GJE Intellectual Property

Haptics Technology: Strategy for Patents

Introduction

Haptics have been seen in various forms for decades but in recent years their development has accelerated and spread out into a wider range of fields than ever before. With more industries recognising the value of this exciting sector and entering the market themselves, it has become increasingly important to make sure a company's intellectual property is protected and that potential IP-related risks are well understood.

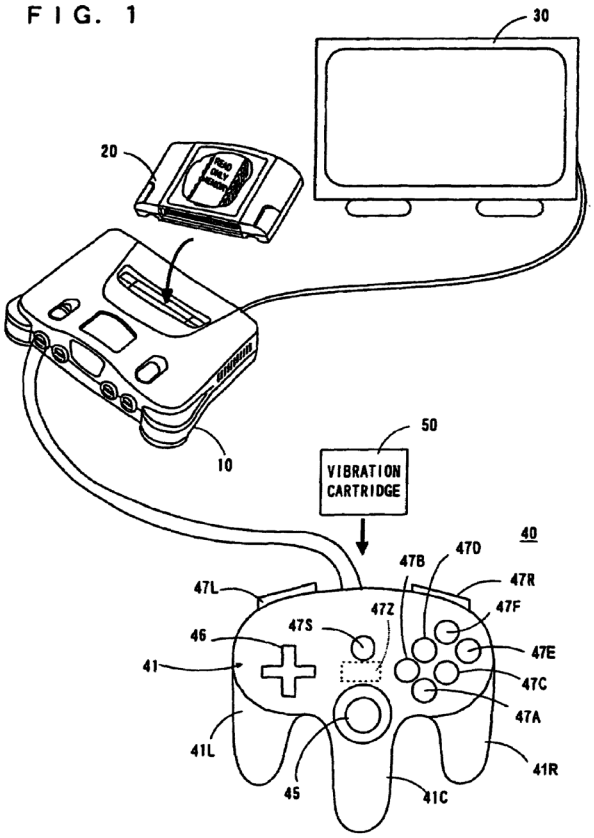
For those unfamiliar with haptics, haptic technologies represent the interaction between humans and machines when expressed through our sense of touch and, whether we realise it or not, the vast majority of us use haptic technology on a daily basis. While the type of haptics you are most familiar with is likely the vibration of your phone, haptics are by no means limited to notifying us of an incoming message or call.

As haptic technology advances, the field is becoming increasingly competitive. Companies such as Immersion Corporation have filed over 3,200 patent applications and UK-based Ultraleap (formerly Ultrahaptics) recently raised £35 million in Series C funding.

With the growth of IoT and edge computing, it is predicted that haptics will pervade all aspects of our daily lives. For example, in the automotive sector it is anticipated that we will be interacting with the car in new ways such as vibrating steering wheels to indicate lane departure or, in the medtech sector, haptics can be used to provide better feedback during diagnosis or surgery.

If there is one thing that we have learned from working alongside a growing number of Computer Technology businesses of all shapes and sizes, it is that the more a business understands its IP and how it fits within its business plan the greater the likelihood of commercial success.

In this white paper we will look at some examples of the history of haptics through patents and considerations for haptics businesses as they look to commercialise their ideas.



An Abridged History Of Haptics Through Patent Applications

Like so many fields of technology, the evolution of haptics can be seen through patent filings. Haptics have been used over the years for many different functions, for example, to transmit information through touch, to create delightful moments, to focus a user's attention, to provide sensory immersion or to simulate real world experiences. While haptics might be thought of as a relatively new technology, such functions have been considered for some time.

One of the earliest haptics patent applications was filed by Bell Telephone Laboratories (now Nokia Bell Labs) in 1971 who developed a "tactile man-machine communication system" [US 3,919,691 A] that could restrain the hand of an operator based on the positon of a held control stick, allowing the operator to "feel" objects that were not actually there.

Haptic feedback is now considered a staple feature of video games and has become an inseparable part of the experience for many. However, it wasn't until 1997 that Nintendo filed an application for the Rumble Pak [US 7,070,507 B2] and brought the technology into the hands of the masses. The Rumble Pak used an eccentric rotating mass (ERM); this is a motor that rotates an offset mass to produce an uneven centripetal force, causing the motor to vibrate back and forth.

