PATENTING INTERNET OF THINGS (IoT) AND INDUSTRIAL IoT INVENTIONS AFTER *ALICE*



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Sometimes referenced as "ubiquitous computing" or "pervasive computing," the Internet of Things (IoT) encompasses innovations involving objects with sensors connected to a data network.[1] A company selling products or using processes incorporating IoT must strategize both offensively and defensively. This article focuses on strategies companies can use to build their IoT patent portfolios, in spite of the uncertainty in the current legal landscape, to protect against copycat competitors and maintain their competitive edge.

In particular, patenting IoT technologies has become more challenging after the U.S. Supreme Court's decision in *Alice Corp. v. CLS Bank International*.[2] Some takeaway points for companies wishing to build their IoT patent portfolios in the wake of *Alice* include:

- Industrial IoT (iIoT) inventions were eligible for patenting well before *Alice* and will continue to be found patent-eligible when the invention is appropriately claimed.
- A new arrangement or combination of old sensors claiming a technological solution to an old, long-standing problem can be patent-eligible.
- Framing an IoT invention in a technological problem-solution construct can be persuasive for patent eligibility.

Patenting IoT inventions requires strategic planning because IoT inventions involve multiple layers of technology converging to form an IoT ecosystem — *e.g.*, edge nodes with sensors, network infrastructure, protocols in the connectivity layer, data servers, and security. And, the IoT landscape spans diverse verticals (i.e., applications) and horizontals (i.e., platforms), including sensor manufacturers, network infrastructure companies, and "Big Data" analytics companies.[3]

Industrial IoT (iIoT) solutions have reaped large dividends for the manufacturing sector — manufacturers that embraced smart factories in 2014 saw an average 28.5 percent increase in revenues that year.[4] Meanwhile, human IoT products, *e.g.*, wearable fitness trackers, smart home devices, and autonomous cars, have transformed traditional consumer goods companies. Patent offices worldwide have observed an uptick in patent filings for IoT and iIoT technologies.[5] Even more so than the smartphone revolution, the IoT revolution pervades a myriad of industries and companies, transforming their business models.[6]

THE *ALICE* TWO-PART TEST

A bedrock principle of patent law is that "[l]aws of nature, natural phenomena, and abstract ideas are not patentable." *See Alice Corp. v. CLS Bank Int'l*, 134 S.Ct. 2347,

MORE ▸

[**INTERNET OF THINGS,** FROM PAGE 21]

(2014) *citing* Myriad, 133 S.Ct., at 2116. The U.S. Supreme Court's 2014 decision in *Alice* laid out a two-part test for determining if an invention is patent-ineligible for being directed to an abstract idea. The first step in the *Alice* analysis is to determine if the claims are "directed to" an abstract idea. If claims are not directed to an abstract idea, they are patent-eligible. But not all patents with claims "directed to" abstract ideas are ineligible. The second test of the *Alice* analysis looks to what else is recited in the claims "to determine whether the additional elements transform the nature of the claim into a patent-eligible application." *Alice* at 2355 *citing Mayo* (internal quotes omitted). *Alice* limits the spectrum of IoT inventions that are patent-eligible.

INDUSTRIAL IoT — REVISITING *DIAMOND V. DIEHR*

Nearly 40 years before *Alice*, the U.S. Supreme Court in *Diamond v. Diehr* held that an industrial process for molding raw synthetic rubber into cured precision products was patent eligible.[7] By constantly measuring the temperature inside the closed molding machine with a thermocouple sensor, the patented process opened the mold press at the optimal time using the well-known Arrhenius equation.[8] While a mathematical formula, such as the Arrhenius equation, is an abstract idea ineligible for patenting, the Diehr invention was patent-eligible because it "implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which that patent laws are designed to protect."[9] The Court reasoned that the claims in *Diehr* were directed to an improvement of the existing technological process of curing rubber. The *Diehr* Court reiterated that processes involving transformation of an article into a different state or thing are patent-eligible under 35 U.S.C. § 101.

The problem to be solved was that, at the time the invention was made, there was no disclosed method of obtaining an accurate measure of the temperature inside the press without opening the press.[10] This process of constantly measuring the temperature inside the closed mold using a thermocouple sensor, feeding this information to a computer for repeated recalculation of cure time, and signaling by the computer to open the mold press, at the appropriate time, was previously unknown in the art.[11] The patent claims recited these process steps with specificity.

Although the inventions in *Diehr* and *Parker v. Flook* — an earlier U.S. Supreme Court decision — involved similar types of inventions at their core, in that the process claims of both patents expressly recite a mathematical formula used to continuously calculate a value, the Court noted that the subject matter recited in the two claims was strikingly different. In *Flook*, the method caused a number (i.e., the "alarm limit") to be continuously updated based on an equation, but did not purport to explain how the variables for the equation were determined; nor did it purport "to contain any disclosure relating to the chemical processes at work, the monitoring of process variables, or the means of setting off the alarm or adjusting an alarm system."[12] By contrast, in *Diehr*, the inclusion of acts of continually measuring internal

temperature and continually recalculating the cure time in the claim, as well as the transformation of raw rubber into cured rubber, seems to have provided the "something more" to hold the claim patent-eligible.

Even though *Diamond v. Diehr* predates *Alice* by more than three decades, it provides useful guideposts in navigating the IoT ecosystem and serves as a primary example of a computer-based invention that is patent-eligible. The closer to *Diehr* that a patent applicant can recite the IoT invention and narrowly tailor claim features that provide a practical application for the invention, the higher likelihood of success in obtaining the patent and withstanding America Invents Act post-grant eligibility challenges. Ultimately, appropriately drafting claims and describing the invention in a patent application may increase your IoT invention's chances of being found patent-eligible.

