CS MQP Interests 2011-2012
by Emmanuel Agu
Overview

- 4 projects
  1. **Graphics**: physically-based game engine
  2. **RFID (sensor)** application
  3. **Hospital Navigation smartphone application**: to help patients navigate Umass medical (large) hospital
  4. **Diabetes monitoring smartphone application**: to help patients with type-II diabetes to monitor health and chronic wounds
Project 1: Game Engine

- **Project:** Develop new open source *physically-based* game engine
- Only "graphics aspects"
  - Game rendering framework
  - OpenGL shader-based
- Physically-based?
  - Light propagation obeys laws of physics
  - New cooler effects possible
Project 1: Game Engine

- Old game engine: Not physically based
- Graphics look fake
- Example: Torque 3D
Project 1: Game Engine

- New game engine: CryEngine by Crysis
- Physically-based
- Commercial
- Closed source
Project 1: Game Engine

- Basic rendering framework: data structures, instancing, etc
- *Plus* real-time global illumination
  - Light Propagation Volumes
  - Screen Space Ambient occlusion
  - Spherical Harmonic Lighting
  - Time of Day modelling
Project 2: RFID Project

- Sensors/RFID used to gather data
- Software processing: infer meta-information
- **Pramari**: is the company that sponsors the leading RFID Open Source Platform Rifidi
- MQP on-site in Hartford Connecticut
Project 2: RFID Project

- **Hospital Asset Tracking**
  Track asset within the hospital,
  Equipment used for which patient
  Secure equipment from theft

Attach RFID to hospital equipment
Project 2: RFID Project

- **Retail Point of Sale**
  
  Automate check out
  
  Smart dressing rooms: which clothes tried on, how often?
  
  Secure merchandise
  
  Magic mirror: recommend similar products to those worn in front of mirror
  
  Attach RFID to clothes
Project 3: Hospital Navigation Mobile App

- Project co-advised with Profs Chernova, Rundensteiner and Agu
- Large hospitals are overwhelming
- UMASS Medical system includes:
  - 5 hospitals
  - 60,000 in-patients in 2010
  - 1.4 million outpatients in 2010
  - Single visit involves clinics in multiple buildings
- How can patient locate doctors office, rooms, etc?
Project 3: Hospital navigation mobile App

- **Solution:** Develop mobile App for navigation
**Project 4: Diabetes Smartphone app**

- Diabetes self-care is typical
  - Diet, blood glucose levels, weight, exercise
  - Wound care (washing, medicating) and detect new ones

- MQP: Develop Android application that assists patients with monitoring and tracking
Elke’s Projects

- Prof Elke Rundensteiner
- Data management
- Information analysis
- GUIs for data analysis

Contact
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Sample projects

- Configure new applications
- Write scripts for processing RFID events/data