Vibrations in many smartphones are created by ERMs, however some use linear resonant actuators (LRAs) instead. These typically use a voice coil (as found in a speaker) to drive a mass connected to a spring along a single axis. For example, Immersion Corporation developed a haptic system featuring an LRA that can be driven by a unidirectional signal [US 8,378,965 B2], and Apple have included their version of an LRA, dubbed the "Taptic Engine" [US 10,051,095 B2], in handsets since the iPhone 6s.

More recently, the piezoelectric effect has been exploited to cause a piezoelectric material to deform repeatedly and generate vibrations, as seen in a 2009 application [US 8,378,979 B2] filed by Amazon for their Kindle devices. Due to the nature of these materials, piezoelectric actuators can be precisely operated at a wider range of frequencies and amplitudes than ERMs or LRAs.

As haptics development has moved forwards it has expanded and is by no means limited to video games or phones, or even to physical objects. For example, Ultraleap use ultrasonic sources to create an acoustic field that provides mid-air haptic feedback [US 9,977,120 B2], and Immersion Corporation were recently granted a patent for their system that generates touchless haptic effects through selective control of an electric field [US 10,223,879 B2].

These are just some examples of how haptics have been protected over time; though the field is moving and branching so quickly who knows what another abridged history may look like in just a few years' time?

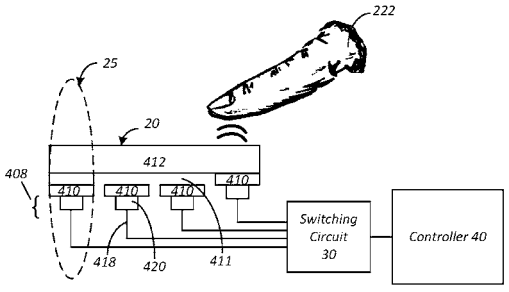
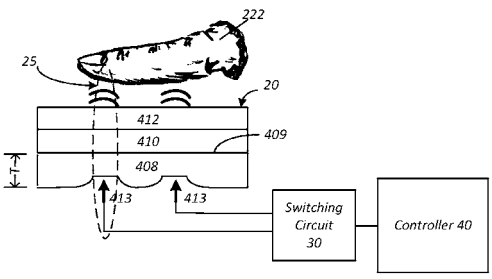


Figure 5



"The patent window starts as soon as you know how to put a concept into practice and closes the moment the implementation is available publically."

Is The Technology Ready?

At the time many of these haptics ideas were conceived, sceptics would have considered them 'blue sky' and not grounded in reality. Just a few short years ago, a VR simulation that allows a surgeon to realistically feel a scalpel in their hands would have been considered pure science fiction but following $9 million in funding, HaptX's gloves portent to do exactly that. Using a 'microfluidic' skin, [US 9,652,037 B2; US 9,904,358 B2] a textile containing an array of pneumatic actuators and air channels, and by combining that with motion tracking, HaptX propose that they can realistically mimic the feeling of delicate touch.

How about the concepts underpinning Ultraleap, one of the poster-children for the UK start-up industry? Ultraleap aims to provide virtual tactile sensations projected onto your hands. Realistic or science fiction? SandboxVR, an immersive VR company have openly been inspired by Star Trek and the Matrix and HaptX have been openly inspired by Ready Player One (the book by Ernest Cline in which in which the protagonist Wade Watts uses a VR "haptic suit" to interact with a virtual world).

In this context, should Ernest Cline have filed for a patent to his "haptic suit"? Can a company file a patent to an idea first conceptualised in Sci-Fi?

How does a company know when to protect their ideas during development? Too soon and the patent might be invalid or inappropriate; too late and they might have missed their chance.

There is of course no one-size fits all answer to this. It is absolutely fundamental to any patent filing strategy to make sure that every idea is considered on its own merits. However, the guiding principles can be demonstrated by analogy. Consider … cake. The patent system is designed to reward those who develop the solutions that put a concept into practice.

