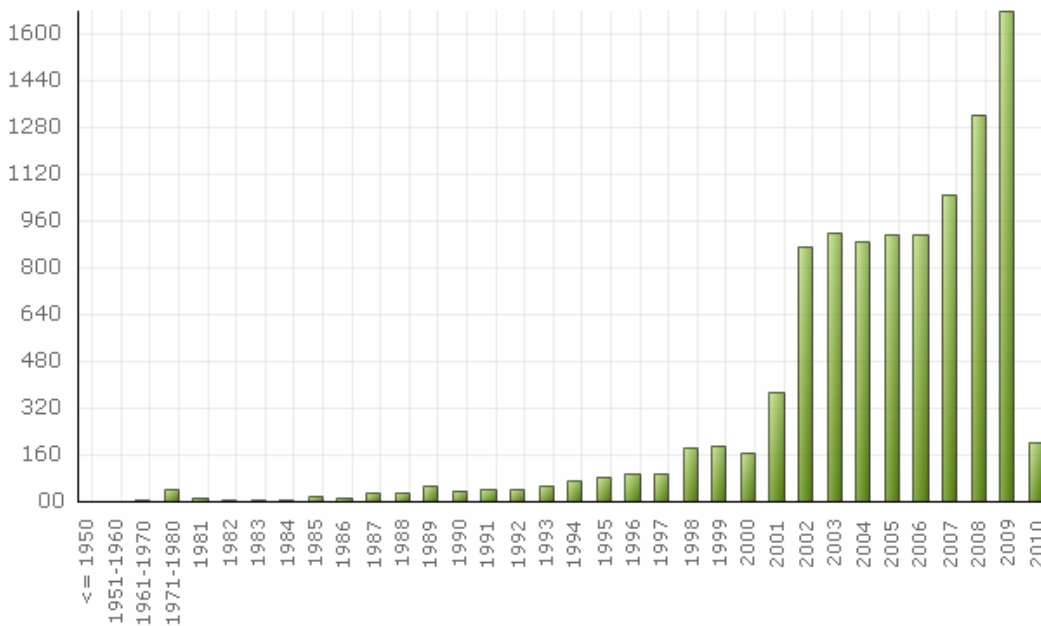
(touch and ((touch w/2 (screen or interface or monitor or display or pad)) or ("tactile feedback" or (multi w/2 touch) or haptic*))*

The query was directed to search through the titles, abstracts and claims and with the assumption that all related patents would be filed in US, the search was limited to US publications. The result was a patent set of 10398 records which would form the basis of our research.

IP Activity across last 40 years

What has been the IP activity trend for touch technologies from 1970 till present date?

We know the first patents for touch based computing technology were filed as early as the 1970's but we have witnessed these technologies making an impact in the markets in recent years. Patent filings across timelines are an indicator of how much activity and research interest there is within a particular space and here is what we discovered for touch technology:



Till the end of the 1990's although it appears that innovators were testing the waters around this technology and the realization that this would be 'hot' technology happened between 2000 and 2002 where the number of patents filed went from 165 patents in the year 2000 to 871 patents in 2002.

Research activity peaked in 2002 after which is remained consistent till 2007 where we can see between 800 to a 1000 new patents filed each year for touch based innovation. 2008 till the present date is where activity around touch technology and computing has really taken off and shown the kind of rapid growth we are witnessing in the interest around products that use this technology and are hitting the markets in recent times.

Just a month and a half into 2010 and we are already seeing over 200 patents. It's clear that this technology picked up slowly, grew consistently and has now reached new heights and is evidently on an upward trend.

How we did it?

Once the patents were populated in Patent iNSIGHT Pro, the publication trend chart was generated on a single click using the dashboard tool.

The same tool also helped generate a tabular report.

