

# MOBILE PHONE COMPUTING AND IOT/WOT

*Presentation*

Computer Science Department

**Guide :**

*Varun G Menon*

*Assistant Professor*

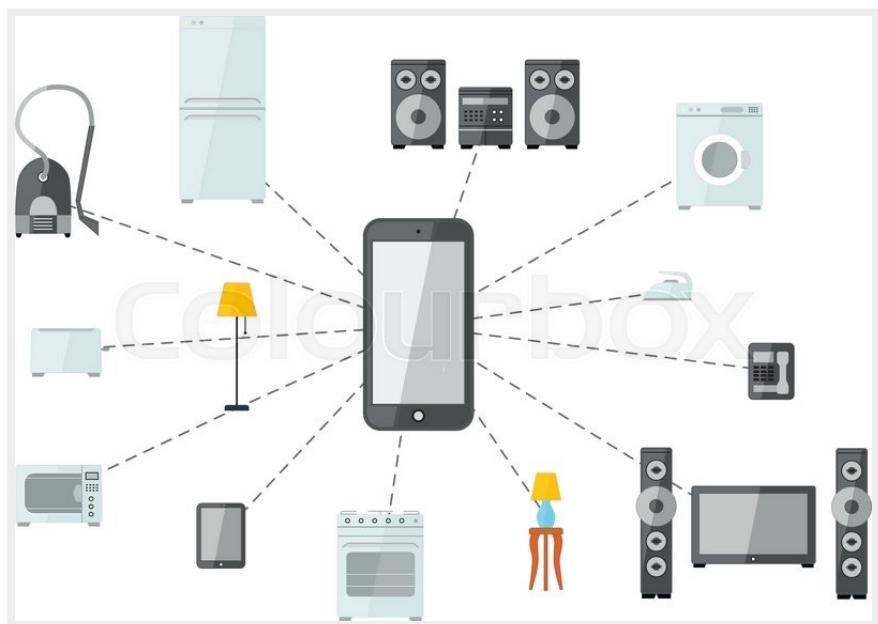
**Presented by:**

*Rajesh R Nair*

*S7 ,CS-2, Roll No:26*

*Batch No :12*

# INTRODUCTION



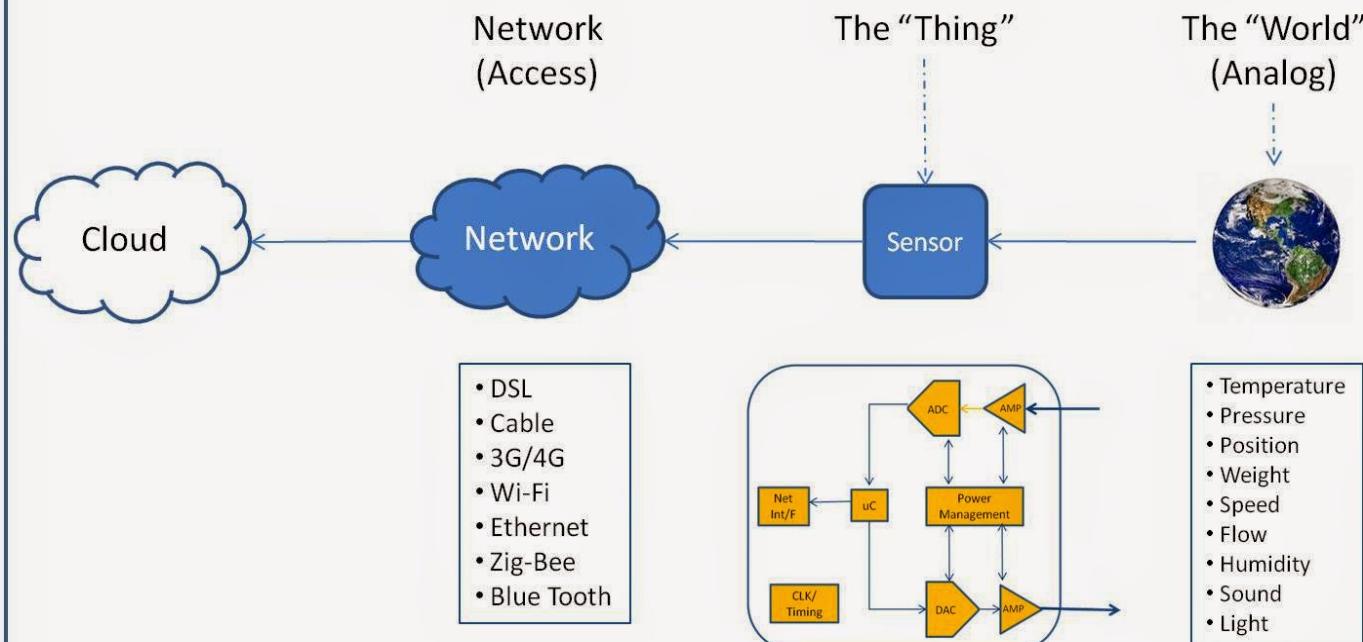
Download from  
Dreamstime.com  
This watermarked comp image is for previewing purposes only.

