Robotics: Musings of a Patent Attorney

Why patents are vital to the success of a robotics company

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September 16, 2014

When I was an undergraduate studying mechanical engineering, I recall working in a lab on an assignment and peering over to the opposite corner where there was an old robotic arm. It was clearly something out of the 60's or 70's. There was one graduate student working in the vicinity. One of my cohorts made a comment along the lines of, "why is that guy working with that robotic arm, there is nothing new going on in robotics these days….robots have already been invented." The group then turned our focus to the task at hand, completing our engineering lab assignment. But to me, that began my interest in the area of robotics, and my belief that the true advancements in robotics had not yet seriously begun.

Fast forward to today, when an attendee at a recent event concerning robotics and medical devices said, "we have had a couple of false starts with robotics over the years, but this time it's for real." He was referring to the recent popularity and activity we are seeing in the robotics space. Big and important companies, such as Google, Inc., have been rapidly acquiring robotics companies. Other companies, such as Kiva Systems, iRobot, Intuitive Surgical (makers of the da Vinci™ surgical robot), and Corindus (makers of CorPath® vascular surgery robots), and Dyson vacuum are surfacing in mainstream news and with robot products that are visible to consumers, no longer just hidden deep inside factories.

Over my many years in the patent field, I have taken my mechanical engineering background and built on that knowledge and skill by extensively patenting inventions in areas of mechanical device, electronics, and software. All of these core technology areas combine in a perfect storm to create today's robots, and it is in each of these areas that patents will be vital to the advancement of the robotics industry, hopefully in a way that makes "this time be for real."

Charles H. Duell was the Commissioner of the US Patent Office in 1899. A quote that has often been attributed to him notes,

> "Everything that can be invented has been invented."

There is a question as to the source of this quote, and whether it was actually ever uttered. However, the sentiment it conveys does resurface periodically in various technologies. Robotics has been one of those technologies for quite a while where many wonder if there is still anything patentable anymore. Sure, there have been some hugely innovative breakout robotics technologies, like the Roomba® vacuum cleaner, the Kiva Systems Mobile-robotic Warehouse Automation System, or the Boston Dynamics BigDog, but what about the vast majority of robotic technologies that are developed daily? Are there innovations happening that are still patentable?

A Robotics Renaissance

In my view, patents will be (and presently already are) vital to robotics. Robotic technologies have had a bit of an uphill battle, as evidenced by the several "false starts" over the years. The innovations in robotics tend to be incremental, rather than ground breaking, which makes them more vulnerable to patentability challenges by the patent examiners as being "obvious" in view of the prior art, and therefore not patentable.

In addition, the cost of development of these incremental technology advancements is substantially higher than the latest craze of software inventions, where in many instances all that is required to create highly successful products and companies are a couple of programmers with a creative idea, a case of energy drinks, and a long weekend to pound out the code. Robotic advancements require physical equipment, components, labs, and testing facilities, in addition to high end computers or processors, and many different people with different knowledge, skills and expertise, to come together as a team and innovate.

The Role of Patents

Patents can serve a vital role as the robotics space advances by spurring innovation, educating innovators as to the advancements that others are making, while simultaneously protecting companies and freeing them up to extensively promote their new robotic innovations without fear of some of the larger competitors stepping in and grabbing some of their market share with competing products comprising the same innovations. There is also the potential of patents to bolster company valuations for potential investors, and even serve as a revenue stream in the future by leveraging patent rights through license agreements with non-competing companies operating in related areas.

Crucial in the development of robots is the parallel development of patent portfolios around these incremental robotic advancements. Innovators working in the robotics space cannot miss opportunities to bank their innovations in the form of patent filings that preserve and protect these advancements, and give these companies that are investing so much into these robotic technologies some value to highlight (in addition to product revenues) when investors and future business partners come along, and some tools to enable these companies to defend and protect their territories against would be infringers.

As this article was being written, Dyson just launched their new robotic vacuum cleaner and indicated it took over 16 years of development. The software for the vision technology took 31 engineers over 100,000 hours to program, while the overall product required contributions from over 200 engineers. They further indicated they have over 420 patents and applications related to the new device, which clearly demonstrates that opportunities for patentable innovations in the robotics arena are still plentiful, despite the long history of robotics technologies.

The Value the Right Patent Attorney Adds

However, unlike many other areas of technology that are new and become hot areas of development, robotics does have the handicap that with all of the false starts over the decades there is a lot of prior art in existence that can create a potential mine field of traps for new patent filings. As such, it takes a team effort between the innovators and their patent attorney to identify patentable inventions by leveraging patentability and freedom-to-operate searches, and to build strong patent portfolios.