To download this tabular report of the IP Activity trend in Microsoft Excel format please click on the link below:

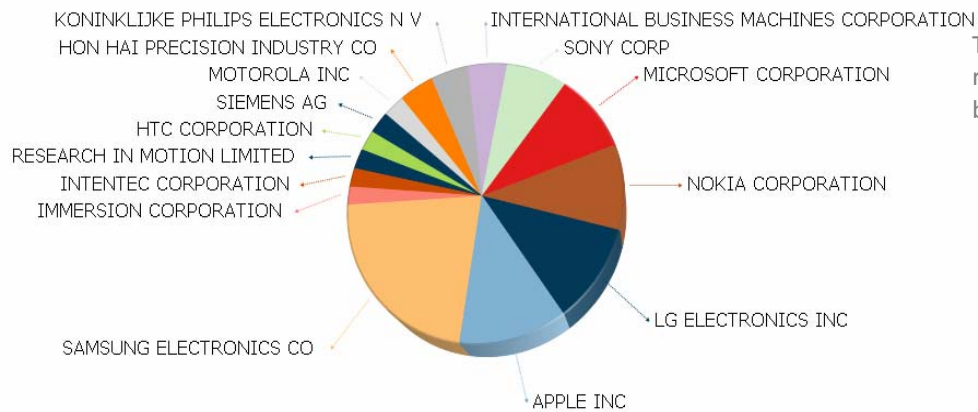


[Download in XLS format](#)

Top Assignees in the Last 5 Years

Who have been the top companies or assignees in touch technology over the last 5 years?

While from marketing or product launches one can assume a certain manufacturer is the number one player for a certain type of technology, it could be misleading. Patent portfolios are a more accurate indicator of how much a business invests in a particular technology such as touch and gives a better picture of who the top assignees in this space are. Here is what we uncovered with respect to the top 15 assignees in the last 5 years:



How we did it?

Using the co-occurrence analyzer in Patent iNSIGHT Pro a matrix of top 15 assignees with respect to time was created. This matrix was then filtered to just the last 5 years. A pie chart and a tabular report was then generated from the co-occurrence analyzer

To download the tabular results please click on the link below:



[Download in XLS format](#)

Top 15 Assignees

1. Samsung Electronics Co
2. Apple Inc
3. LG Electronics Inc
4. Nokia Corporation
5. Microsoft Corporation
6. Sony Corp
7. International Business Machines
8. K Phillips Electronics NV
9. Hon Hai Precision Industry Co
10. Motorola Inc
11. Siemens AG
12. HTC Corporation
13. Research In Motion Limited
14. Intenec Corporation
15. Immersion Corporation

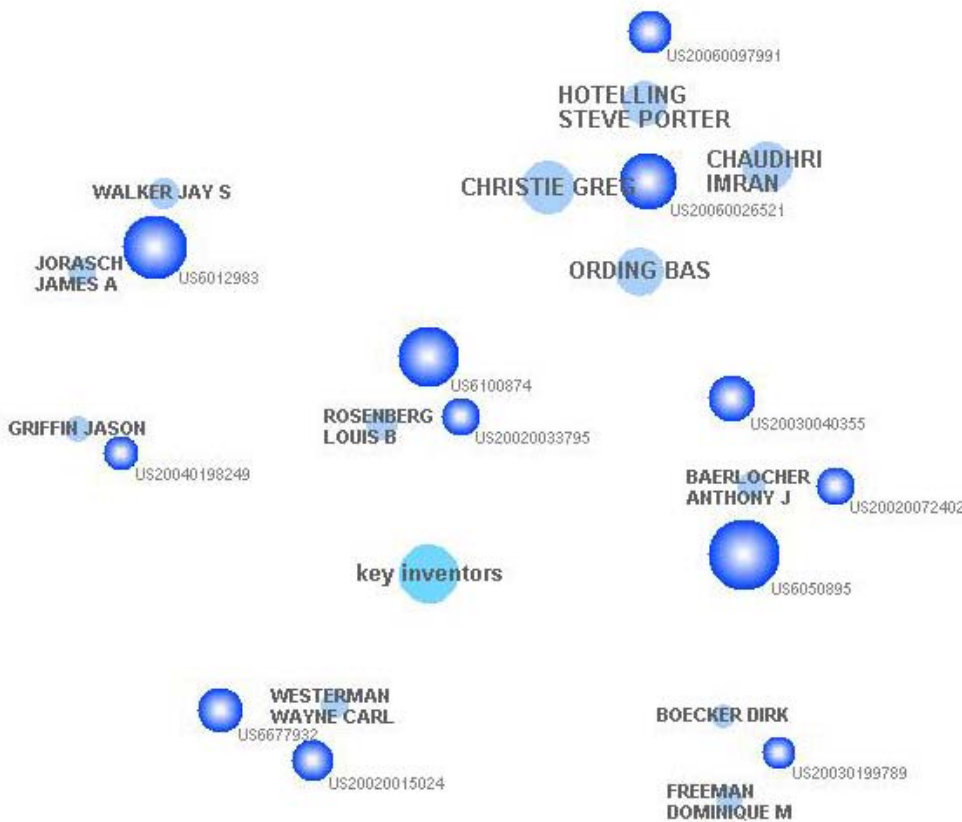
Key Inventors

Who are the key inventors who have made significant contributions in the touch technology space?

