



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

HYOWON BAN

Date(mm-dd-yyyy)

2/16/2020

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	Development of Calliope Mobile Application: Representing Geographic Information Science (GIScience) Data to Public						
2. Research Area	A.I.	Big Data	Cloud Computing	Block Chain	AR/VR	ICT/SW Convergence	Other ICT /SW
	X	X	X				X
3. Chief of research	Title	Associate Professor		Contact	E-mail : hyowon.ban@csulb.edu		
	Name	Hyowon Ban			Tel : +1-562-985-7808		
4. Affiliation	Name	California University, Beach	State Long	Classification	(X) University () Research Institute () Industry () ETC.		
5. Capacity for students (5 or less)	3		Support for students (all necessary)		(X) Visa support (X) Research Mentoring (X) Research Space (X) Accessibility to Research equipment		

6. Research Objective

Through the proposed research, I would like to develop a new way of communicating geographical information by combining art and science through cutting-edge technologies including GIScience and Computer Science. I plan to work with three students from Republic of Korea in this project during July ~ December 2020.

7. Research Summary

In 2013, I had a collaborative project to combine geographic information of Los Angeles County, California, U.S.A., with music and design in a mobile application. Together with faculty and students from design, music, and geography at California State University, Long Beach (CSULB) we worked on a creative, interdisciplinary project called “**Calliope**.” In the project, we converted geographic data, including topography and a few types of socio-economical information from U.S. Census Data, into design and music to provide a new way of representing the environment around us. Advanced techniques, including Geographic Information Science (GIScience), geovisualization, computer graphics, and digital audio, were used in the project. One of the outcomes of the project was the user-interface design of a mobile application, that can be used by the general public to access geographical information about the area—e.g., crime rate, languages spoken, land use, elevation, etc.—around the user’s current position. The mock-up version of the mobile application showed the geographical information via interactive digital maps and graphic design, and also it played music expressing the data by pitch and percussion. For instance, if the user approached nearer to areas of high crime rate, unpleasant sound became louder from the application and vice versa. Figure 1 shows example interface designs of the Calliope mobile application.



Figure 1. Example designs of the Calliope mobile application geovisualizing languages spoken, crime rates, elevations, land uses, and summary of the surrounding areas of the user (Video at: <http://youtu.be/pbOj5uDyDag>)

In 2015, I had **user evaluations** of the mock-up mobile application. With the IRB approval, I interviewed 11 general public and 10 students, faculty, and staffs of CSULB. Results of the user evaluation provided many useful suggestions to improve the mobile application. Among them, some brilliant ideas yet challenges below could benefit by using recent technologies such as Artificial Intelligence (AI) and Big Data on the web:



- Various types of information about the destination of the user—such as local characteristics, safe travel, traffic, weather, and related websites—displayed
- Voice-activated car navigation that supports multiple languages and multi-modal navigation including public transportation system

In this joint research opportunity, I would like to develop the Calliope mobile application that actually works through collaboration with students in majors of Computer Science and GIScience from Korea so that they could participate in building the application. A database developed from the pilot study that includes all necessary data such as music scores will be used in the proposed project. In addition, I plan to publish with the students by inviting them as co-authors of journal papers about the project.

Significance: This research is novel in that it bridges science and art—i.e., GIScience, computer science, design, and music—to create new ways of perceiving and understanding our local environment. Especially, many interviewees of the user evaluations responded that the sound element of the proposed mobile application would be very helpful for visually impaired people. The research spawns a new field of communication linking music and geographical data and encourages participation of the public and especially people with disabilities in GIScience by intuitively representing geographic information using art.

The outcomes of the research include the followings. **(1) Peer-reviewed publications** by submitting manuscripts of the research to international journals such as Applied Geography (Impact Factor: 3.068) or Transactions in GIS (Impact Factor: 2.188). **(2) Scholarly presentations** about the Calliope project at conference such as 2021 American Association of Geographers (AAG) conference and 2022 GIScience Conference. **(3) Training for three students from Republic of Korea** in all processes of the research project including publication.

The goals of the research are to: **(1)** provide a new way to illustrate and interpret environmental and socio-demographical geographic information into design and music; **(2)** suggest a mobile application which general public including people with disabilities might find it useful and easy to explore information they need in their daily life.

8. Need for funding from Korean government

The grant will be used for hiring **three students from Republic of Korea** including **a student from GIScience major**—for GIS database development and digital mapping—and **two students from Computer Science major**—for development of the mobile application—to publish Calliope to the public.

9. Request for Korean Universities

The selection of students studying abroad should be conducted after mutual consultation, and please cooperate as much as possible to prepare for VISA. For instance, CSULB asks all foreign visitors for research collaboration to submit paperwork for VISA prior to 6 months of arrival to the U.S.