Face-to-Face Proximity Estimation Using Bluetooth On Smartphones

Abstract:
The availability of “always-on” communications has tremendous implications for how people interact socially. In particular, sociologists are interested in the question if such pervasive access increases or decreases face-to-face interactions. Unlike triangulation which seeks to precisely define position, the question of face-to-face interaction reduces to one of proximity, i.e., are the individuals within a certain distance? Moreover, the problem of proximity estimation is complicated by the fact that the measurement must be quite precise (1-1.5 m) and can cover a wide variety of environments. Existing approaches such as GPS and Wi-Fi triangulation are insufficient to meet the requirements of accuracy and flexibility. In contrast, Bluetooth, which is commonly available on most smartphones, provides a compelling alternative for proximity estimation. In this paper, we demonstrate through experimental studies the efficacy of Bluetooth for this exact purpose. We propose a proximity estimation model to determine the distance based on the RSSI values of Bluetooth and light sensor data in different environments. We present several real world scenarios and explore Bluetooth proximity estimation on Android with respect to accuracy and power consumption.

Existing System:
Face-to-face interaction does not demand an absolute position but rather requires a determination of proximity. Existing approaches such as GPS and Wi-Fi triangulation are insufficient to meet the requirements of accuracy and flexibility. The problem of proximity estimation is complicated by the fact that the
measurement must be quite precise (1-1.5 m) and can cover a wide variety of environments.

**Disadvantages:**

- GPS and Wi-Fi triangulation are insufficient to meet the requirements of accuracy and flexibility.

**Proposed System:**

We demonstrate the viability of using Bluetooth for the purposes of face-to-face proximity estimation and propose a proximity estimation model with appropriate smoothing and consideration of a wide variety of typical environments. We explore the energy efficiency and accuracy of Bluetooth compared with Wi-Fi and GPS via real-life measurements. We deploy an application “PhoneMonitor” which collects data such as Bluetooth RSSI values on 196 Android-based phones. Based on the data collection platform, we are able to use the proximity estimation model across several real-world cases to provide high accurate determination of face-to-face interaction distance.

**Advantages:**

- Compared with the method of collecting all devices around, the accuracy of utilizing proximity estimation model to estimate whether two devices are in a direct communication distance is improved dramatically.
- We also compared the battery usage and accuracy of our method with other different location methods such as Wi-Fi triangulation and GPS.
- The results demonstrates that Bluetooth offers an effective mechanism that is accurate and power efficient for measuring face-to-face proximity.
System Requirements:

Hardware Requirements:

➤ System : Pentium IV 2.4 GHz.
➤ Hard Disk : 40 GB.
➤ Floppy Drive : 1.44 Mb.
➤ Monitor : 15 VGA Colour.
➤ Mouse : Logitech.
➤ Ram : 512 Mb.
➤ MOBILE : ANDROID

Software Requirements:

➤ Operating system : Windows 7.
➤ Coding Language : Java 1.7
➤ Tool Kit : Android 4.2.2
➤ IDE : Eclipse Juno