



# IoT and Wearables

## Secure Mobile IoT Application Development

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Secure Mobile IoT Development— Lecture 4

# Today's Class: More on Hybrid apps and Lab time

## Part 1: IoT Background

- Concept

- Sensors and embedded devices

- Stats

- Threat vectors

- Attack Demo

## Part 2: Look at Metawear (no slides)

## Part 3: Lab time (new IoT lab up)

## Part 2: Lab time – continue with the hybrid lab

<https://github.com/MLHale/CYBR8480/blob/master/modules/hybrid-app-tutorial-part2.md>

ASK QUESTIONS!

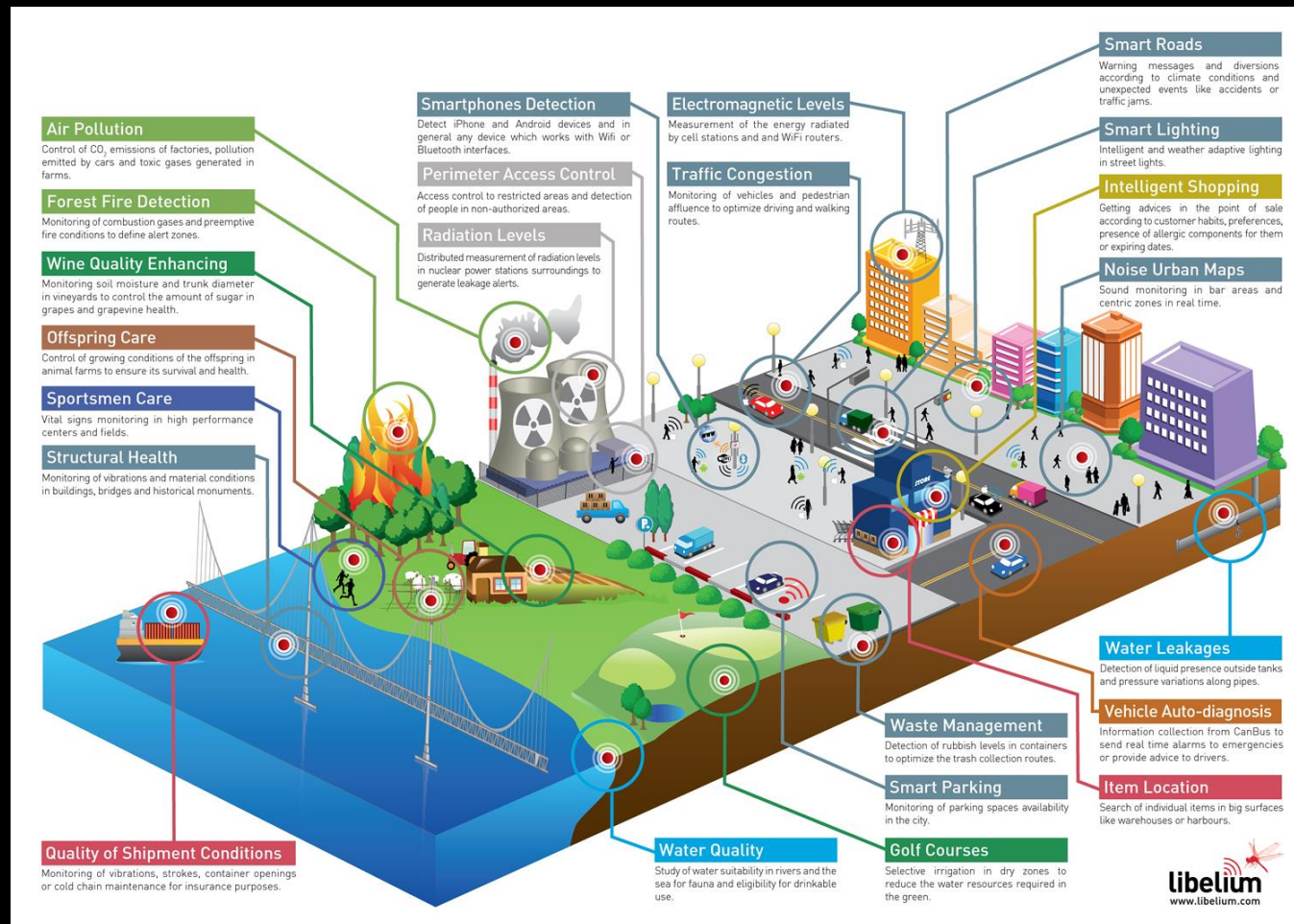


What is the internet of things and  
why should you care?



