Using Mobile Phone Sensors For Wireless Home Security Systems

Project Code: BA1a-13

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Introduction
This project aims at developing an Android application for home security. There are two main functions: motion detection and fall detection. The motion feature detects an unauthorized person entering your premises and the fall detection feature detects falling motion of elderly. Having a home security system provides a peace of mind that users are protected. Wireless home security system is more stable and secure than traditional ones. It is cost-effective and easy to set up. Instant notifications make users aware of accidents as soon as possible and thus reduce the accident severity level.

Aim
To develop a low-cost and user-friendly home security application by utilizing the built-in sensors such as the camera, accelerometer and GPS.

System Block Diagram

Graphical User Interface

Features

- Motion Detection: Detect unauthorized people entering the home
- Fall Detection: Detect falling motion of the elderly
- Real Time Home Surveillance: Allow users to monitor their home
- Google Maps: Allow users to find their way to the destination
- Contact List: Allow users to add, edit or delete emergency contacts
- GPS Tracker: Allow users who get lost to identify their locations
- Notifications: Email and SMS messages are sent to notify users once motion or fall is detected.

Methodology

- Motion Detection
  - Pixel Difference
    - \(|\text{Current Frame} - \text{Previous Frame}| > \text{Threshold}\)

Fall Detection

- Face Detection

Real Time Home Surveillance

- Accelerometer
  - \(\text{Accelerometer readings} > \text{Threshold}\)

Testing and Results

- Motion Detection
  - A suitable threshold value of 150,000 is chosen.

- Fall Detection
  - Distance of longer than 5 meters have better performances.

- Instant notifications make users aware of accidents as soon as possible and thus reduce the accident severity level.