# Wearable Devices

COMPUTER LITERACY

# Factors in Wearable Tech Today

- Faster and cheaper hardware
- Cloud storage
- Location data
- Quantified self activity
- Visual & voice technology
- Personalization
- Gaming industry

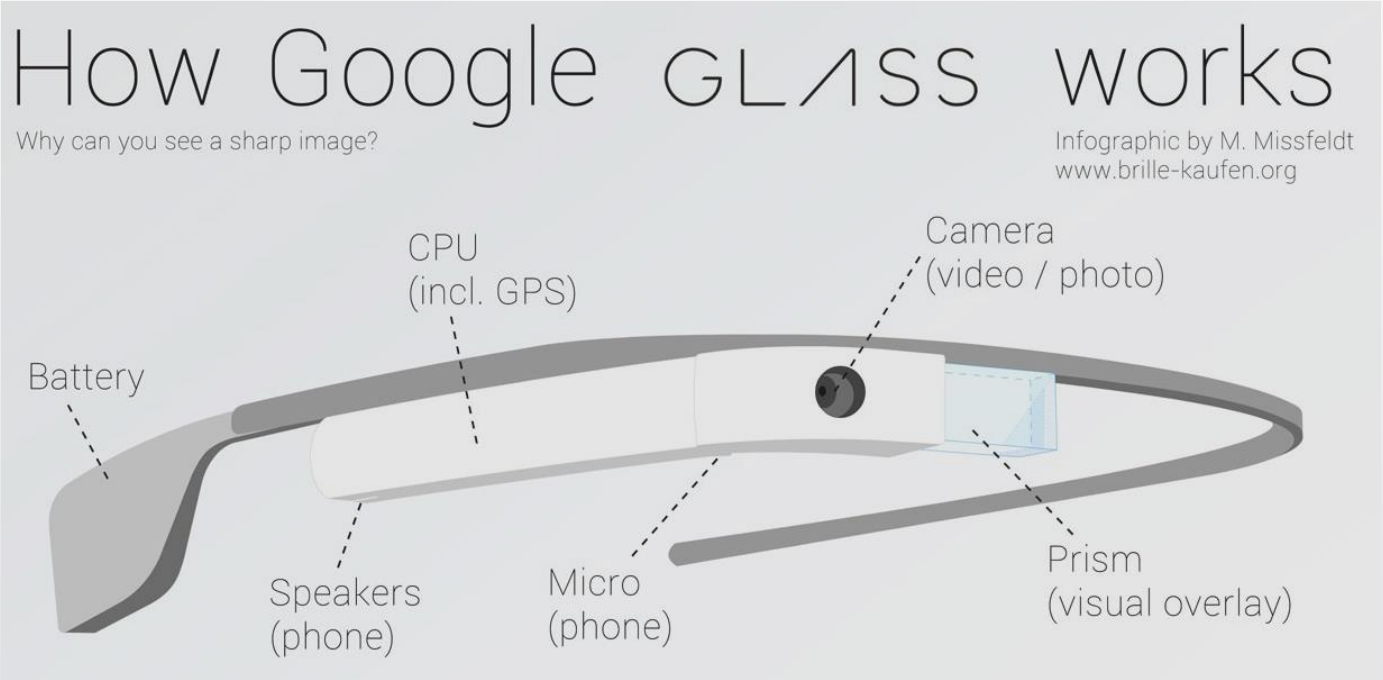
# Devices

- Audio-video capturing devices
- Body data gathering devices
- Gesture recognizing devices
- Other devices proposed in research