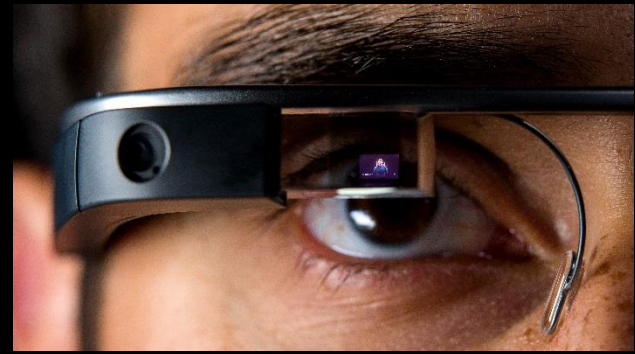
What is the internet of things?

# Sensors Embedded Everywhere



What is the internet of things?

fitbit  
surge™



GLASS

Including on your wrist, in your clothes, on your face...

NIKEFUEL



UP  
by JAWBONE™

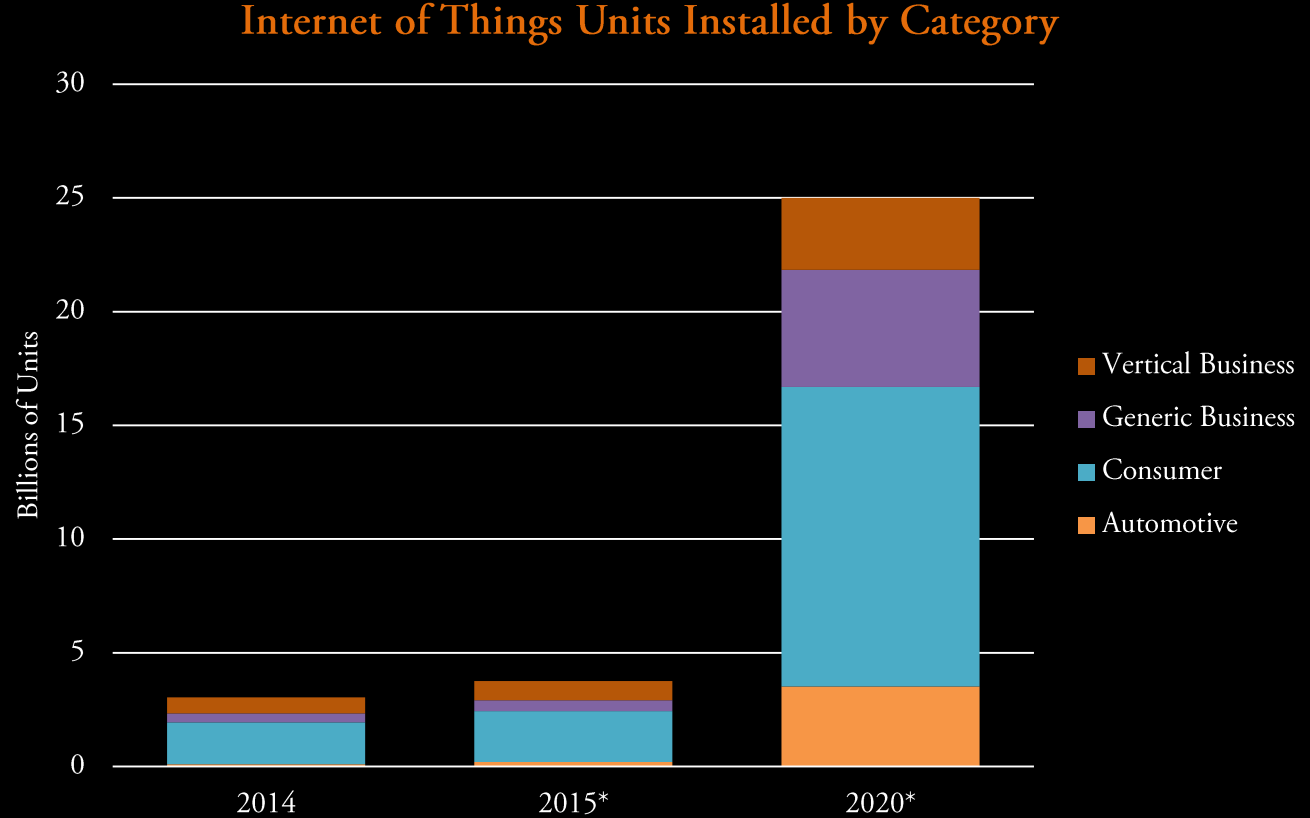


What is the internet of things?

And lots of:



## An Idea of Scale (IoT)

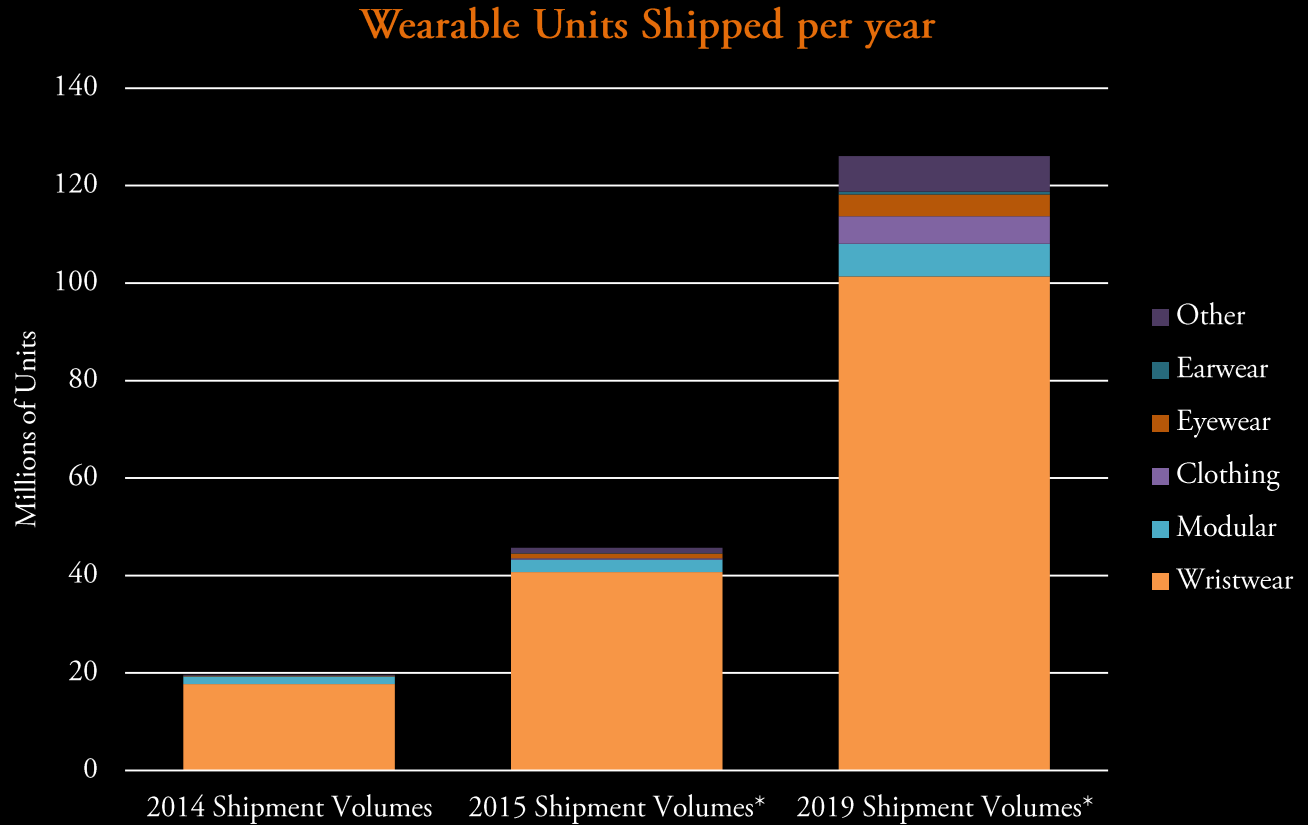


\* Forecasted figures

Source: Gartner: 4.9 Billion Connected “Things” will be in use by end of 2015, November, 2014