So you won't get a patent simply for coming up with a concept for a Victoria Sponge, but the person who wrote the recipe and explained how to bake the sponge and combine it with the jam and cream will be able to apply. You don't have to have include the specific temperatures of the oven or the varieties of strawberries but you do have to provide enough steps that a fellow baker could replicate the results.

In the haptics context, the science fiction writer isn't going to get a patent for their ambitious prophecy but the engineer who develops the technology to make it happen will.

Here it is important to emphasise that the engineer doesn't have to have actually built the prototype yet but it must be realistic that the technology will work. This is fundamental to patent filing strategy. The window for filing is tight and the value in the patent application might diminish the longer you wait.

For example, a competitor might get there first or you might have needed to disclose the concept to investors or partners. On the other hand, filing too early and you risk the idea changing or the business not taking off enough to pay for the patent filing — the patent process is a train track and once you get off you can't get back on.

What Is Patentable?

Although science fiction can be said to have inspired some of modern haptics design, the truth is that the quest for tactile feedback is grounded in the need for the modern world to improve the man-machine interaction or reduce the cognitive burden on the user. In this context, is everything patentable or are there limits to what patents can be granted for?

In Europe at least, inventions must be capable of being made or used in some kind of industry and have to be "technical". Although ideas categorised as computer programs or presentation of invention aren't allowed, patents can be granted if there is a technical benefit or an improvement in the functioning of a machine. Take a GUI, for example (see here). Patents to GUIs are allowed if they provide a technical benefit and are substantially more than an aesthetically pleasing visual arrangement of elements.

In 2015, Immersion Corporation, one of the global leaders in haptic technology took their application to protect haptic feedback for a virtual pet to the European Patent Office's Board of Appeal. Setting a precedent for other haptics companies, the Board determined that in the context of virtual pets, solutions that address the problem of achieving the reliable and reproducible perception of a physical interaction with the real pet, would be protectable.

Moreover, the board found that the invention, namely a reciprocating cursor movement and haptic feedback, related to inherently protectable technical features of the device interface.

In computer games, an area which provides a lot of the cutting-edge consumer-focussed haptics commercial implementations, patents have provided a key competitive position. For example, in EP 1808210 B1, Nintendo successfully protected a way of changing virtual movement speed by indicting physical distance with a pointing device. This had utility when emulating a joystick; the user is able to indicate direction of the joystick and speed of movement based on where a pointing device is aimed.

In EP 0844580 B1, Konami were successfully able to convince the Board of Appeal that it is patentable to indicate at the base of a virtual footballer how passes can be made to other players.

What this means for haptics companies is that ways of interacting with machines are potentially patentable. Not only are haptics use cases patentable, as in the example of the Virtual Pet, but inventions that provide a technical improvement to improve man-machine interaction are also potentially protectable.

It is important again to consider that each idea should be considered on its individual merits. Just because something can be protected, doesn't mean it should be. Each idea should be evaluated based on whether it will add value the patent portfolio and how it will contribute to the overall business strategy.

Commercial Considerations

Although it is clear that more haptics ideas are potentially patentable than many might have thought and that timing is a key consideration, the commercial realities of ideas in the haptics field are crucial to consider. For example, how the idea will be exploited and the potential revenue streams involved are a significant component in formulating a filing strategy.

Let's consider for example two of the leading companies in the field, Immersion Corporation and Novint Technologies. Both companies are developers and licensors of haptics technology aiming to provide an immersive experience and both derive significant revenue from licensing their improvements to others rather than developing B2C offerings.

For example, Immersion Corporation have announced licensing deals with the likes of Sony Interactive Entertainment and licensing and collaboration deals with Google on their next generation hardware products, among others.

Not only are haptics ideas often incorporated into partner products but, as the ideas themselves a combination of software and hardware, there is a degree of complexity introduced as there are multiple components involved. Indeed Immersion Corporation call this the haptics stack, comprising a design layer, a software layer and a hardware layer.

In this context, patents are essential components of a licensing strategy, a strategy which is fundamentally an IP transaction. The transaction includes the transfer of know-how (e.g. design specifications), copyright (e.g. software – object and/or source code) and branding (e.g. trade marks) but is strengthened by an inclusion of a licence to use patented technology.