While the products and brands that represent a technology or innovation steal most of the limelight, it's interesting to know which inventors have made significant contributions to the progress of the technology that has touched so many lives. What are their inventions that have changed the way we do things? Here is a quick visual representation of the key innovators to whom these discoveries have been credited:

How we did it?

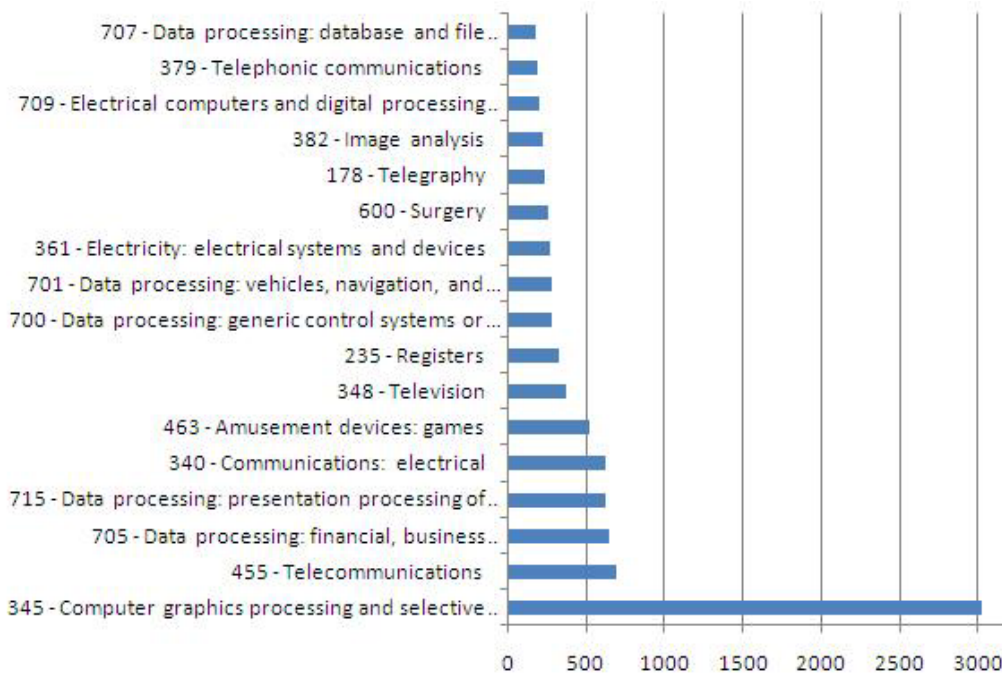
Using VizMAP we first created a landscape of top 25 inventors. And there the patents with the most forward citations. The map shows the important inventors and their important patents with patent numbers. The size of the patent node in dark blue color is dependent on the number of citing documents of that patent.



Inventors such as Steve Porter Hotelling, Jay S Walker, Luis B Rosenberg and Anthony J Baerlocher were responsible for patents that were cited in several future patents in this space and can be considered critical in the development of the technology as we know it today.

Industrial Applications of Touch

From the opportunities point of view one needs to look into the various industrial applications of this technology and this can be done by classifying touch technology patent search results by industry. We found that touch technology has had very extensive applications across many industries.



Selective visual display systems and telecommunications topped the charts in terms of IP activity with references to touch technology however, the list covers motor vehicles, optic projectors, photocopying and surgery among several other industrial applications.

From the findings it's evident that although in more established industries such as visual display systems, telecom and financial data processing there is significant activity as a result of market success, there are a lot of relatively under exploited industries and markets such as merchandising, chairs and seats among others where there are likely to be more opportunities waiting to be uncovered.

