A Smartwatch-Based Assistance System for the Elderly Performing Fall Detection, Unusual Inactivity Recognition and Medication Reminding

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Medication

Photo: http://www.albanyivf.com/fertility_treatment/medication.htm
Elderly people tend to fall

30-40% of people aged 65 or older fall at least once a year

10-20% of those get seriously injured
Pebble smartwatch

- 3D acceleration sensor
- Bluetooth
- battery performance
- water resistant
Alerts in case of fall, distress or inactivity

Requests the status of Carrie

Emergency contacts

Smartphone

Smartwatch

Photos: [http://globe-views.com/dreams/nurse.html](http://globe-views.com/dreams/nurse.html) (Nurse); [http://tiny.cc/308xvx](http://tiny.cc/308xvx) (Man with Smartphone)
Fall Detection

- Machine learning-based approach
- Multilayer perceptron is trained with pre-recorded data of falls and non-fall situations
- Sensitivity: 98.4%
  Specificity: 99.4% (on staged falls)
Inactivity Recognition

- Threshold-based approach
- Adapts itself to the user’s daily routines
- Respects weekly recurring patterns
- Calculates “usual” inactivity for any given time of day
inactivity durations and the calculated thresholds
manual help requests & automatic fall detection
inactivity recognition
alerts are texted to emergency contacts
medication reminders
Future research

● evaluation of performance and acceptance in field tests
● usability tests
● alternative wearables
● improvements to fall detection (online learning, custom network per user)