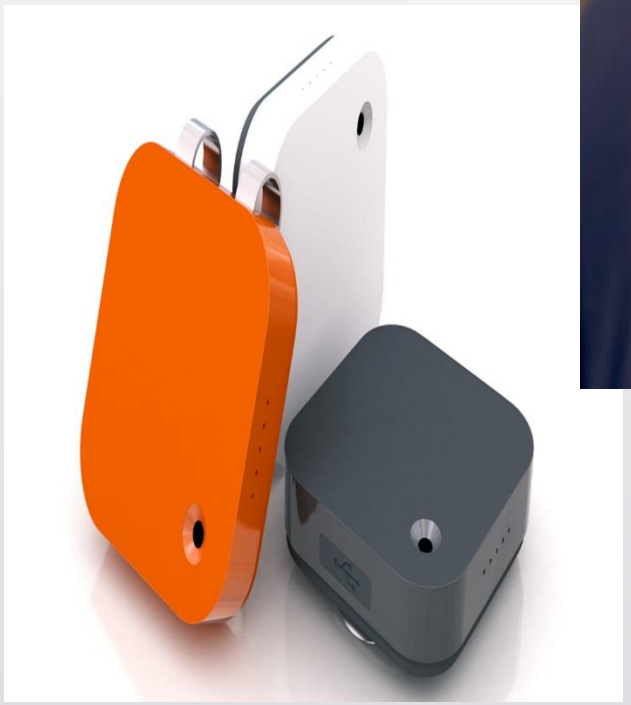
# Audio-Video Capturing Devices

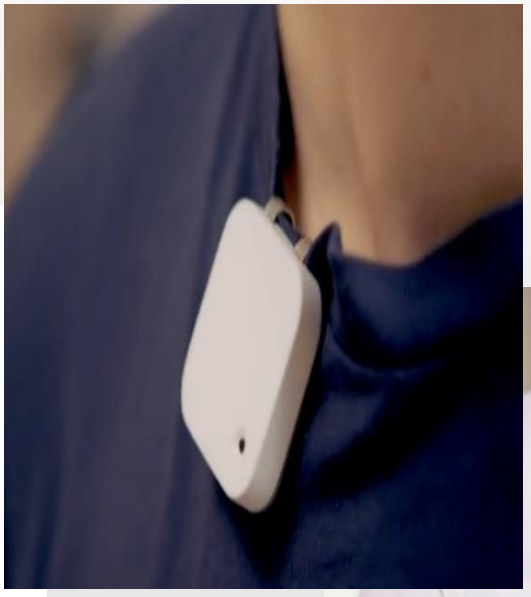
Logging Life Events

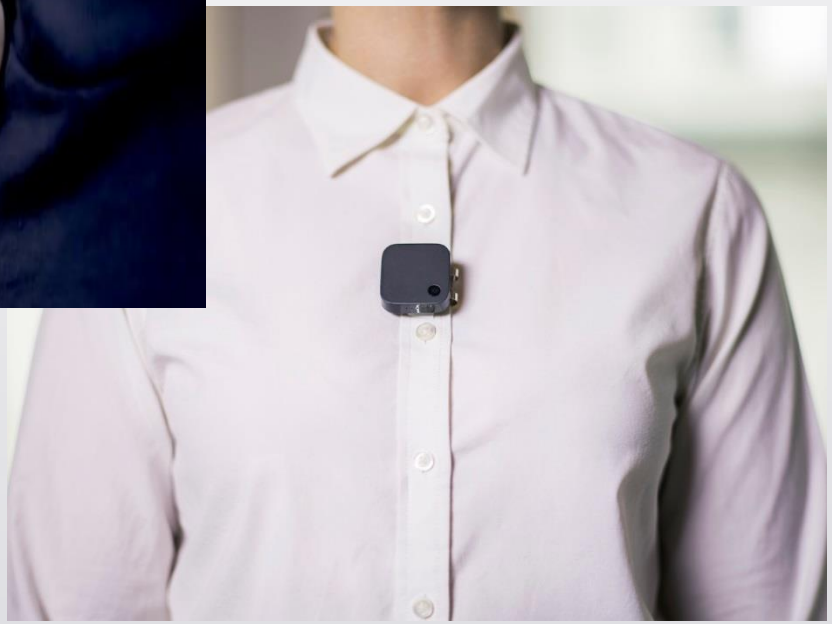
# Google Glass (Smart Glasses)




# Narrative Clip (First Person Camera)







http://getnarrative.com/

# Autographer (First Person Camera with Sensors and GPS)


# Kapture (Autonomic Audio Capture)

https://kaptureaudio.com/

# Body Data Gathering Devices

Monitoring Health Status

# Jawbone (Activity Monitor)

**RECHARGEABLE BATTERY**

Up to 10 days of use on a single charge.

**VIBRATION MOTOR**

Powers your silent alarm clock & reminds you to move.

**PRECISION MOTION SENSOR**

Accurately tracks your movement and sleep activity.

**3.5MM PLUG**

Syncs your band with the app on your phone.

**SWEAT-PROOF & WATER-RESISTANT***

Wear the band while showering or working out.

* Water-resistant up to 1m.

