Mobile Health Interoperability

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Overview

- Overall Vision
- Faculty
- Components
- Projects
Mobile Health Interoperability Lab
Overall Vision

- Laboratory dedicated to mHealth interoperability
- Lab mimics healthcare scenarios
- Focus is on home environment, other environments outside hospital
- Incorporate various mobile medical devices, sensors, and mobile computing
- Application development at several layers
  » Device interface layer
  » Aggregation Layer
  » EHR/HIS Layer
- Undergraduate and graduate student developers
From Device to Health Information System

Devices

Aggregation

EHR/HIS

*Logos are used to indicate products or standards used in testbed, not endorsement or affiliation with lab
Faculty

Christopher Doss
Mohd Anwar

Corey Graves

Daniel Limbrick
Albert Esterline
Components

- Patient Data Simulation
  - Advanced Geri Manikin
  - Pronk Technologies SimCube

- Mobile Platforms
  - Android, iOS, and Microsoft tablets
  - Arduino and Raspberry Pi Processors
  - Bluetooth Development Kits
Components (Cont.)

- **Medical Devices**
  - GE Mac 1600 EKG
  - GE VSM 100 Monitor
  - Various BP monitors, Pulse Oximeters, Weight Scales, etc

- **Health Information Systems**
  - Mirth Interface
  - Several EHR/HIS Systems
  - Each on Dedicated Server
Current Projects

- Normalized Data for EHR System
- Integrating FHIR with .NET
- A Real-time System for Capturing FHIR-Based Observations of Daily Living on Mobile Devices
- Captured Standardized Medical Data Compilation
- Integrating FHIR with OpenMRS
- Up and Coming Projects
- Context-Aware Remote Health Monitoring Service
- FHIRFrame
Normalized Data for EHR Systems –
Shrikant Jadhav

- Information exchange requires must be normalized (well-structured)
- Data should be linked and bounded properly
- Research entails developing algorithms for converting data from one form to another
Integrating FHIR with .NET –
Addis Elliott and R. Christian Ford

- .NET Framework allows for application development for Windows 8 devices and Kinect
- Leverage .NET FHIR development
- Develop the code that will support developers to use FHIR on .NET devices to ease integration with EHR systems

- Interface Android/Feature phones with Pulse Oximeter
- Capture data in FHIR format
- Transfer data to HealthATM
Captured Standardized Medical Data Compilation – Kahn Cam, Morgan Curry, Matthew Hill, Aaron Jordan, Michael Lowe

- Developing a patient simulator
- SimCube will be used to simulate patient vital signs
- ECG and Pulse Oximeter will be used to monitor results
- Data will be captured via microcontroller
Integrating FHIR with OpenMRS – Jacob Groome, Steven Moore, and Dwain Robinson

- Capture (simulated) medical data from mobile device
- Translate into FHIR resource
- Store data into OpenMRS
Research Phase – Dennis Azorlibu, Muhammad

Apple Health Kit

Open HIE
Context-Aware Remote Health Monitoring Service

- **ThingWorx Application Server**
- **Soap Server**
- **Pod Gateway**

**Personal Medical Devices**
- Weight Sensor
- Glucose Sensor
- BP Sensor
Main Clinician View
Patient Details View

Calvin Jones has history of heart ailment. Mr. Jones had surgery on December 18, 2013. Since then, his condition has improved. He stopped smoking and began a more healthy lifestyle through diet and exercise.

Home Health aid notes: Blood pressure has been inconsistent
Current Research

- Reference Architecture for Mobile Health Interoperability
- Implementation of MH FHIR Project Scope Statement
- Develop a set of APIs and SDK add-ons
- Goal is to facilitate implementation of medical applications according to international standards
- Follow approach utilized by OpenGL
- Support app development on various platforms (iOS, Android, .NET, Arduino)
- Ease incorporation of FHIR
- Facilitate interaction with EHR/PHR
- Enforce IHE workflows
References

- mHIMSS Roadmap: http://www.himss.org/mobilehealthit/roadmap
- 3millionlives: http://3millionlives.co.uk/
- Johns Hopkins University Global mHealth Initiative: http://www.jhumhealth.org/