WISDM Creates Android App to Track Couch Potatoes

by Xavier Griffiths, FCRH '14

Your smartphone says a lot about you, including your age, preferences, and current whereabouts. Imagine an app that can monitor your physical activity, letting you know by the end of the day if you've been as inactive as a couch potato. An undergraduate research team in the Computer Science department at Fordham is currently building that app. Their project, called WISDM (Wireless Sensor Data Mining) will determine how information, such as whether or not you are walking or running, can be derived from the sensors included in most smartphones. The WISDM team hopes that this app will be useful for many people, especially those in the medical field.

The WISDM project focuses on the accelerometer sensor, which is often used either to change the orientation of the screen or as an input method for games in most smartphones. According to Jeff Lockhart, FCRH '12, "the goal of the WISDM project is to take the sensor data and try to get computers to learn meaningful patterns out of that data." The app can accurately identify a user based on his or her biometric identification, which includes the user's name, age, weight, height and hometown. Based on the information gathered by the accelerometer, the team has developed machine models that can differentiate between when a specific person is walking, standing or performing some other activity such as jogging.

WISDM has its origins in the honors thesis of Jennifer Pappas, FCRH '09. Since its creation, the project has been largely composed of undergraduate researchers. At first, students focused on dedicated sensor units furnished by Sun Microsystems instead of experimenting with smartphone devices. Now under the guidance of Dr. Weiss, chair of the Computer Science department, the WISDM project has expanded to include about a dozen undergraduates. However, their work goes beyond simply writing code. The team is split into four separate groups working on everything from smartphone development to managing relations with clients. Moreover, every paper produced by the project credits one or more of its undergraduate students as an author.

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According to Dr. Weiss, WISDM "isn't just an academic exercise. These students are actually doing original research and getting things published. So it benefits the university because we are supposed to be teaching, and it benefits the students because they are actually producing things that can help them get jobs and get into graduate school."

WISDM offers some advantages over other data collection methods that allow other smart phone users to document your activity. Data mining is not subject to the bias of what people want to report about themselves. The team has developed models sophisticated enough to recognize the unique walking pace of 222 people with perfect accuracy after less than five minutes of recording. This method has great implications for security and privacy. Based on such precise metrics, your phone will be able to identify you when you carry it in your pocket. The next phase of the project seeks to detect what the team calls "soft biometric traits," which refers to predicting a person's height, weight, sex and even hair color based on mined sensor data. "Anything you can think of, we'd like to try and predict. How fit you are, how long you spend studying, although most of those will be hard," Dr. Weiss admits.

The WISDM project aims not only to mine sensor data but also to explore app development for smart phones. In fact, the WISDM team has already built an app called the ActiTracker and it is currently available for Android phones. In its current form, ActiTracker is not optimized for use by the general population. Its purpose now is to collect data from the project's volunteer subjects.

According to one of its developers, Tony Pulickal, FCRH '13, ActiTracker was "created as a means for people to understand more about themselves. As the phone collects data which we can use to analyze them [the user], they can also use it to assess their own basic activities." The team identifies a report from the World Health Organization, which cites that 3.2 million people die each year due to inactivity.

Even in its unfinished state, the app exhibits impressive functionality. One feature graphs the activity of a phone's accelerometer in real time, responding quickly and accurately. ActiTracker also features a map view based on Google Maps for Android which alludes to the project's prospective interest in GPS-based data mining. The app can also record a user's activity, such as speed and altitude in real time.

Essentially a fitness app, ActiTracker also has a training feature. A user can complete pre-set activities, such as standing or jogging, for a set period of time and be rewarded by unlocking achievements, like playing a video game on Xbox LIVE.

The team plans to support ActiTracker with constant updates even after it is made available to the public. One plan is to give users access to records of their activity online and also the ability to share that information with friends. The WISDM project hopes to have a wide release of ActiTracker for the general population by the end of the summer. Amidst previous claims that technology discourages people from exercising and physically exerting themselves, ActiTracker may prove to be the exception. ∎

The WISDM team. Photography by Michael Rezin, FCRH '14.