# Fitbit (Fitness Tracker)

# Apple Watch


10:09
225
19
04


12
9
3
312CAL ELLIPTICAL


10:55
Tuesday, Sep 9

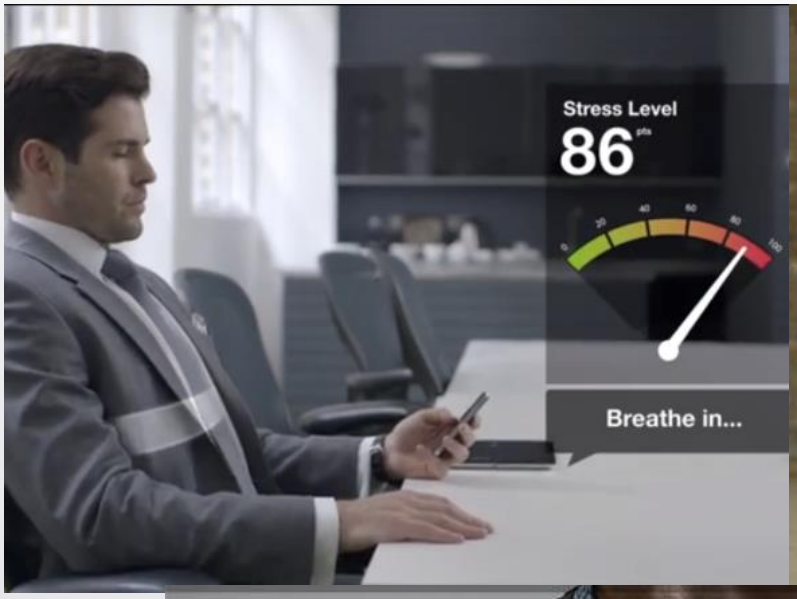

82° PARTLY CLOUDY

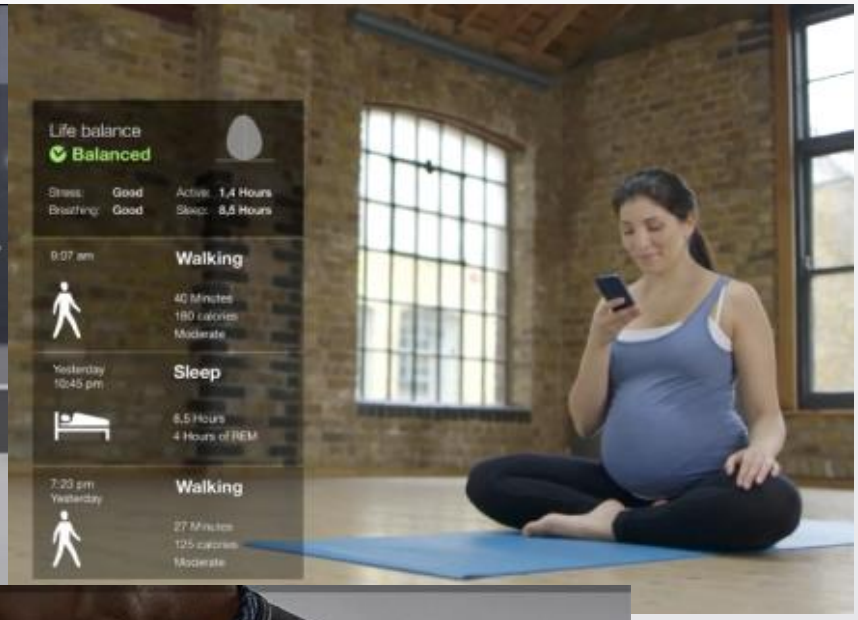
# Emotiv (Brain Activity Tracker – EEG)

https://www.emotiv.com/

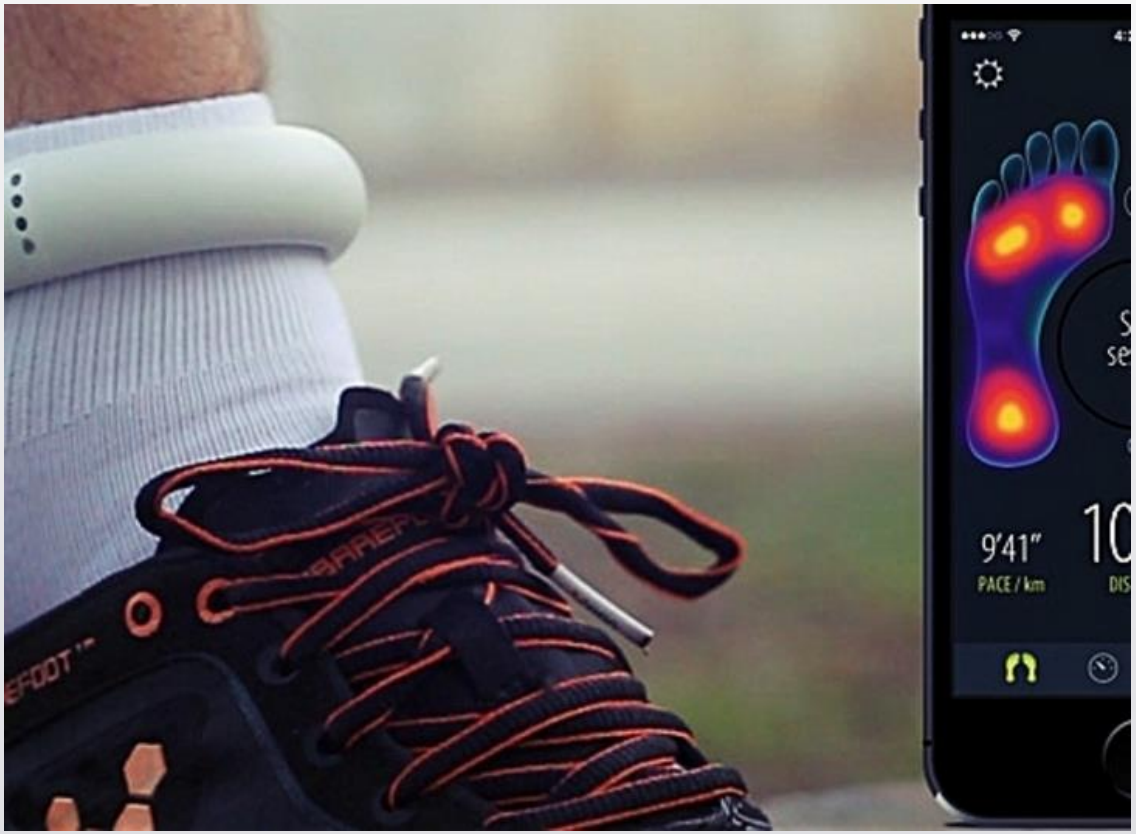
# Muse (Brain Monitor)

