Michelle Ho P Section October 12, 2017

By using GPS (global positioning system) technology, transportation researchers have effectively tracked pedestrian activity. The journal article, "Sensing Human Activity: GPS Tracking," written by Stefan van der Spek, Jeroen van Schaick, Peter de Bois, and Remco de Haan in 2010, describes a study about tracking city traffic. Its goal was to find a method to improve traffic in urban city areas and to apply that method to new cities. Major cities face problems of overcrowding, which causes traffic, because many people visit the cities' business centers, malls, and landmarks. To determine existing traffic flow patterns, researchers decided to use GPS technology, despite its novelty at the time. GPS is mostly used for orientation, navigation, and communication, which makes it effective for tracking. Prior research focused on traditional data visualization techniques, such as maps and tables, also helped researchers identify traffic patterns. To make the results of the study quantifiable, researchers decided to collect temporal data as well.

Researchers designed two experiments. One experiment had 1300+ pedestrians carry GPS devices in the major cities of Norwich in the U.K., Rouen in France, and Koblenz in Germany for 7 days per location. In order to recruit enough participants to get usable data, the researchers gave out flyers in the parking lots entering each of these cities. Those would be where the participants would start to walk into the city on foot. They were also interviewed to determine the city's most popular public spaces. The researchers made note of the interviewee's gender, age, frequency of visits to the city, and route taken in the city, and average time and money spent in the city. The other experiment focused on the new city of Almere in the Netherlands, where families carried GPS devices 24/7 for a week. Researchers aimed to determine the patterns of movement, to see how a new city could improve its layout based on the

existing population. The devices used were GARMIN MAP60Cx GPS receivers, which were small black boxes that recorded spatial and temporal data in the form of track logs. The data from these track logs was converted into a series of gpx files and shapes files, then linked to the ArcGIS platform. The participants were also required to take a questionnaire that determined whether they properly used the GPS device. The data from the questionnaires was put into the SPSS database then linked to the ArcGIS platform, with the track log data. From there, the density analysis, of the times spent at certain locations and the number of people at a location at a certain time, was calculated from the data. Visual representations including illustrated temporal maps, animated temporal maps, and a conclusion map were created, which based on the patterns researchers found in the data. The maps made it easy to see what areas had the most pedestrian traffic.

For the experiment involving the three older cities, the study was able to identify certain patterns in pedestrian activity, based on the social and demographic qualities. The article did not provide any further explanation for exactly what these patterns were. However, it did say that the conclusions from the study would be used to improve cities for pedestrians. For the Almere experiment, the article described how new towns are planned, based on social and economic patterns. The study found it difficult to track pedestrian activity of the families, because cars were the main mode of transportation. Still, there were maps provided showing the movement of families in Almere. Using the pedestrian density analysis from the first experiment and the visual representations of traffic flow from both experiments, the researchers determined a method to improve pedestrian traffic, although the method was not explicitly stated in the article. The study determined that GPS technology was incredibly useful for tracking pedestrian technology and should be used for transportation science research in the future.