## An Idea of Scale (Wearables)



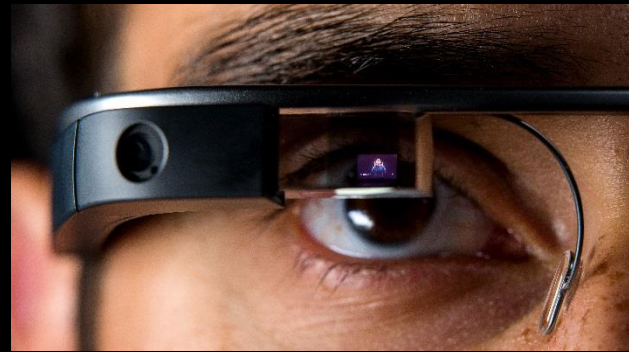
\* Forecasted figures

Source: IDC Worldwide Quarterly Wearable Device Tracker, March 30, 2015

133.4% Growth from 2014 to 2015 (19.6M to 45.7M)

45.1% Five-year compound annual growth rate (19.6 to 126.1)

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...ok so what? its sleep and pedometer data.

NIKEFUEL

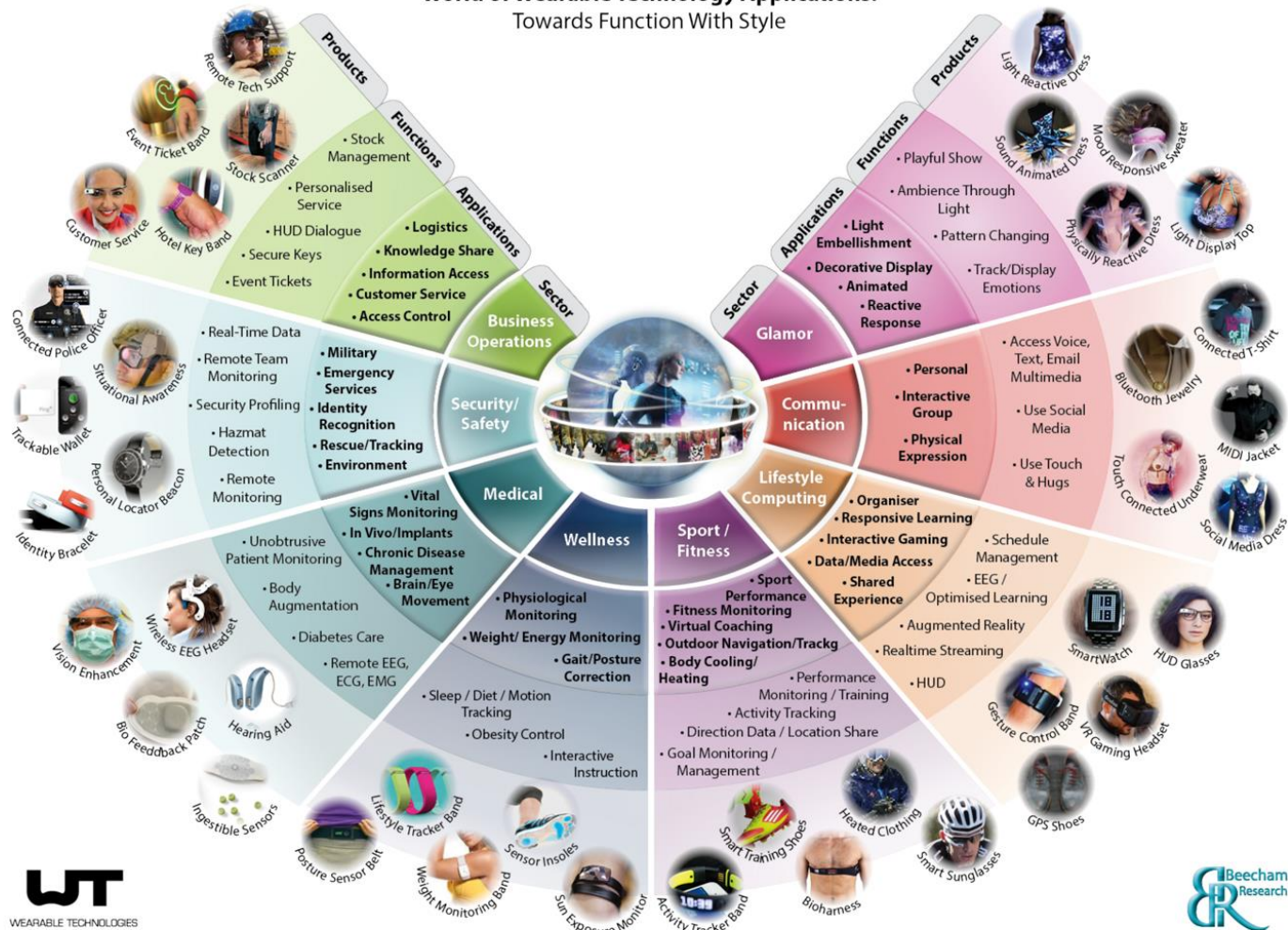


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Not  
exactly.

