Attendance Tracking using Bluetooth Low Energy-Enabled Smartphones

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Abstract

Low attendance in lectures has become an issue of concern for many colleges and universities. It has been shown that attendance figures have a strong relationship with final grade, with students who have higher attendance generally performing better. Colleges have employed a variety of flawed methods of tracking attendance in an attempt to tackle this problem.

The aim of this dissertation is to develop a system that combats many of these flaws by using students' smartphones and Bluetooth Low Energy (BLE) technology. BLE is a short range communication protocol released by the Bluetooth Special Interest group as a subset of Bluetooth. Its low power consumption, flexible network topology support, and its high rate of adoption among smartphone brands means there is potential to incorporate this technology into such an attendance tracking system.

A prototype attendance tracking system using these elements is presented in this dissertation, which attempts to demonstrate its feasibility in a college setting. The implementation develops an Android application that broadcasts a student's presence using Bluetooth Low Energy. A small device in each lecture room communicates with each smartphone, reading each student's ID number multiple times during the lecture.

The implementation is evaluated in terms of its speed, power consumption, and accuracy. Its speed and power consumption are determined to be within acceptable ranges, however the accuracy of the scanning device is hampered by the hardware chosen for the implementation. The Raspberry Pi Zero W chosen for this purpose resulted in inconsistent detection of students. The initial work in this dissertation is promising and indicates that the chosen system is feasible in a college setting. However, hardware changes and large scale testing in a trial lecture would required before it can be conclusively determined.