



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

Jun-Seok Oh

Date(mm-dd-yyyy)

01-31-2020

Signature of
Chief of Research

Jun-Seok Oh

(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	Application of big data analytics and artificial intelligence to monitoring daily activity, transportation mode and physical fitness to support future smart cities and mobility options						
2. Research Area	A.I.	Big Data	Cloud Computing	Block Chain	AR/VR	ICT/SW Convergence	Other ICT /SW
	X	X	X				
3. Chief of research	Title	Professor / Director		Contact	E-mail : jun.oh@wmich.edu		
	Name	Jun-Seok Oh			Tel : +1-269-599-5076		
4. Affiliation	Name	Western Michigan University		Classification	(X) University () Research Institute () Industry () ETC.		
5. Capacity for students (5 or less)	2		Support for students (all necessary)		(X) Visa support (X) Research Mentoring (X) Research Space (X) Accessibility to Research equipment		
6. Research Objective	This research develops a platform that collects daily activity, travel choice and physical fitness data through a mobile phone application combined with a wearable device and analyzes the impacts of built environment and transportation choices on human health by applying the big data analytics and artificial intelligence to support future smart cities and mobility choices.						

7. Research Summary	<p>The relationship between transportation and health may play a significant role in improving the public's well-being due to physical activities and health benefits of active transportation. Travel behavior researchers need to investigate the relationship between transportation mode choices and human health by observing traveler behaviors and their effect on physical activity and public health. This research identifies and categorizes the health outcomes from daily physical activity and daily travel activities by employing wearable devices with sensing and GPS tracking technology. In this study, the research team develops an integrated data collection and processing platform named "PASTA" to monitor the participant's daily travel and physical activities. This platform automates data collection and integrates the big data processing of daily travel GPS trajectories from a mobile application designed by the research team with physical activity data from the Fitbit Charge 2/3.</p> <p>The whole process required the advancement of an integrated work system consisting of four major components including, development of mobile application to collect Global Positioning System (GPS) data and health data, maintenance of back-end server, database management, and classifier system development. A set of initial data was collected from a total of 120 participants from Kalamazoo in Michigan and Arlington in Texas for a one-year period. Each respondent has an average of approximately 100,000 records for the study period. With missing values being eliminated from the records, the final sample consisted of more than 10 million GPS records. Each record in the dataset represents a GPS signal that was captured consecutively in every 15-second interval by the Android GPS device and contains information on index, date and time, latitude, longitude, altitude, speed, distance, and satellite information. In addition, individual's fitness data collected from Fitbit 2 and 3 includes heart rates, the number of steps, calories burned, etc.</p> <p>This study applies big data analytics and artificial intelligent to overcome the challenges and develop accurate and automated algorithms in identifying individual's activity and the transportation mode used. Specifically, this study includes three main tasks. The first task is to develop an advanced algorithm to classify activities, such as home, work, shopping, travel, etc. This research team proposes to combine a Geohash, a public domain geocoding system that encodes a geographic location into a short string of letters and digits, and Geographic Information System (GIS) database to achieve the best outcome when classifying activities and trips. The second task is to identify transportation modes based on the data collected by applying various artificial intelligence techniques. This process will be later integrated into the PASTA platform system to enable automated processing. The third task is to develop a data processing system to quantify the amount of physical activity associated with daily activity and travel choices with the algorithms developed. Success of these tasks will allow an automated data processing and analyzing systems to quantify the health benefit of personal activity associated with daily activity and travel choices.</p> <p>This research is a part of research project being conducted in Transportation Research Center for Livable Communities (TRCLC) housed in Western Michigan University and established by the U.S. Department of Transportation.</p>
8. Need for funding from Korean government	<ul style="list-style-type: none"> ○ This research will be jointly led by Prof. Jun-Seok Oh, the Director of Transportation Research Center for Livable Communities (TRCLC) at Western Michigan University. ○ This research needs funding to advise up to two students to work together with researchers at TRCLC. ○ Research Period: July 2020 – June 2021
9. Request for Korean Universities	<p>It is not required but desirable that the student has basic understanding in database management and computer programming, and English proficiency to communicate with other students in the U.S. The selection of students studying abroad should be conducted after mutual consultation, and please cooperate as much as possible to prepare for VISA.</p>