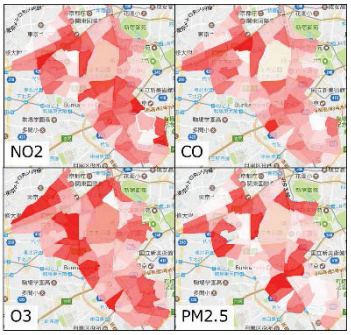
Instructor Name	Kaoru Sezaki, Professor	Laboratory Location	Institute of Industrial Science	Research Area	Urban Computing Ubiquitous Computing

The focus of our laboratory is Urban Computing and Ubiquitous Computing. There, heterogeneous spatial big data related to urban areas are sensed and analyzed. They are then utilized for various applications such as Maas (Mobility as a Service), behavior change, urban planning, disaster mitigation, environmental monitoring, and economic analysis. It involves multiple research fields such as communication and network systems to transmit data from sensors, machine learning for the heterogeneous urban data to determine their implication and interaction of applications on smartphones. We are conducting many projects. You may join one of them to pursue one of the research mentioned above fields, or you may voluntarily start your research theme based on your own interest. It's all up to you! The followings are examples of ongoing researches. For more details, check our website shown at the bottom.

1. Mobile Sensing of Urban Environment and its Applications

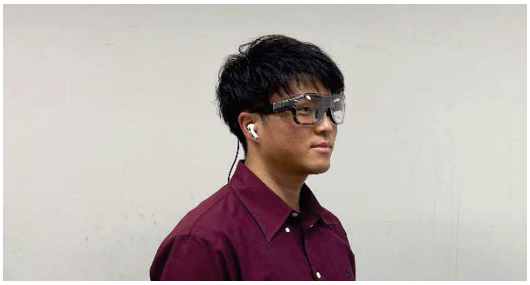
With the rapid growth of IoT devices, it is expected that we can acquire urban data from fixed sensors deployed in the city infrastructure. However, it is not realistic because the hidden cost of deploying and maintaining sensors as well as supplying power to them. On the other hand, there are many sensors in smartphones and floating cars (cars with sensors) are readily available. Since we don't have to take care of such sensors' deployment and maintenance, the cost is dramatically cheaper. By combining fixed sensors and these sensors with mobility, we can expect spatiotemporal dynamic urban data in real time and with much higher resolution. However, many research issues remain to be solved as "active sensing" where sensors are moving with controlled mobility, distributed calibration of sensors, privacy preserving sensing and data mining and cost-effective sensing in huge areas. We are now tackling these issues and studying various applications in various areas such as smart city, smart grid, digital signage, policy and decision making, economics, ITS, urban planning, and meteorology.



<The environmental monitoring of Shibuya area by mobile sensing>

2. Action Recognition for Ubiquitous Computing

"What People are doing" and "where they are" are essential information for Ubiquitous Computing, navigation, traffic control and other applications. It is also crucial in emergencies and used in various scenarios as detecting the anomaly in urban areas such as big events and disasters. Also, it is essential information when analyzing the pandemic as COVID-19. To this end, we are currently developing a system to analyze pedestrians' behavior using earable devices such as earphones. We are also conducting a cost-effective way of monitoring people flow and the prediction of future flow for urban planning and policy making by integrating the current people flow and various external data as climate and social network.



<The experiment of detecting pedesterian's behavior using eye tracker and earable devices>

3. Systems and framework for Behavior change

We are developing a framework for promoting behavior change by recording the persons' activity and locations. The smartphone App. for behavior change Called Selfguard and Mocha are now available through App Store and you can try them at hand. The optimal incentive mechanism for behavior change especially for preventing pandemic as COVID-19 and adult disease is now studied using the methodology of behavioral economics.

■ HP of the lab. https://www.mcl.iis.u-tokyo.ac.jp/en/
■ Feel free to contact Prof. Kaoru SEZAKI (sezaki@iis.u-tokyo.ac.jp) for questions and lab. tour