- Technologies such as wireless sensor networks, shortrange wireless communications, and radio-frequency identification (RFID) have allowed the Internet to penetrate in embedded computing
- The rise of multisensory mobile phones with Internet connectivity has helped to reduce the barriers for associating mobile computing with the IoT/WoT

# INTERNET OF THINGS

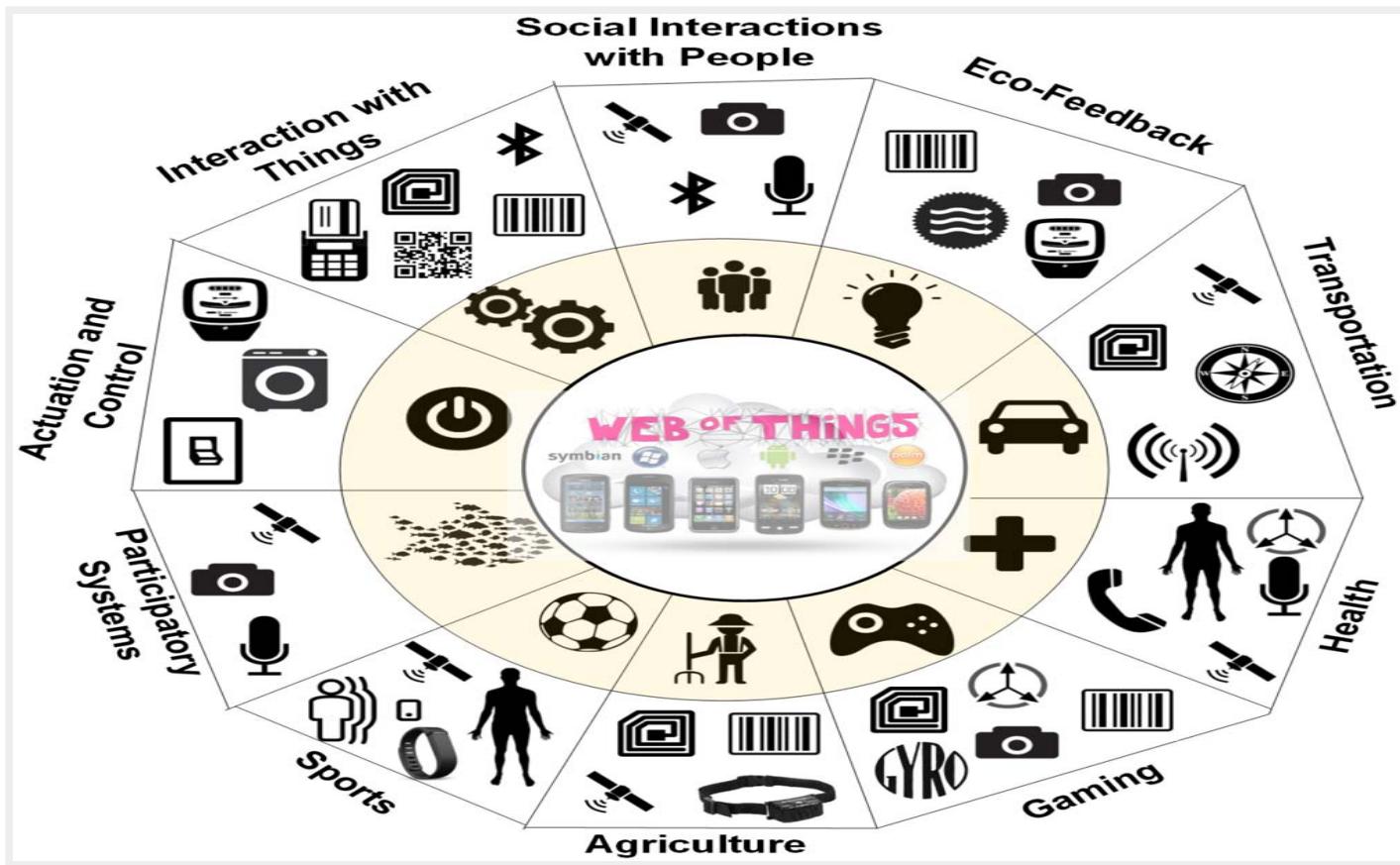
- Internet of thing is that things can communicate to each other without human.
- Internet of things targets to connect various objects (e.g. mobile phones, computers, cars, appliances) with unique addresses, to enable them interacting with each other and with the world.