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CONNECTED AVIATION — iIoT IN THE AVIATION INDUSTRY

In addition to the manufacturing industry, the iIoT is revolutionizing the aviation industry. Companies like Gogo, Inc., and Boeing, which introduced the Connexion framework in the early 2000s, are driving the "Connected Aviation" movement.[13] The aviation iIoT is digitizing everything from electronic flight bags in the cockpit to air traffic control to maintenance equipment.

One recent court decision offers insight into patent-eligible cockpit technology.[14] The patent at issue in *Thales Visionix Inc. v. United States* is directed broadly to a helmet-mounted display system (HMDS) used by F-35 fighter pilots.[15] The claims were drawn to a method and system for using two inertial sensors arranged in a specific way — one mounted on a helmet, the other mounted on an airplane — to determine the orientation of the helmet relative to a moving airplane.[16] Taking into account that HDMSs are subject to drift, in which small measurement errors accumulate into larger errors when estimating an object's position, the claimed invention uses a computer running mathematical equations to periodically calculate the relative orientation of the helmet. The patent does not claim an improvement to a computer or a new sensor technology, but makes use of generic inertial sensors and computing platforms.

The Court of Appeals for the Federal Circuit found the claims to be "nearly indistinguishable" from those in *Diehr* for purposes of patent eligibility. The Court drew a direct analogy to the *Diehr* case in focusing on the overall configuration of parts that operate together to achieve a particular

MORE ▸

[**INTERNET OF THINGS,** FROM PAGE 23]

goal, whether it is curing rubber or tracking a helmet mounted display.[17] In particular, the Court found that although the claims in *Visionix* utilize mathematical equations to determine the orientation of the helmet, "[these] equations…serve only to tabulate the position and orientation information" while being dictated by the placement of the inertial sensor and application of laws of physics.[18] The *Visionix* claims "result in a system that reduces errors in an inertial system that tracks an objection on a moving platform."[19] Moreover, the Court noted that the claimed method "eliminates many complications" of prior art solutions, and that the claimed invention is "unconventional" and "may seem somewhat strange" to those within the field.[20]

Visionix suggests that drafting a specification and claims directed to a non-conventional, specific arrangement of sensors, even if the sensors themselves are well known, may still provide grounds for patent eligibility. Therefore, even if the inventive concept or technological solution being claimed relies upon conventional sensors, a patenting strategy that follows the lessons from *Visionix* may help to address patent-eligibility concerns under *Alice*.

CONSUMER GOODS IoT

In addition to iIoT inventions, consumer facing IoT inventions are also abundant. So much so that companies like FitBit, Jawbone, Samsung, Cisco, Intel, Alarm.com, and others have been embroiled in patent litigations over IoT.[21] A review of courts' reasoning in these patent suits offers some guidance for companies seeking to patent in the IoT space.

The *FitBit v. Jawbone* lawsuit involves FitBit's patent on its wearable fitness wristband.[22] FitBit's patent described a computer server in the cloud maintaining a list of eligible wearable devices for a user and allows the user's smartphone to automatically pair with those bands in the server's list. It effortlessly enables the pairing with just a tap on the band. In the Fitbit lawsuit, the judge, sitting in the U.S. District Court for the Northern District of California, ruled on a motion on the pleadings that FitBit's patent appeared to be patent-eligible under *Alice*. The judge's reasoning provides a useful takeaway for companies patenting human IoT inventions — specifically IoT wearables with a small form factor. The court reasoned that despite the claims likely being directed to an abstract idea, they recited significantly more than an abstract idea under step-two of the *Alice* test. Specifically, the court reasoned that, first, wearables, like the FitBit's wristband, have a small form factor that cannot accommodate a traditional keyboard or buttons. Fitbit's tapping method to complete user validation without a keyboard is an inventive concept; it improves device pairing for wearables — which

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is a real-world problem. Second, injecting a server into a traditional interaction between just a wearable and client device provided an inventive concept to the traditional pairing steps. At any rate, these reasons were sufficient to persuade the court to not grant the motion on the pleadings and continue forward with the case. A takeaway for companies seeking to patent IoT inventions directed to consumer wearables is that improving the human interface for consumer IoT inventions, perhaps because of the apparent real-world application, seems to be persuasive in overcoming *Alice*. Second, the interaction of multiple nodes in an IoT ecosystem seems to be another common theme. In *FitBit*, the server played an integral function in the tapping interaction between the various devices. Overall, just like the court in *Visionix* found the problem-solution story in the patent to be persuasive, it seems that FitBit's patent told a story about a real-world problem that it solved and likely helped the Court in finding the patent to be patent-eligible.

CONCLUSION

IoT and iIoT patents are able to overcome the *Alice* hurdle by relying on lessons learned from IoT litigations and court opinions. *Alice* does not necessarily preclude patentability of IoT inventions that include software and algorithms. First, try to tell a compelling story through the specification that outlines the problem addressed and solution achieved by the claimed invention. Successful drafters will include details about the total technological solution to the problem domain, including elements that are otherwise in the prior art. Second, the examples in *Diehr* and *Visionix* follow the formula of software combined with sensors that interact with the physical world in some way. These two elements applied in a specific way to solve a particular problem may be sufficient to be achieve patent eligibility. Finally, with consumer-facing IoT inventions, consider if the small form factor of the product or the specific network infrastructure required for the invention may provide opportunities to showcase patent eligibility. Although there is no panacea for overcoming *Alice*, these lessons tailored for IoT/iIoT may give inventors a leg up in obtaining a patent. ■

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