ARCHANGEL
An architecture for ubiquitous, intelligent, transparent activities monitoring for active ageing and independent living through the early detection of signs of medical problems
http://mm.aueb.gr/research/archangel

Athens University of Economics and Business

Mobile Multimedia Laboratory
Prof. George C. Polyzos, PI

1. Project Highlights
- Sensor-based system for monitoring and modeling the activities of the elderly and people with special needs.
- Applies to the home life and possibly to the person outside the home
- Monitored person carries GPS-enabled cellular phone and/or other localization devices
- Deploy off-the-self sensors to home, other locations

2. Objectives
- Learn the daily activities of the monitored individuals
- Detect changes in individuals’ routines and health status
- Provide alerts and preliminary diagnosis as quickly as possible when something out of the ordinary occurs
- Actuator-based automation of certain tasks in the home

3. System Architecture
A. Monitoring Environment
1) Indoor Area Component (IAC)
   - To be installed in homes and other places
     - Off-the-self environmental sensors
     - Indoor Gateway to gather, aggregate & process sensor data
     - Allows multi-interface communications with URC
2) Outdoor Area Component (OAC)
   - Allows the system to keep track of monitored individuals and for their caretakers to contact them
     - Software for GPS-enabled cell phones
     - Tx to the URC standardized messages with location data
3) User Registrar Component (URC)
   - Gathers and redistributes standardized messages (per tracked individual) to the Diagnostic Environment

B. Diagnostic Environment
1) Event Recognizer Component (ERC)
   - Uses machine learning to identify higher level events from lower level sensor and positioning readings
   - Trained to recognize the appropriate events by the caretakers
2) Activities Modeling Component (AMC)
   - Statistical machine learning to create personalized activities models of each monitored individual
   - Detects deviations from routine

4. Experimental Environment
- Off-the-self sensors & GPS-enabled cellular phones
- Standard software platforms both for the mobile side (Windows Mobile) and the server side
- User-friendly interface to the human caretakers
- Using Data Set of indoor traces (from MIT) to test the system’s sensor-based algorithms (for Activity Recognition, etc.)

5. Simulation Results
Activity Recognition via Temporal Rules & Data Mining

Cell Phone as a Platform for Healthcare