# IoT: The Basics



# MOBILE PHONE COMPUTING AND IOT/WOT

## APPLICATION CATEGORIES



# PARTICPATORY SENSING

Applications that enable individuals in the general public to gather, analyze and share local information

## APPLICATION

- Noise Tube Project

# NOISE TUBE PROJECT

- **GOAL :** Help monitor noise pollution wherever you live.
- **TASK :** Measure and map your daily noise exposure with a mobile app.
- **DESCRIPTION :**
  - Developed in Sony Computer Science Lab
  - Facilitates sound measuring at any place and any time through a mobile app which exploits basic smartphone functionalities, namely microphone, wireless connectivity and localisation through GPS.
  - NoiseTube website collects all user measurements and visualises them on Google Maps.
  - Resulting maps give an average but not at all a complete view on the situation.
  - Free and Open Source.

# NOISE TUBE PROJECT

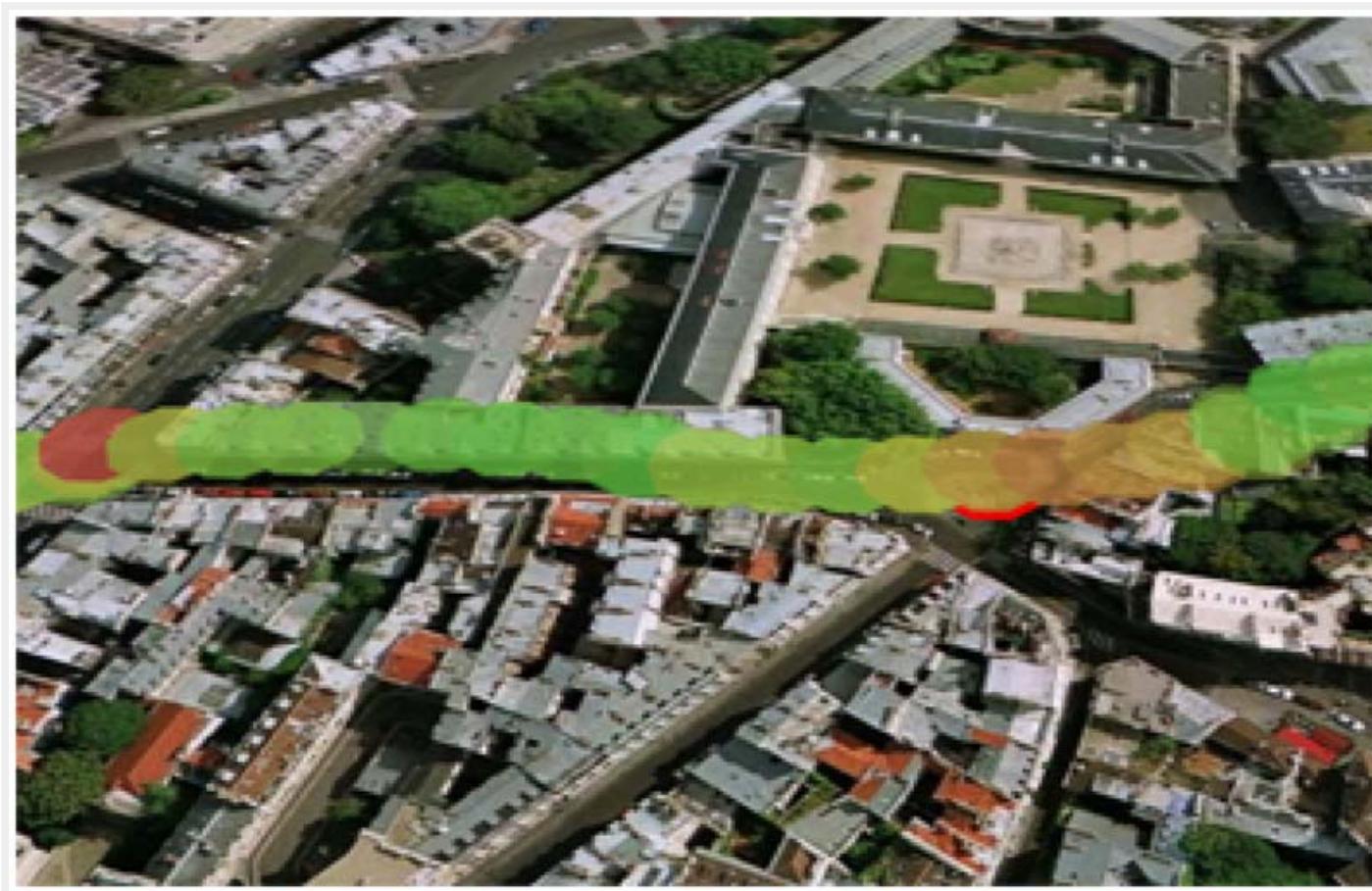


fig 1.Sound exposure through the NoiseTube project [22].



# ECO FEEDBACK

Involves mobile applications that provide feedback to the users about various environmental phenomena or events, or about their personal consumption

## APPLICATION

- UbiLense

# UBILENSE

- **GOAL :** Help monitor energy consumption of electrical and electronic devices.
- **TASK :** Measure energy consumed by an electrical device just by pointing on them using a phone camera
- **DESCRIPTION :**
  - Mobile phone sends the camera image to the image recognition server.
  - Server returns name and associated Plogg ID of the recognized object.
  - Mobile phone requests current energy consumption from associated Plogg.