Considering the potential implementation of the technology and the accompanying revenue stream is central to a good patent filing strategy. What should companies do differently depending on how they want to apply the technology? Are there third-party IPR risk issues and are these mitigated? What is different if you are manufacturing chips or designing software compared to B2C haptic gloves, for example? Do any patent applications cover only the smallest saleable unit (or only the implementing apparatus) or do they cover all potential implementations (e.g. chips, software, and the apparatus embodying the idea)? How does territorial implementation of the idea affect the filing strategy?

Getting The Plan Right

IP acquisition

To protect all the commercial aspects of a product you will need to acquire one type of or a range of IP rights. These IP rights include patents, confidential information (know-how), registered trade marks, registered designs and copyright.

To help you decide which option is best you need to be aware of what these different IP rights are, how they are created, what protection they offer and how much they cost. Creating an effective IP portfolio is complex and represents a serious investment of both time and money, especially when patents are involved.

For example, it may take several years to obtain a granted patent. This means that if you think the associated technology or market will have moved on by then the protection you have paid handsomely for will be redundant and offer your company little value. In addition, a formal patent application requires a full written disclosure of your invention that will become available to the public (and your competitors) when the application is published, so it could be worth discussing an alternative strategy.

Before you acquire any IP rights, seek specialist advice to help you assess all of the costs, benefits and outcomes associated with your acquisition, then regularly review your decisions to ensure they remain valid.

How can you work out exactly what innovation you have?

We discussed above how haptics technology is at the cutting edge of modern innovation. As haptics are implemented and developed, there may be areas in your business where you think there is innovation to exploit but you're not quite sure what that innovation is.

What do you need to know?

If you do think there is additional innovation within your business you need to find out three things.

1. The innovation you have — what do you actually have? What is patentable? What other intellectual property rights could you use to protect your innovation?

2. The funding you need to develop that innovation — what type of investment do you want? What level of investment do you need? What IP budget will you need? What timeline should you be working to?

3. Any additional support you need — what other professional advice will you need to take this additional innovation to market?

Once you have the answers to all three you will be in a position to take your business forward.

What is the easiest way to find out what you need to know?

We have developed our proprietary Innovation Capture Session (ICS) to help our haptics clients highlight and ring-fence all of the innovation they have. The ICS will:

- clearly identify the innovation you have

- ensure your innovation is properly protected

- your innovation is supported by the structure required for commercial success.

The process

1. We start by identifying the innovation you have.

2. We then provide an intellectual property overview that includes any potentially patentable material and showcases any other form of IP protection you may need, e.g. trade marks and designs.

3. We talk tactics, suggesting the searching, drafting and filing strategy you could implement and the timing and costs linked to those recommendations. detailed advice is required, we'll introduce you to specialists we trust.

We also look at any wider business considerations such as structure, funding and tax efficiency. If more detailed advice is required, we'll introduce you to specialists we trust.

We then summarise all of our findings and all of our recommendations in a detailed report you can use to take the next step, safe in the knowledge you are doing the right things for the right reasons and ensuring you do not spend time or money seeking unnecessary or irrelevant advice.

Our report will provide clear guidance on how to take your business forward, as follows.

Your IP Strategy

We will help you decide the best type of protection and also how to proceed tactically in terms of choosing the right licensing, enforcement and filing strategies, so that you avoid unnecessary fees and have all the right protection in place — legally, commercially and geographically — for your specific objectives.

The right structure and funding for your business

You will be forewarned should you need to make any changes to your structure or make efforts to find any funding you may require. Knowing exactly what you have will also make it easier to show your investors how they'll recoup the level of return they wanted, which will make them more likely to invest.

An accurate definition of your market

Once you know exactly what you have, you will be able to define your market. This will allow you to implement more productive and cost-effective marketing that could save you considerable unnecessary expense and make more accurate future revenue projections.

Every Innovation Capture Session is delivered for a fixed fee, irrespective of how long it takes us to write the report and recommendations.

Get In Touch

If you would like to know more about how our expertise in haptic technology and the computer implemented invention sector then please get in touch.

We welcome enquiries via computertech@gje.com and will be delighted to explain in more detail why you should consider GJE for your IP needs.

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