# OmSignal (Smart Shirt)

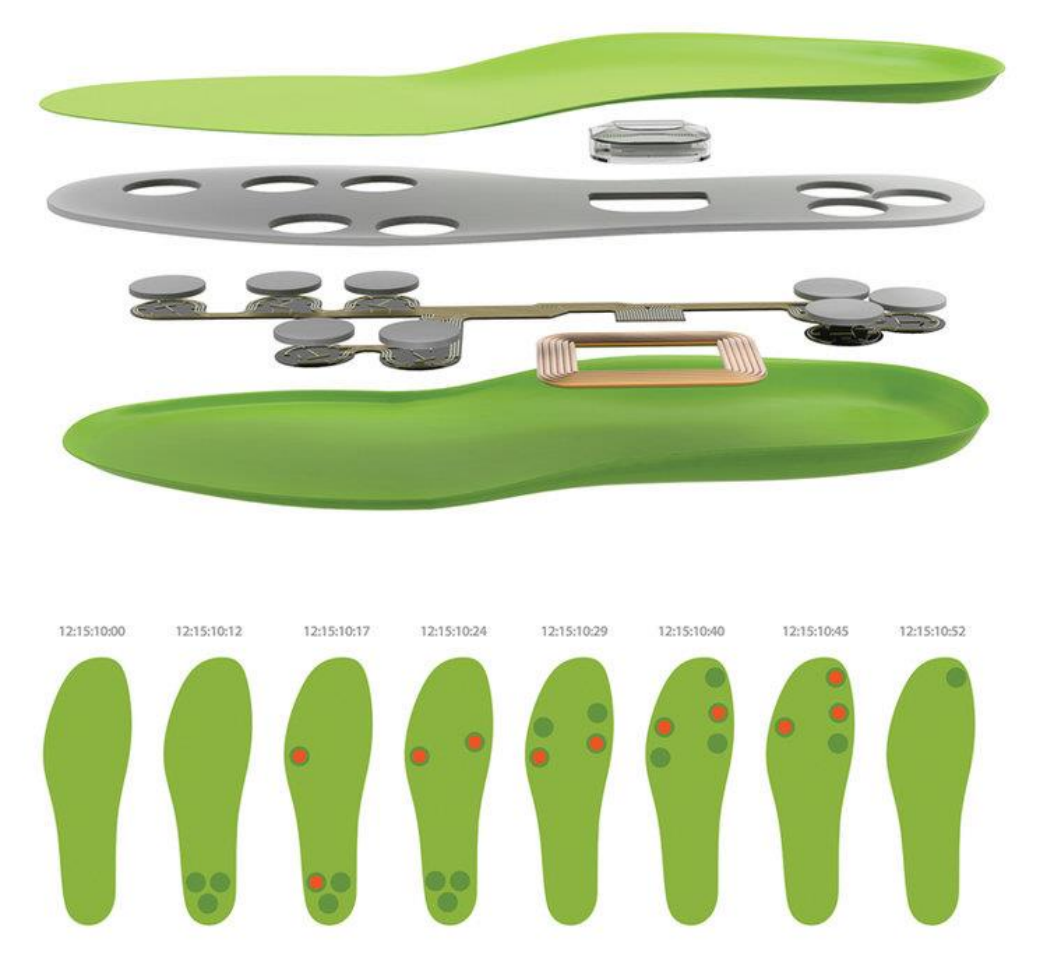



# Sensoria (Smart Socks)

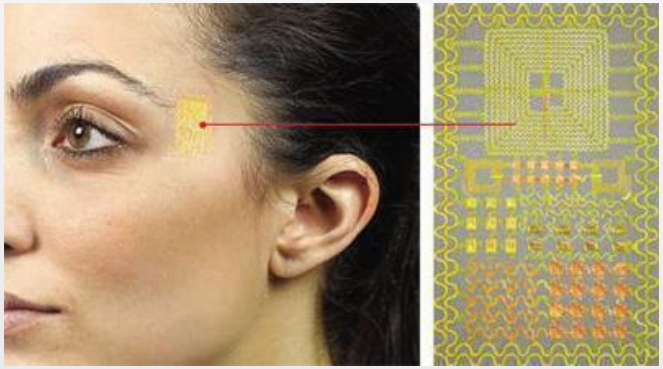


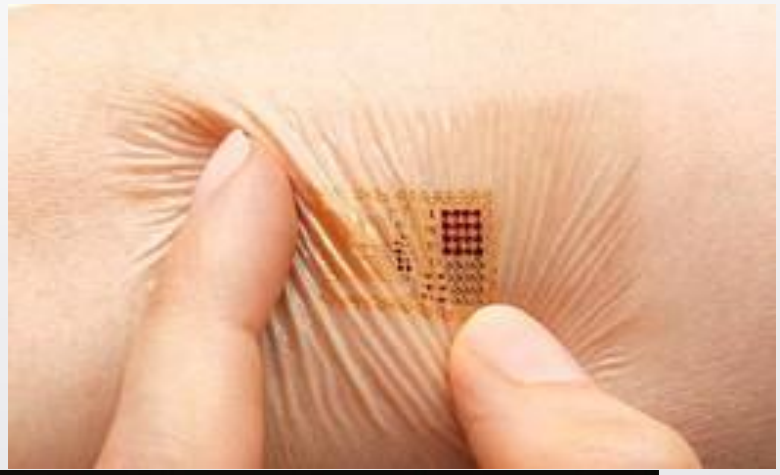

# FootLogger (Shoe Sole for Fitness Tracking)



# Owlet (Baby Status Monitoring)

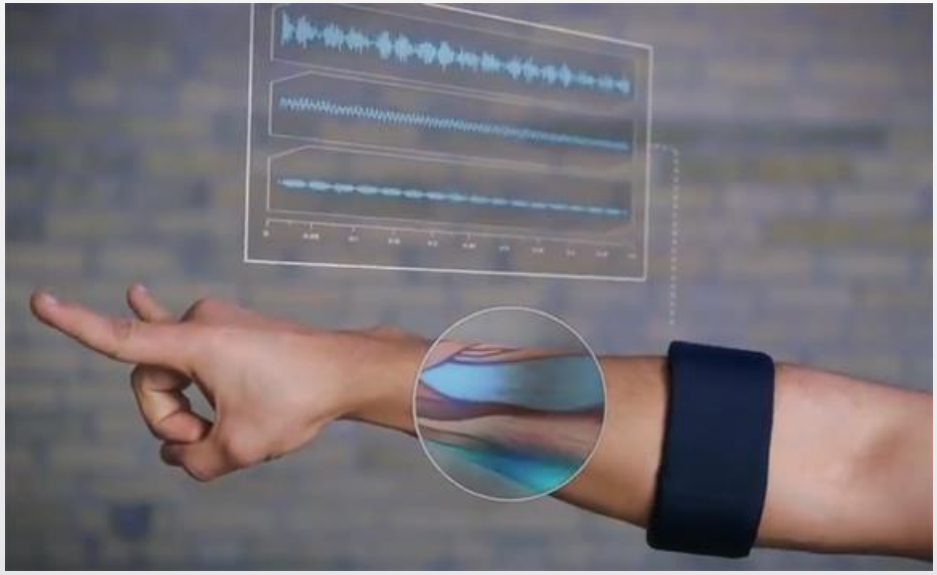

# MC10 (Flexible wearable sensors for health monitoring)

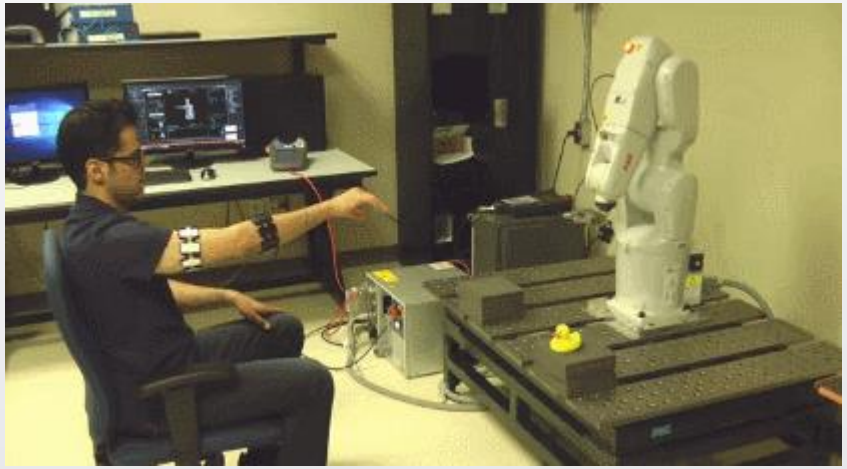