# UBILENSE

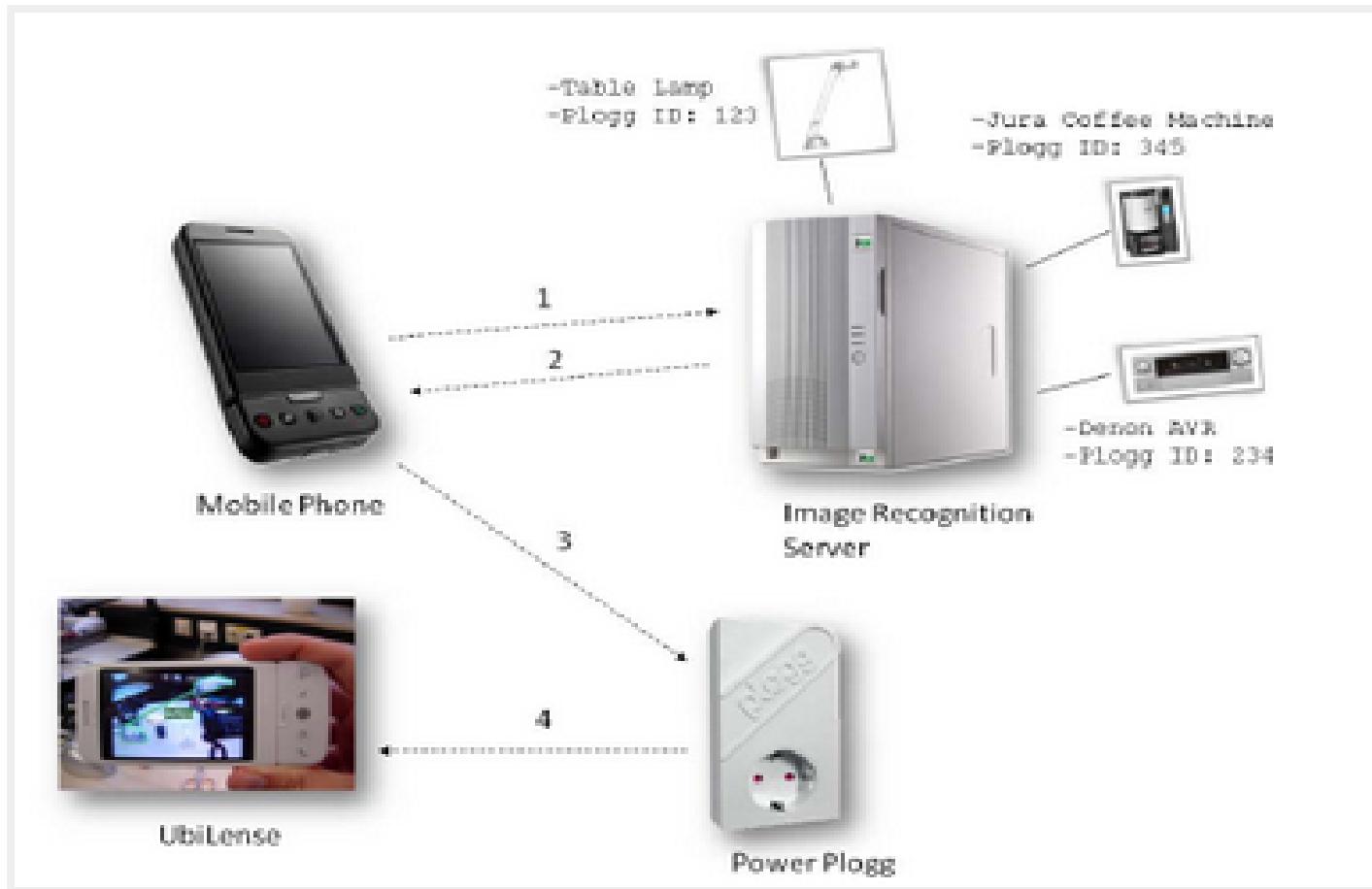


fig 2.Ubilense architecture



# ACTUATION AND CONTROL

Related to mobile applications that control some physical devices or actuate some events related to these devices. A typical example is home automation applications

## APPLICATION

- Plantly

# PLANTY

- **GOAL :** Monitoring growth of plants in a garden and providing guidelines for setting up a garden.
- **TASK :** Ensure healthy environment for plants to grow and helping users to grow garden.
- **FEATURES :**
  - Sensors of Planty measure temperature, soil moisture, and illuminance.
  - Monitor growth environment of the plant
  - Remote Watering
  - Smart Alarm.
  - Tips for gardening
  - Receive reports of your gardening activities and compare them with those of others.