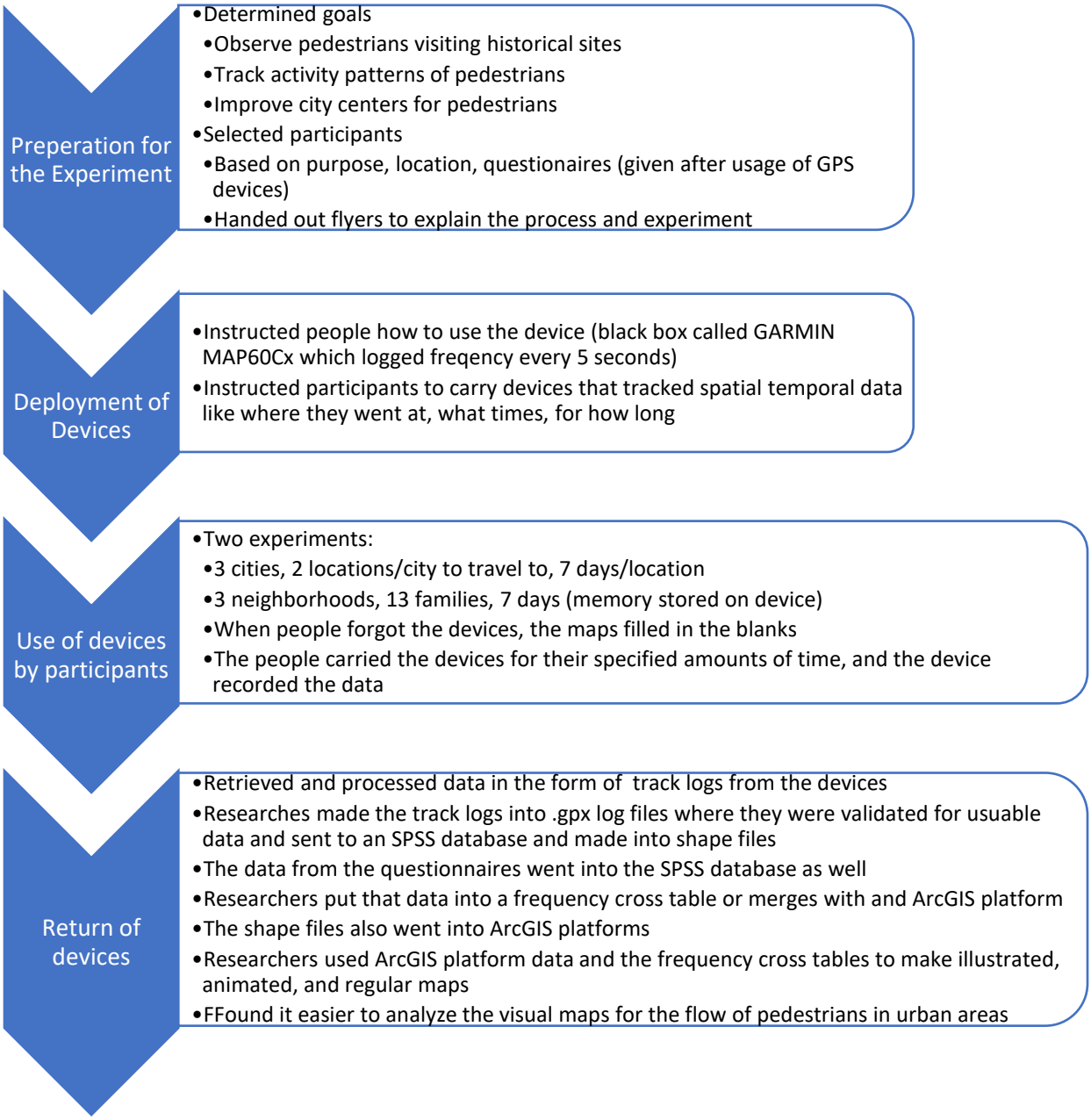

Figure 1 A flow chart depicting the experimental procedure used to determine the movement of people in an urban setting using GPS

Table 1 Abbreviations and calculations found in the paper

Abbreviations	Actual Meaning
GPS	Global Positioning System
TU Delft	Delft University of Technology in the Netherlands
GNSS	Global Navigation Satellite System
PDT	Position Determination Technology
RFID	Radio Frequency Identification
LBS	Location Based Services
GPSU	Global positioning system utility
DIT	Data Interoperability tool

PPT Chart

Problem	Plan	Timeline
Word choice does not always fit	Re read sentences myself for clarity, peer editing, think as I write, "is this the best word"	Next STW paper, Hum
Sentence structure is choppy, does not always flow	Reread sentences out loud	Hum, STW paper
Not using parallel- structure	Reread sentences out loud to listen for parallel structure	Hum, STW paper, physics
Wordy sentences/ not concise	Identify awkward sounding phrases and try to word them so they are not wordy, split sentence into multiple	Hum, STW paper
Incorrect use of words like because vs since, to vs as, off vs on	Identify the words that are problematic, find those words in the paper, refer to hacker to see if it is the correct use	Hum, STW paper

Work Cited

Spek, S. V., VanSchaick, J., Bois, P. D., & Haan, R. D. (2014). Sensing Human Activity: GPS Tracking. *MDPI AG*, *9*(4), 3033-3055. DOI: 10.3390/s90403033