For the complete list of top industries where touch technology is being applied please download from the link below



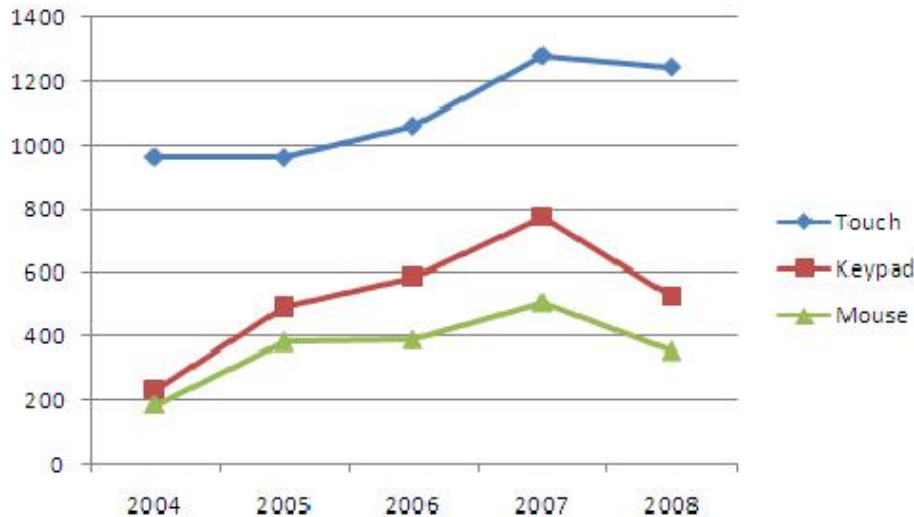
Excel export of Top industries

US Classes	# Records
345 - Computer graphics processing and selective visual display systems	3031
455 - Telecommunications	687
705 - Data processing: financial, business practice, management, or cost/price determination	646
715 - Data processing: presentation processing of document, operator interface processing, and screen saver display processing	622
340 - Communications: electrical	622
463 - Amusement devices: games	517
348 - Television	365
235 - Registers	319
700 - Data processing: generic control systems or specific applications	277
701 - Data processing: vehicles, navigation, and relative location	270
361 - Electricity: electrical systems and devices	266
600 - Surgery	256
178 - Telegraphy	226
382 - Image analysis	222
709 - Electrical computers and digital processing systems: multicomputer data transferring	197
379 - Telephonic communications	182
707 - Data processing: database and file management or data structures	177

Touch Keypad & Mouse IP Activity Comparison

Who leads the trend amongst electronic interface devices? Is it keypad, mouse or touch interface?

Touch has emerged as a popular computing and electronic interface technology. Till recently the digital keypad and mouse were the most popular input or interface technologies but how does touch technology stack up against these well established ones?



From the patent activity filings from 2004 to 2008 it shows all three have been showing a growth in IP activity till 2007 after which keypad and mouse technologies have shown a slightly sharper decline as touch holds its ground. Overall, the IP activity around touch technologies has been significantly higher and although it's not an indicator of its popularity in the market, it's clearly the technology innovators are showing a greater interest and betting on it for the future.