# Gesture Recognizing Devices

# Myo (Muscle Activity Tracker)





# Fin (Another Smart Ring)

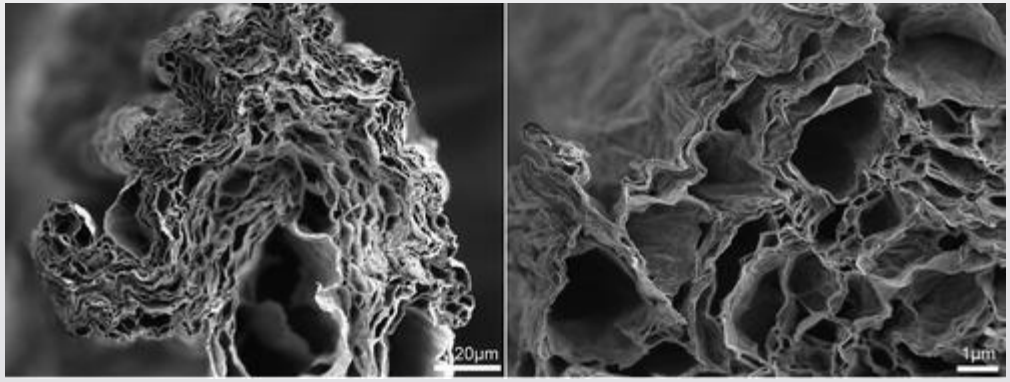
**Ring GINA (MobiCase 2013) for 3D gestures**

# SkinPut (MSR)

# Wearables discussed in Research Papers

# New Wearables – Energy Storage Textiles

- High-Performance Multifunctional Graphene Yarns: Toward Wearable All-Carbon Energy Storage Textiles (ACS Nano, 2014).