## World of Wearable Technology Applications: Towards Function With Style





Why do apps use



?

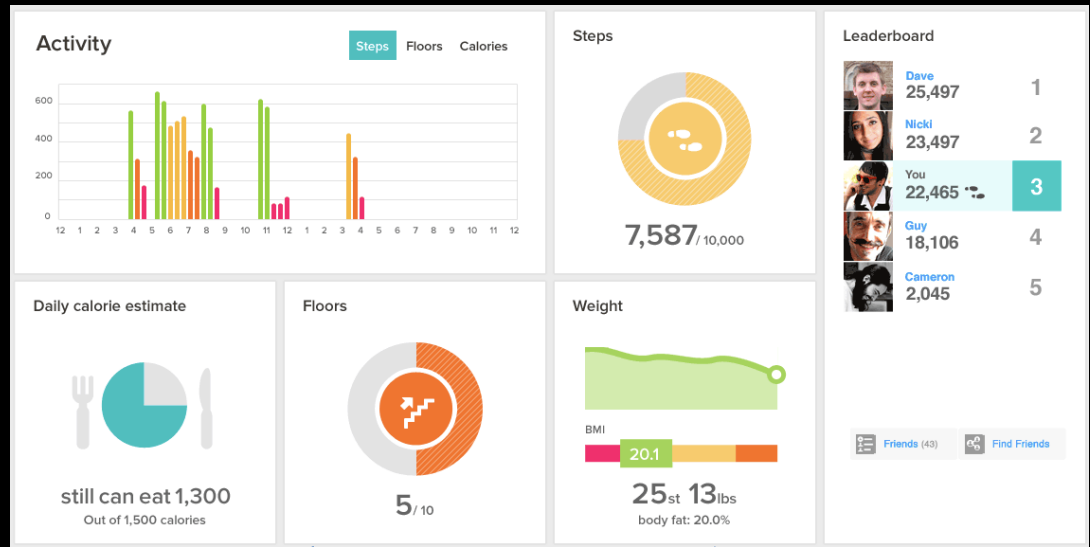
Better know the user\*

\*in whatever application

Mostly

-> Advertising and revenue generation

The possibilities:



A screenshot of a tweet from Amazon (@amazon) dated Jan 15. The tweet text is "42% Off Today's Deal - Shop Now! [amazon.com/b?gbBuyboxDeal...](#)". Below the text is a large image of a roll of white paper. At the bottom, it says "Today's Best Deals on amazon". There are also icons for retweets (47) and likes (27).



