Collecting Activity-Travel Data and Individual Mobility Analysis Using Smartphone and Smart Watch: A Case Study in Luxembourg

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Recent technological advances in Information & Communication Technologies (ICT) and the sharing economy are ushering in a new age in transportation: the era of smart mobility. One of the main goals of a smart city is an on-demand mobility system that would permit citizens to choose among public and private transport providers and assemble the convenient way of traveling anywhere at any time. Citizens could access a variety of options with their mobile devices e.g. a rideshare, car pooling, public transport, an automated car.

In a smart urban mobility of the future citizens and the transportation system are seamlessly connected, interacting through innovative technologies, having easy access to a wide variety of real time information on-the-move. Embedded with a variety of sensors e.g. GPS, accelerometer, gyroscope, microphone, Bluetooth, Wi-Fi, the smart devices have become a very useful tools in collecting data.

In this research project we aim to develop a decision support mobility system that will incentivize sustainable collaborative mobility within a closed community (University of Luxembourg) by learning and assisting individual and collective activity-travel decisions. Using smartphones and smart watches to collect travel data signals, we will exploit individual choice regularities and preferences, as well as activity-travel common patterns.

The objective in this study has a slightly different approach. Using all the sensors data collected with the smartphones and smart watches, we will apply the machine learning techniques on the real-time big data provided by this smart mobility system. The core activity is the design of a closed loop information mechanism that seeks mutual adaptation between traveller's activity-travel choices and advices. The architecture of this new concept is later translated into software specifications, therefore implemented in a system composed by the web and smartphone apps, where travellers are supported in the activity-travel choices, and bilaterally give and obtain feedback from the service providers. The system allows for quick alternative scanning and computations, information exchange and synchronisation with the devices of the users in real time.

The aim of this paper is to present the methodologies and discuss the experiences in the use of multi-sensor smart devices from the first data collection stage started in June 2015, in the case of the ongoing relocation of the University of Luxembourg.

The presentation and the following full paper will give an overview of the individual pattern identified from the sensor data collected e.g. GPS position, activity analysis, transport mode, speed, linear acceleration, connectivity, number of Bluetooth devices, sound intensity. These will lead to deeper insights into transport trends and travelling behaviour that in turn will allow for better decision and planning, as well as quicker response to disruptions in the transport network.