# New Wearables – Smart Temporary Tattoos

- DuoSkin: Rapidly Prototyping On-Skin User Interfaces Using Skin-Friendly Materials (International Symposium of Wearable Computers, 2016)


Figure 5: Input on (a) a continuous slider and (b) 2D touchpad.

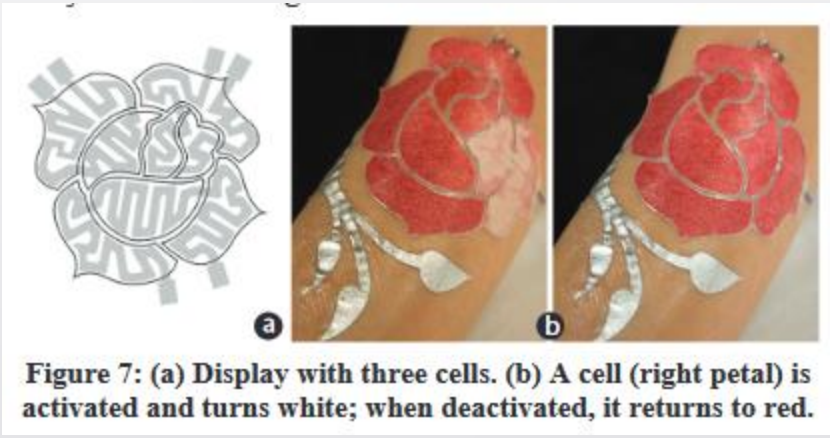



Figure 7: (a) Display with three cells. (b) A cell (right petal) is activated and turns white; when deactivated, it returns to red.

