BabyGuard

Wearable & Rich Featured
Baby Monitoring and Safety System

Dec 14th, 2018
Group Members

- Establish connection detection among wearable and phone
- Implement and test alarm system
- Implement a website to illustrate our product

Yun Shi
- Wearable hardware design
- Wearable device development, interfacing and programming
- Determine technical feasibility of the solution.

Kiran

Advisor
Prof. Tessier
What are the Problems?

- Large amount of missing children without instant alert
  
  According to the National Center for Missing and Exploited Children, roughly 800,000 children are reported missing each year in the United States -- that's roughly 2,000 per day. Of those, there are 115 child "stranger abduction" cases each year, which means the child was taken by an unknown person.


- Lack of tools for timely detecting the body temperature of a baby

- Current products in the market do not have multi-functional features
What is BabyGuard?

- Low cost array of **wearable sensors** collect a baby’s body temperature and motion data.
- Provides **real-time** feedback and able to track long term physical movement and temperature data.
- Uses a home-mounted server to support **post data analysis** and sharing.
New Features Since CDR

- Alarm System for Android App
  - Temperature Alarm
  - Distance Alarm

- Magnitude Adjustment Function for Motion Sensor

- AES Encrypted Data Transmission
## Material Costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bluetooth Low Energy Device</td>
<td>¥ 300</td>
</tr>
<tr>
<td>Button Cell</td>
<td>¥ 5</td>
</tr>
<tr>
<td>Android Device</td>
<td>¥ 2000 (Testing Purpose)</td>
</tr>
<tr>
<td>Personal Computer</td>
<td>¥ 4000 (Testing Purpose)</td>
</tr>
<tr>
<td>TOTAL COST</td>
<td>¥ 305 (US$45)</td>
</tr>
</tbody>
</table>
SYSTEM DESIGN OVERVIEW
System Requirements

Wearable Device
- Mounted with sensors and connects to Android app or Home Server via BT
- Real-time capture for temperature, acceleration and orientations sensor data
- AES encryption for data transmission, which protects a user’s privacy.

PC
- Connects with wearable device to download sensor data
- Enabled post data analysis and data sharing functions.

Android App
- Interacts with Wearable Device to receive data from various sensors
- User interface to monitor and provide alarm if trigger pre-set threshold
Block Diagram

PC
- Data Handler
  - Temp. & Activity Data
  - Data Storage & Sharing

Wearable Device
- Temp. Sensor
- Accel. Sensor
- Gyro Sensor
- Bluetooth on/off

Mobile Phone
- Data Handler
- User Interface
- Alarms
- Temp. & Activity Data
- Bluetooth
- Temp.

Connections:
- Temp. Data from Wearable Device to PC
- Accel. Data from Wearable Device to PC
- Gyro. Data from Wearable Device to PC
- Bluetooth from Wearable Device to Mobile Phone
- Bluetooth from PC to Wearable Device
- Bluetooth from Mobile Phone to Wearable Device
- Temp. from Wearable Device to Mobile Phone
Solution Design - Wearable

- Temperature Sensor
- Accelerometer Sensor
- Gyroscope Sensor
- CPU
- On/OFF
- Coin Cell Battery
Solution Design - PC Interface

DEVICE

nShi
F8:D3:03:50:5F:FB

Devices Information

SESSIONS

nShi 4
2018-10-20T23:16:42.461

Received Data
Solution Design - Android APP

- Android application designed in Android Studio
- Retrieves real-time data from wearable
- Instant alarm for:
  - Temperature
  - Distance
DEMO TIME
Demo Outline

● Android App
  ➢ Temperature Sensor
  ➢ Temperature Alert
  ➢ Distance Alert & Data Analysis
  ➢ Motion Sensor
  ➢ User Customized Function

● Home Server
  ➢ Temperature and Motion Data Transmission
  ➢ Data Post-Analysis and Sharing
Bluetooth Signal Strength Test

\[ \text{RSSI}[\text{dBm}] = -10^n \log(d) + A [\text{dBm}] \]

- \(d\) = distance from device (m)
- \(n\) = environment constant
- \(A[\text{dBm}]\) = RSSI value measured 1 meter from device
THANK YOU

QUESTIONS?