Big data is also important for other sectors

Medical -> patient well being & diagnosis

Military -> warfighter well being / operational intelligence



SITUATIONAL AWARENESS

Yeah it's important

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surge™



GLASS

...there are many security challenges

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# (in)security landscape

## New security flaws found in popular IoT baby monitors

Even internet-connected baby monitors aren't invulnerable that are easy to exploit.

By Zack Whittaker for Zero Day Initiative

## Hackers are coming for your smartwatch



CALE GUTHRIE WEISSMAN

APR. 13, 2015, 1:35 PM

## Nike+ FuelBand SE BLE Protocol Reversed

Simor

29 Jan 2015 in REVERSING NIKE NIKE+ FUEL BAND SE FUEL BAND NIKE FUEL BAND

## Anonymity is the internet's next big battleground

Jon Card

## Researchers find about 25 security vulnerabilities per Internet of Things device

Computerworld | Aug 4, 2014 12:32 PM PT

## Security Analysis of Wearable Fitness Devices (Fitbit)

Britt Cyr, Webb Horn, Daniela Miao, Michael Specter

Massachusetts Institute of Technology

dmiao@mit.edu, specter@mit.edu

## How I hacked my smart bracelet

By Roman Unuchek on March 26, 2015. 11:00 am

## Bluetooth: With Low Energy comes Low Security

Mike Ryan  
iSEC Partners

# Domain security issues

## User Awareness and Privacy Behaviors

Don't recognize data sensitivity or misuse  
May install malware or malicious apps  
Apps may be an invasion of privacy

## Web Application

Standard Web attacks (XSS, SQL injection, CSRF, etc)  
Information Leakage (e.g. geotagging in social media)  
Secure data storage and acceptable data usage

## Mobile Application

Third party tracking apps accessing data (stored/in-transit)  
Data encoding and transmission  
Resource consumption

## Wearable Hardware

Physical tampering  
Data encoding and transmission  
Resource consumption



# Inter-domain security issues

User Awareness and Privacy Behaviors

Web Application

Insecure Wi-Fi or 4G  
Lack of API Security (HTTPS/CORS/CSRF)

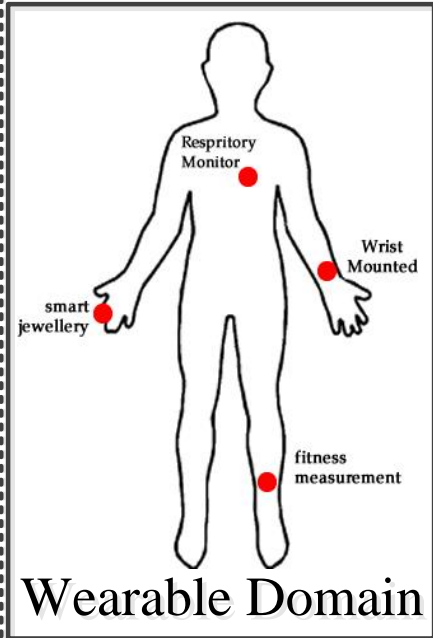
Mobile Application

Lack of over-the-air encryption  
Man-in-the-middle attacks  
Denial of service / Resource consumption