# New Wearables – New Applications

- Detecting Cocaine Usage through Wearable ECG Sensor (UbiComp 2013)

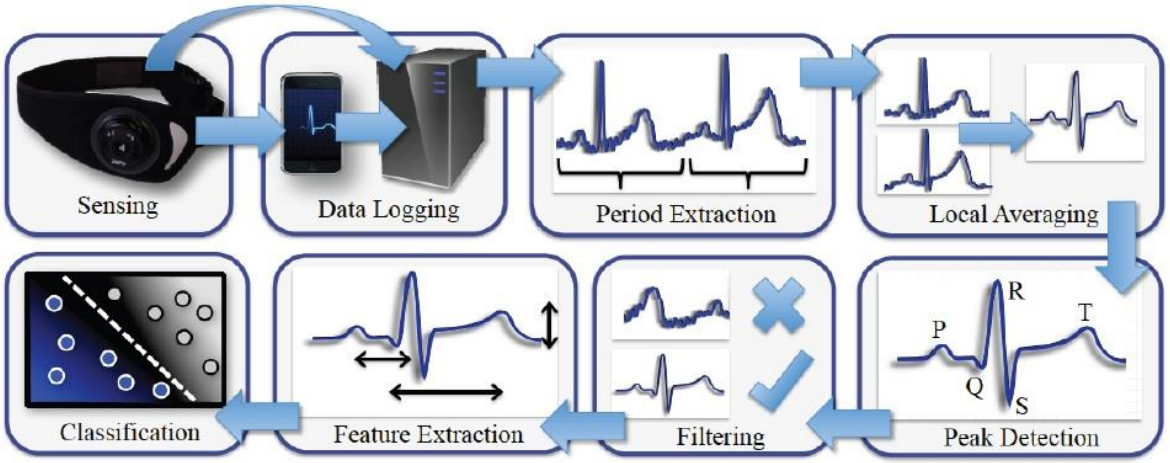
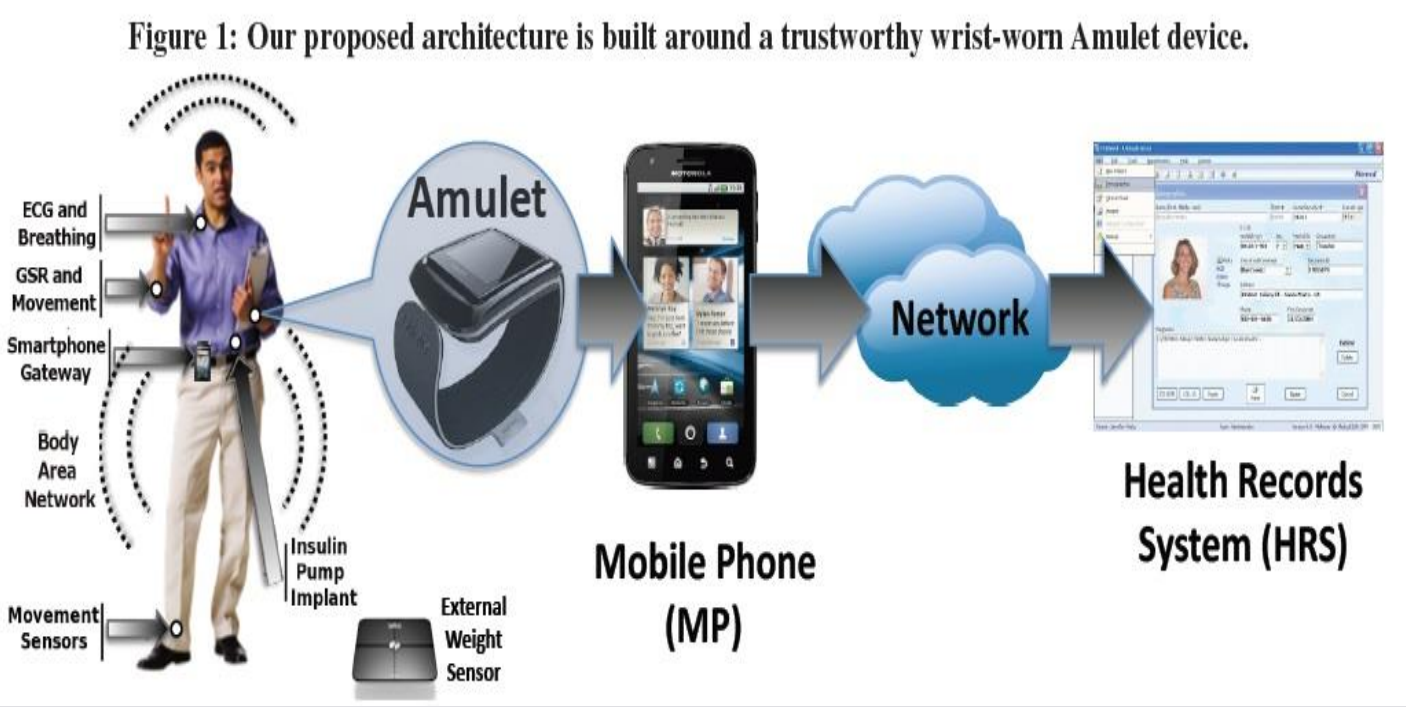