This process can be summarized as follows:

1. Identify innovations with a standardized internal invention disclosure process that motivates engineers and scientists to document new ideas;
2. Ensure a process of regular and frequent review of those invention disclosures, either internally or together with your patent attorney;

3. Consider informal/preliminary/iterative patentability and freedom-to-operate searches early in the product development cycle to identify potential roadblocks to carving out valuable intellectual property and/or potential roadblocks to product sales due to potential for infringement of existing competitor patents;
4. Ensure your company is organized not only to integrate and leverage innovation, but to promote innovation attempts at all levels of the organization.

Crucial to the success of such a process is that a knowledgeable and experienced patent attorney be integrally involved, and it cannot be just any patent attorney. The unique combination of vastly different areas of technology that go into the development of a robot means that inventors and robotics companies should take time to seek out and work with patent attorneys that have the right background, and who can help identify areas where patentable inventions are occurring.

Knowledge of Mechanics. Robots are fundamentally mechanical devices. Many patent attorneys feel that it is "easy" to patent a mechanical device because the device is tangible, can be readily described, and can be shown in figures from any possible angle. However, the reality is that oftentimes mechanical inventions can be some of the most difficult to describe correctly and accurately in a patent application. I have an anonymous quotation hanging on the wall of my office that says,

> "The search for the *mot juste* (right word) is not a pedantic fad but a vital necessity. Words are our precision tools. Imprecision engenders ambiguity and hours are wasted in removing verbal misunderstandings before the argument of substance can begin."

Over the years, I've seen the decision of patentability of mechanical devices hinge on whether the right word was used to describe the device in the patent application, or whether a word that was close but had a slightly imprecise meaning was instead used. When a slightly imprecise word is used to describe a mechanical device, that leads to hours of waste in the form of the patent attorney arguing with the patent examiner as to "what is meant by" the word or phrase that was used to describe the invention when the patent application was drafted. Taking the time up front when the patent application is initially drafted to really think about the proper word or words to describe a mechanical device can be determinative of whether a patent ultimately grants years later.

Knowledge of Software. In addition to having a strong foundation of understanding of mechanical devices, those working on patents in the robotics field should also have a good understanding of the patentability of software. This is also a very difficult area, not because software is difficult to describe, but rather because the US Patent & Trademark Office, and the Federal Courts are presently in an epic struggle as to whether or not software is actually patentable at all. It seems every month there is a different flavor of what types of software claims the patent examiners are allowing, with which specific combination of words, and what is required in terms of the detailed description to enable a software focused patent application. The US Supreme Court recently issued a decision in Alice Corporation Pty. Ltd. v. CLS Bank International that attempts to clarify that "abstract ideas" are not patentable, but which most patent attorneys feel has only managed to further muddy the waters of what is patentable subject matter, especially in the software arena.

Knowledge of Electronics. For robots, the interaction of software with the mechanical device most often occurs through the use of electronics. As such, this is the third area where the patent attorney must have some familiarity to a sufficient level to help identify when some incremental electronics advancement may be sufficiently novel and nonobvious to be patentable.

These three main areas (mechanical, software, electrical) are the core areas of technology that combine to create robots. It is not inconsequential if the patent attorneys working on patents in

the robotics space do not have extensive experience with all three areas. Yet, such patent attorneys are uncommon, especially those with a solid foundation in the mechanical arts and also extensive experience with software and electronics. Most software and electronics patents are handled by patent attorneys with computer science or electrical engineering backgrounds, not mechanical; while most mechanical engineer patent attorneys steer clear of software and electronic inventions and instead focus on mechanical devices and consumer products.

Part of the value a patent attorney can add to a patent portfolio is the ability to quickly understand new inventions when they are presented, and help to identify areas where potential patent coverage can be obtained. This process is best performed by a patent attorney who can begin from a position of inherent understanding of the core technologies, and what can be considered an advancement in today's world versus the prior art. Thus, having core knowledge in all three areas of mechanical, software, and electronics, is a huge advantage.

Conclusion

As the robotics industry continues to advance and expand into areas including power source, actuation, sensors, mechanical manipulation, locomotion, interaction with surrounding environment, and human interaction, the patent portfolios that are built around these advancements will bring great value and sustainability to the innovators in this space. The patent attorneys that are lucky enough to work with these innovators are in for some exciting times, and I personally am looking forward to it with great interest and enthusiasm.

For more information on patents in the robotics industry, please contact **Sean D. Detweiler**.