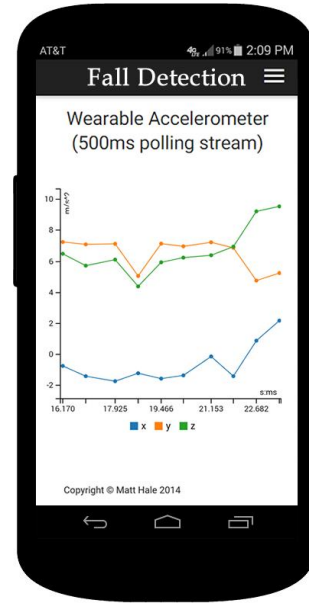
Wearable Hardware

# Attack vectors for a typical app

## Wearable Application

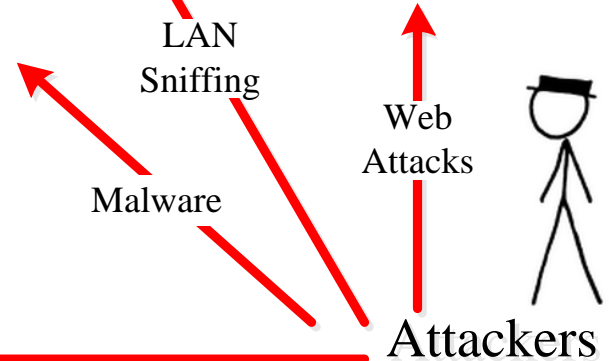
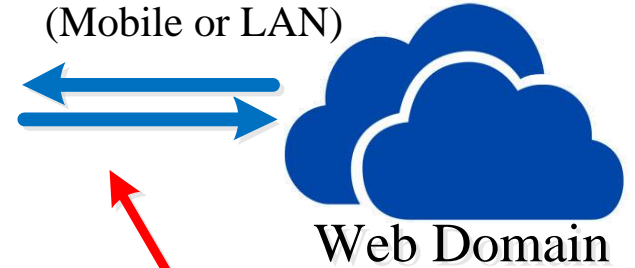


Bluetooth  
Sniffing /  
Packet Injection



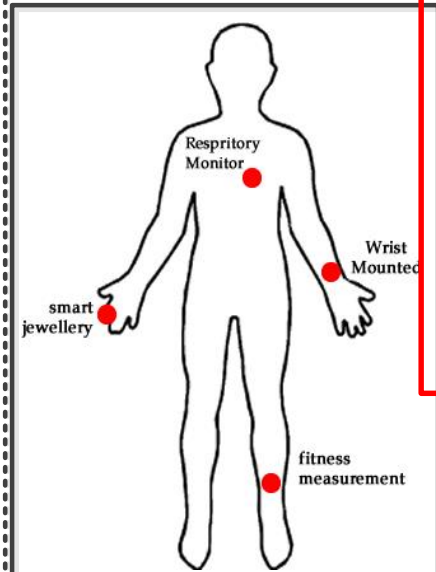
Mobile Domain

TCP / IP  
(Mobile or LAN)



# DEMO

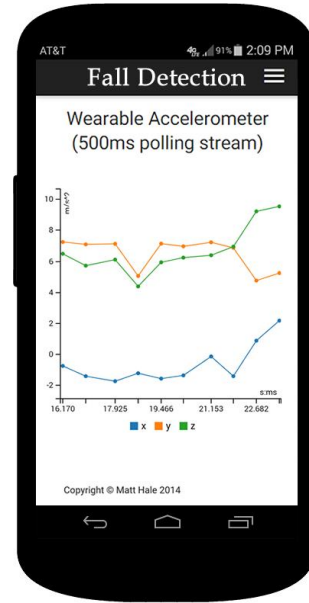
## Wearable Application



Wearable Domain

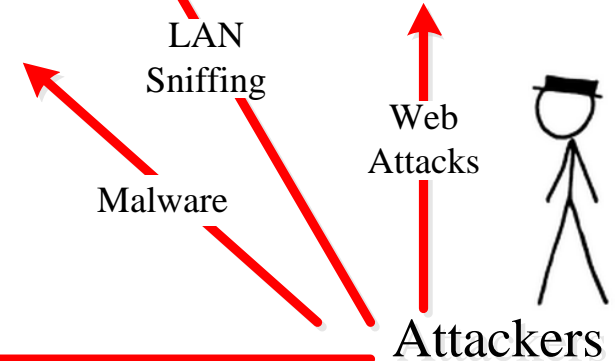
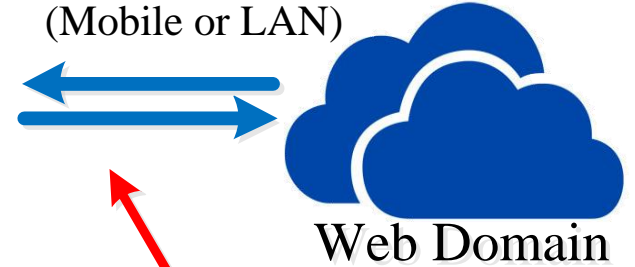


Bluetooth  
Sniffing /  
Packet Injection



Mobile Domain

TCP / IP  
(Mobile or LAN)





# Questions?

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