**Figure 3. This figure illustrates the primary steps in our sensing, data acquisition and data processing pipeline. Raw ECG measurements are transmitted wirelessly to a smartphone and also downloaded directly to a server to provide redundancy. We first segment ECG periods using RR intervals. To deal with noise in the signals, we compute local averages over 30 second sliding windows. We apply peak detection to the smoothed waveforms and discard those that do not have the correct configuration of peaks and troughs. We apply feature extraction and standardization followed by classification. The above steps apply only to features in the knowledge-based framework. For features in the data-driven framework the local averaging step is directly followed by classification**

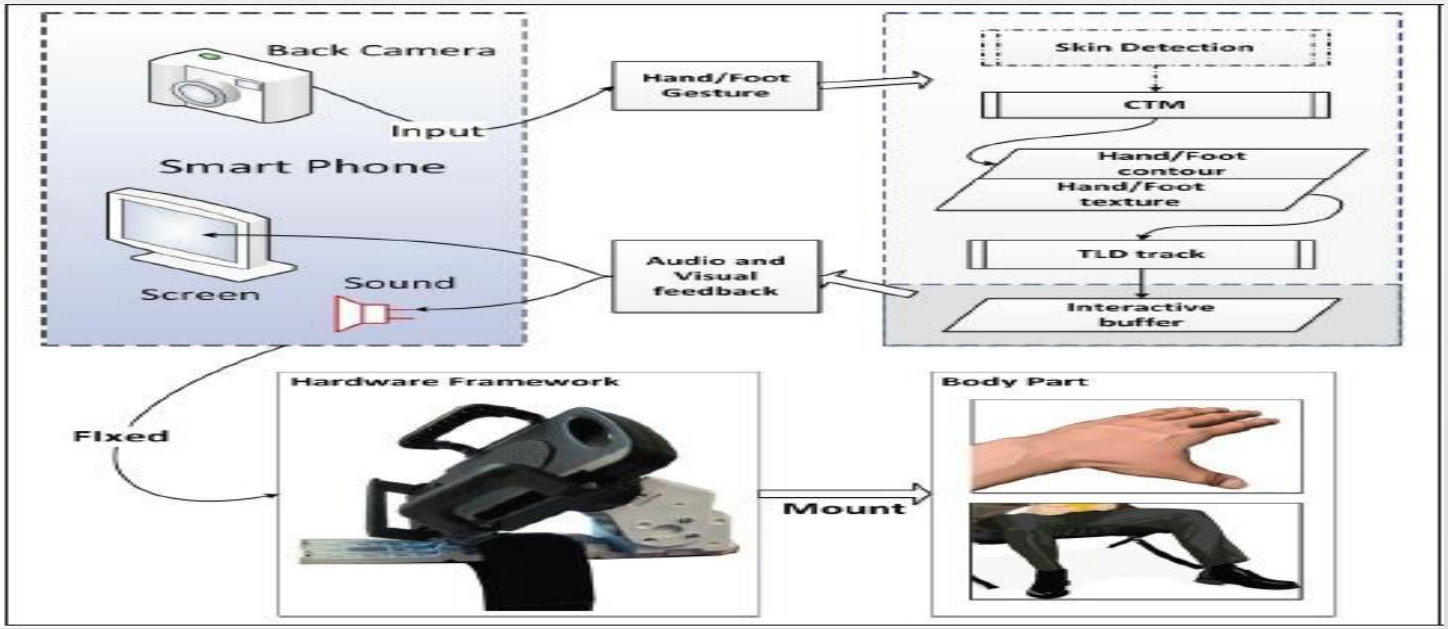
# New Wearables – New Applications

- An Amulet for Trustworthy Wearable mHealth (HotMobile 2012)



# New Wearables – New Applications

- Wearable Smartphone: Wearable Hybrid Framework for Hand and Foot Gesture Interaction on Smartphone (CVF, ICCV 2013)



# New Wearables – New Applications

- An Interactive Belt Worn Badge (CHI 2012)


**Figure 1. Prototype interactive badge and associated belt clip.**

# Classification of Wearables

**By Function**

- Life Logger
- Gesture Recognizers
- Entertainer
  - Video
  - Gaming
- Assistant
  - For Chore Jobs
  - For Creative Jobs
  - For Emergency Jobs

**By Creation**

- Replace daily wearables with smarter alternatives
  - Watches, Shirts, Shoes, Socks etc.
- Create new wearables
  - Armband, Headband, Shirt Clippers etc.

# Applications

- Life logging
- Activity tracking / monitoring
- Healthcare
- Gesture recognition
- Remote control
- Research
- Augmented Reality

# Concerns

- Privacy
- Security
- Energy
- Misinterpretation