Home Health Care Alert Information System and Social Network

**Background:** EmbedRF LLC in partnership with OHSU is currently developing a new product called the Mobility Assessment and Tracking Radio Frequency (matRF) system that will be used to enable passive in-home monitoring of elderly patients living independently within their home or in a care facility. The project monitors the patient’s movement around the living area and uses pattern recognition and tracking algorithms to assess daily living markers including (1) average walking speed (2) trips to the bathroom, kitchen, living room etc. (3) gait assessment (4) fall events and (5) immobility events.

**Capstone Team Involvement**

In phase 2, the MobileRF system will be required to securely send health information gathered by the Hub to research personnel for storage and further analysis. Ultimately, the MobileRF product will also need to have the capability to send health information to friends, family members, and/or health care workers who are monitoring the older person. The capstone team's goal was thus to implement such a system for data collection and monitoring.

**Our Design:**

**Information System Overview**

The Embed-RF information system consists of the following three primary components: (1) a hub, (2) a server, and (3) a mobile phone application. The hub aggregates the data, performs the tracking and mobility assessment algorithms, and then relays this information to a centralized Internet server. The Internet server then performs some processing to determine if an alert is required in the event that the patient appears to be in trouble (i.e. if they have fallen or if there is a significant change in their movement patterns). The Internet server will then notify a patient’s family member or health provider via a message to a smart phone mobile application.

**Tools:**

**Languages Used:**
- Visual C#
- PHP
- MySQL
- HTML
- Java
- AJAX

**Development Environments:**
- Microsoft Visual Studio
- MySQL Workbench
- Eclipse
- PHPMyAdmin
- Adobe Dreamweaver
- Adobe Flash

**Functionality:**

- Administrator credential verification
- Register a new resident
- Configure residential layout
- Calibrate all way points and paths
- Collect Raw Data from USB ports
- Simulate three modes of collection:
  - Raw Tagged
  - Raw Tag-Free
  - Interpreted Data
- Store all above data on local MySQL database
- Register a new care giver
- Allow Patient /Care giver to add 1 or more care givers with privileges as in most social networking of today
- Store Care giver info into a remote database
- Ability to request specific information from database
- Ability for Patient/Care giver to send and receive email
- Allow majority of social network features on active account
- Ability to monitor if Access Point Device ON or OFF

**Example of Each GUI:**

**People Enrolled:**

**Team Members:**
- Maisee Brown
- Huy Huynh
- Cipstone Advisor:
  - Martin Siderius
  - Peter G. Jacobs
  - Eric Wan

**Sponsors:**
- Ron Groenendaal
- Anindya S. Paul

**Community:**
- Nicole Larimer | ORCATECH Point of Care
- Lab Coordinator

**Background:**

In partnership with OHSU, the Department of Electrical and Computer Engineering is currently developing a new product called the Mobility Assessment and Tracking Radio Frequency (matRF) system that will enable passive in-home monitoring of elderly patients living independently within their home or in a care facility. The project, led by a team of researchers and engineers, focuses on monitoring patient movement around the living area and using pattern recognition and tracking algorithms to assess daily living markers such as average walking speed, trips to various rooms, gait assessment, fall events, and immobility events.

**Capstone Team Involvement:**

In phase 2, the MobileRF system will be required to securely send health information gathered by the Hub to research personnel for storage and further analysis. This project aims to extend the capabilities of the existing system by allowing friends, family members, and healthcare workers to monitor the older person remotely, enhancing the overall quality of care. The team's goal was to implement a system that facilitates continuous monitoring and alert notifications in case of potential health issues.

**Our Design:**

**Information System Overview:**

The Embed-RF information system comprises three primary components: a hub, a server, and a mobile phone application. The hub aggregates data, performs tracking and mobility assessment algorithms, and forwards this information to a centralized Internet server. The Internet server then processes the data to determine if an alert is required, such as in cases of falls or significant changes in movement patterns. An alert is communicated to the family member or health provider via a mobile application.

**Tools:**

**Languages Used:**
- Visual C#
- PHP
- MySQL
- HTML
- Java
- AJAX

**Development Environments:**
- Microsoft Visual Studio
- MySQL Workbench
- Eclipse
- PHPMyAdmin
- Adobe Dreamweaver
- Adobe Flash

**Functionality:**

- Administrator credential verification
- New resident registration
- Residential layout configuration
- Way points and path calibration
- Collection of raw data from USB ports
- Simulation of data collection modes:
  - Raw Tagged
  - Raw Tag-Free
  - Interpreted Data
- Local storage of collected data in MySQL database
- Registration of a new care giver
- Permission management for care givers
- Requesting specific health care information
- Sending and receiving emails
- Utilization of social networking features
- Monitoring of access points

**Example of Each GUI:**

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