Ministry of Science and ICT

IITP Institute of Information & Communications Technology Planning & Evaluation

APPLICATION FORM
(JOINT RESEARCH)
HIGH POTENTIAL INDIVIDUALS GLOBAL TRAINING PROGRAM)

AGREEMENT

As stated above, I submit this application form to IITP that conducts “High Potential Individuals Global Training Program” supported by Ministry of Science, ICT in South Korea. IITP may disclose the information below to the public for the purpose of providing information and matching a research partnership between your institute and a Korean university.

* IITP : Institute for Information & communications Technology Planning & Evaluation

Printed Name of Chief of Research	Bonwoo Koo	Date(mm-dd-yyyy)	01/31/2020
Signature of Chief of Research			

☞ ***(Note)*** *This application is to identify the willingness to participate in this research and to find a research partnership for research institutes in Korea. Therefore, in its sole discretion, it is acceptable to contain only minimal information. (max. 3 pages)*

1. Research Title	Patenting on blockchain technology and technological development						
2. Research Area	**A.I.**	**Big Data**	**Cloud Computing**	**Block Chain**	**AR/ VR**	**ICT/SW Convergence**	**Other ICT /SW**
		X		**X**			
3. Chief of research	Title	Associate Professor		Contact	E-mail : bonkoo@uwaterloo.ca		
	Name	Bonwoo Koo			Tel : +1-519-888-4567 x.37843		
4. Affiliation	Name	University of Waterloo		Classification	(X) University ( ) Research Institute ( ) Industry ( ) ETC.		
5. Capacity for students (5 or less)	2 students		**Support for students** ***(all necessary)***		(X) Visa support (X) Research Mentoring (X) Research Space (X) Accessibility to Research equipment		
6. Research Objective	The objective of this research is to examine the current landscape of patenting pattern of newly emerging blockchain technology in terms of number, assignee, technology area, and relevant markets, and to analyze how blockchain technology will evolve in the market. By examining the experiences of previous emerging technologies such as biotechnology and software technology, this research can provide insights on the future direction of						

	technological development in terms of R&D, innovation, market structure and economic development. This research can also recommend efficient policies that foster proper technological development and shape efficient market structure.
7. Research Summary	Newly emerging technologies such as blockchain have the potential to radically transform the economy and society. Blockchain technology refers to the transparent and publicly accessible ledger that allows to securely transfer the ownership based on decentralized consensus (Blockchain Support Center, 2020). Blockchain technology can formulate cryptocurrency-related businesses such as bitcoin, but it has gained a lot of attention in a variety of areas including financial services, e-commerce, supply chain, and government operations. Chen et al. (2019) report that the median value of a FinTech innovation which includes blockchain and internet of things is about $46 million and blockchain is one of the most valuable technology among FinTech innovations. New technologies often attract a flurry of patents as firms are trying to take a dominant position in the emerging market, as were witnessed in biotechnology and nanotechnology in the 1990s – 2000s, and software technology in the 2000s – 2010s. With the potential as a disruptive technology to shake up the economy, firms are rushing to obtain patents on blockchain technology. The first patent on blockchain-related technology was reported to be filed in 2012, and it is estimated that there are more than 1,600 U.S. patents (both applied and granted) on blockchain technologies as of June 2019. As the technology and related standards on cryptocurrencies are adopted in various industries, this patenting trend is likely to continue at an accelerating rate. However, proliferation of too many patents may slow down innovations as firms need to negotiate every patents and are often entangled in patent litigations if negotiation fails. In the cases of smartphone patent battles (e.g., Apple vs. Samsung), for example, firms are spending billions of dollars to assert monopoly over the new technology, which might have slowed down further innovations. Patent may also prohibit collaboration among firms in the early stage of development, and thus the openness nature of blockchain technology may be damaged by the proliferation of patents at this early stage. The objective of this research is to examine the current landscape of patenting pattern of newly emerging blockchain technology in terms of number, assignee, technology area, and relevant markets, and to analyze how blockchain technology will evolve in the market. By examining the experiences of previous emerging technologies such as biotechnology and software technology, this research can provide insights on the future direction of technological development in terms of R&D, innovation, market structure and economic development. This research can also recommend efficient policies that foster proper technological development and shape efficient market structure. More detailed issues examined in this research include; • Preliminary data show that a majority of early applicants on blockchain patents are small companies, which is different from the pattern of early biotechnology patents in which applicants are mostly university and large companies, but is similar to the early pattern of software patents. In software industry, the proliferation of patents led to massive patent litigations by some non-practicing entities (sometimes called “patent trolls”), which might have proved to be a serious threat to the growth of the software industry in its early stage. By carefully examining the landscape of software patents and comparing their features with the current trend of blockchain patents, this research will analyze the potential development trajectory of blockchain technology and its related market. It will also examine the role of small start-up firms to achieve innovation and to compete with large established firms, thereby reshaping the market structure.

	• Careful examination of patent documents can reveal the direction of the technological development and market formation in many technologies. The current applications of blockchain patents are mostly related to digital currency standards, digital currency exchanges, blockchain algorithms and infrastructure, blockchain front- and back-end applications, and blockchain-related enterprise technology. For each area of these technologies, this study will examine the current status of technological development, main players (firms, universities or organization) in the relevant technology, and potential development its market, using both patent and market data. • In response to the surge in patents, there are alternative movements which encourage the free use of technology, such as making the technology open source, mandating licensees not to enforce patents, or forming patent pools to ensure free access among members. The balance between innovation incentive associated patens and free access and distribution in the open source movement can have impact on the development pattern of blockchain technology. Using the example of software industry in which both patents and open source paradigms are commonly observed, this research will evaluate the balance between two types of protection paradigm for technological development. • Blockchain technology is likely to make a significant effect on financial, accounting, and insurance industries which are heavily regulated by government. Government regulation is critical in the development of market in its early stage, and the success of information technology is often attributed to the judicious use of government regulation. As government regulation is expected to enforce in relevant industries regarding the use of blockchain technology, it is important to evaluate the role of regulation on the development of blockchain technologies and related applications on secure financial transaction, accounting or data management. To evaluate the above research questions with systematic evidence, this research will use the US patent data on blockchain-related patent during the past decade, 2010 – 2019. The United States Patent and Trademark Office (USPTO) provides all patent information through the Bulk Data Storage System (BDSS). This vast database is stored in an XML (Extensible Markup Language) file format which needs to be converted into manageable database management system for further analysis. Since it is difficult to extract relevant patents for newly emerging technology like blockchain, this research also uses the machine learning technique to select blockchain-related patents. The lexicon of blockchain-related keywords will first be developed using existing literature on blockchain and a corpus dataset is selected, trained and tested to constructed relevant database of blockchain patents.
8. Need for funding from Korean government	Blockchain and bitcoin has attracted lots of attention from both industry and policy makers in Korea, but there is a lack of evidence-based research on their impact on technology and market. Using the patent data, this research can help the current development of blockchain technology in Korea and its potential development in the market. Finding capable students to perform this research is crucial for the successful outcome, and Korean students are known for their diligence and good work ethics. I view this government funding as an avenue to find capable Korean students, train them intensively and help them achieve successful career.
9. Request for Korean Universities	I will explore several Korean universities to find capable students. Currently, I contacted Yonsei University, and I will pursue more universities.