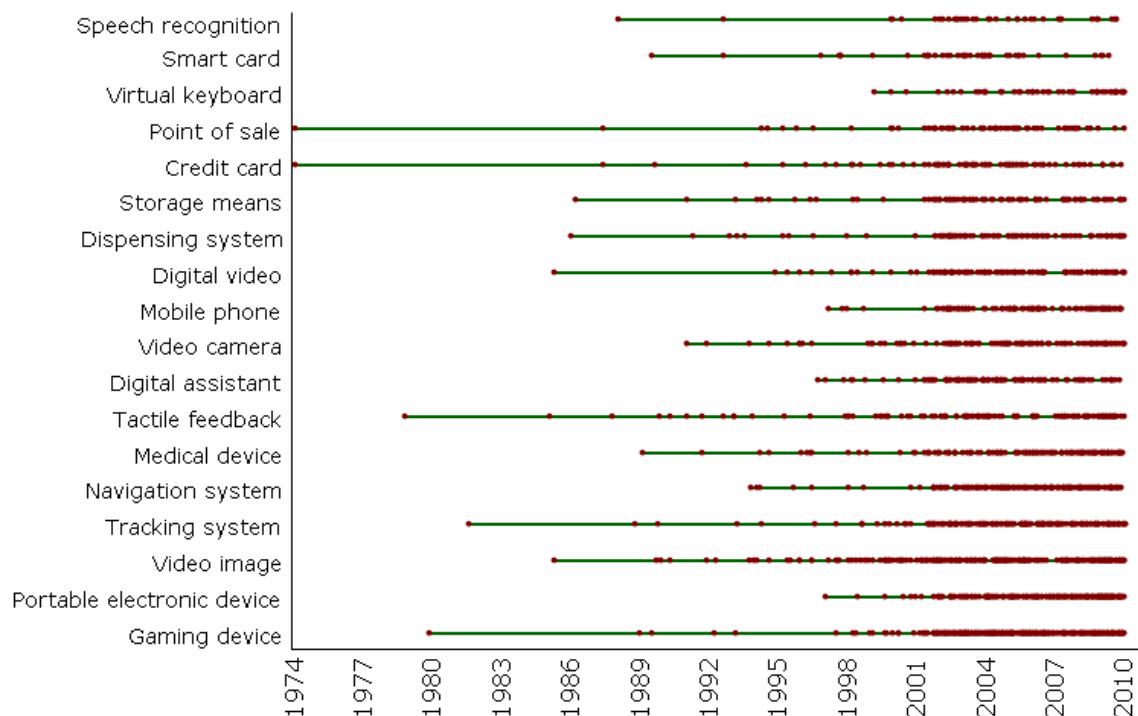
How we did it?

To compare the trend for the three interface technologies, a quick search was done individually for keypad, mouse and touch while restricting the results to patents filed from 2004 to 2008. The results which can be exported to excel displays the number of filings for each technology. Using the dashboard within Patent iNSIGHT Pro a trend chart is generated to display the results in a form where they can easily be compared as shown on the left.

Technology Innovations associated with Touch

What are the other technologies and IP filings which can be associated with touch technology?

A quick look into related technologies displays competing as well as co-dependent technologies as above. Voice recognition and virtual keyboard stand out as two spaces a lot of research has been put into recently and believed to be the future of interfacing with electronics much like touch technology. A more detailed look into tactile feedback reveals it's an interesting evolution of touch technology and along with gaming devices, medical devices, mobile phones, digital assistants these are all areas of interest for anyone exploring touch based IP.



How we did it?

To do a very broad similarity study to touch technologies the Patent Insight Pro Clustering (Auto-Categorization) Engine was used to identify key technologies within the set of records and their related sub-technologies. The prominent amongst these technologies were selected to generate an Innovation Timeline report and display these technologies along with indications of IP activity around them as shown on the left.

Touch Technology IP Summary

Where Does This Technology Stand in 2010?

From these insights into touch technologies it appears that it is coming of age in current times although the early breakthroughs were made decades ago. From the innovation activity around it we can see that it really made headway in the 90's and the last 3 years 2008, 2009, 2010 indicate that research in this space has just taken off to a new level and going by the current trend is only likely to climb even higher from here. It's one of the extremely "hot" technologies of our times and is being sought after by a very wide of industries for various applications and is likely to squeeze its predecessors like keypad and mouse and become one of the electronic and computing interfaces of choice in the present decade.

From what we have seen through the insights revealed by IP activity and patent data we are going to see a lot more of touch related electronics in the days to come.

About Patent iNSIGHT Pro

Patent iNSIGHT Pro™ is a comprehensive patent analysis platform that allows you to accelerate your time-to-decision from patent analysis activities. Designed from inputs by experienced patent researchers, Patent iNSIGHT Pro easily blends into your existing Research workflow. Patent iNSIGHT Pro is used by leading legal services, Pharmaceutical & biotech, electronics companies and research organization across US, Europe, South America and India with more than 180 end users. Patent iNSIGHT Pro is developed and marketed by Gridlogics, a research driven IT Company specializing in providing intellectual property analysis and visualization solutions to aid R&D and corporate strategy.

Gridlogics is headquartered in Pune, India and has a sales presence in Delhi, Mumbai and USA.

For more information:

Visit us at: www.patentinsightpro.com

Or call us at: 1-408-786-5524

Or mail us at: contact@patentinsightpro.com