# PLANTY

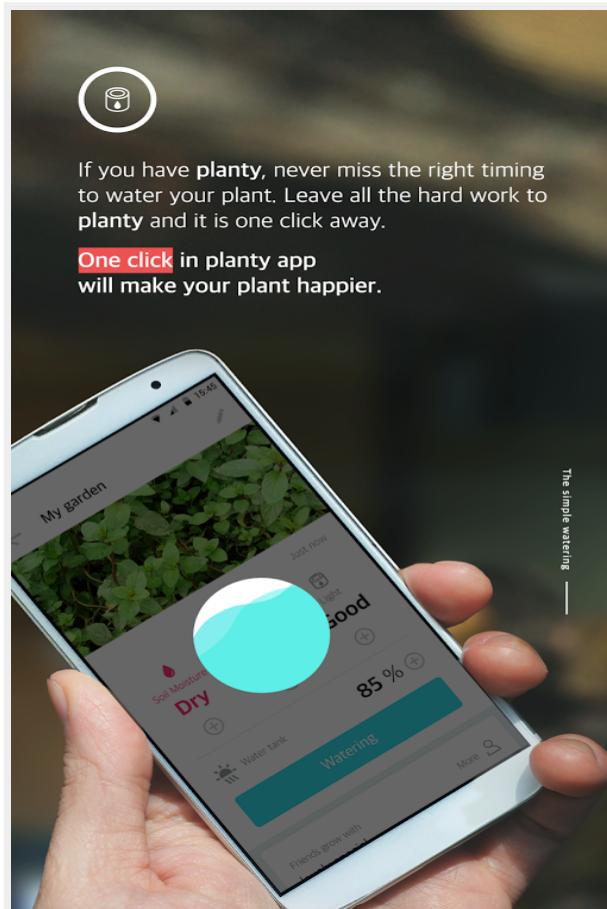
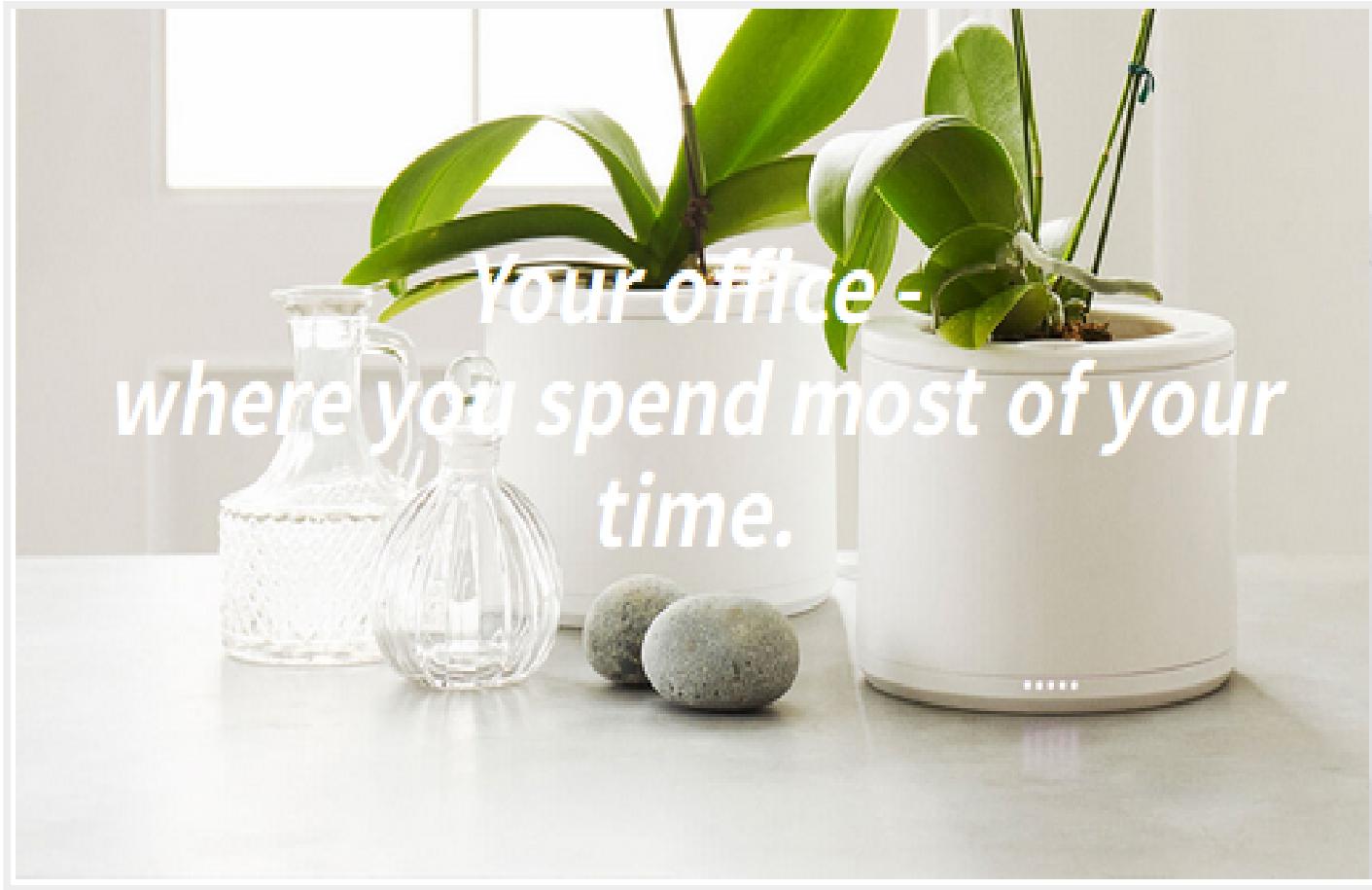


fig 3. Plantly Mobile App





*Your office -  
where you spend most of your  
time.*

fig 4.Pot Saucers equipped with sensors

# HEALTH

The mobile phone acts as an intermediary between body sensors and the Web. It receives information about the health status of the user, measured by various sensor devices installed on the body of the user and then uploads/shares this information to the Web for better analysis, comparisons and feedback.

# APPLICATION

- My Health Assistant

# MY HEALTH ASSISTANT

- **GOAL :** Maintaining or improving the state of your health by monitoring a wide range of health parameters.
- **FEATURES :**
  - Tracking of: weight, body water and fat, waist size, height, blood pressure, body, temperature.
  - Calculation of a relative overall health index.
  - Average daily statistic
  - Creating health reports
  - Medication taking: planning , remainders, watching.
  - Creating health diaries

# MYHEALTH ASSISTANT

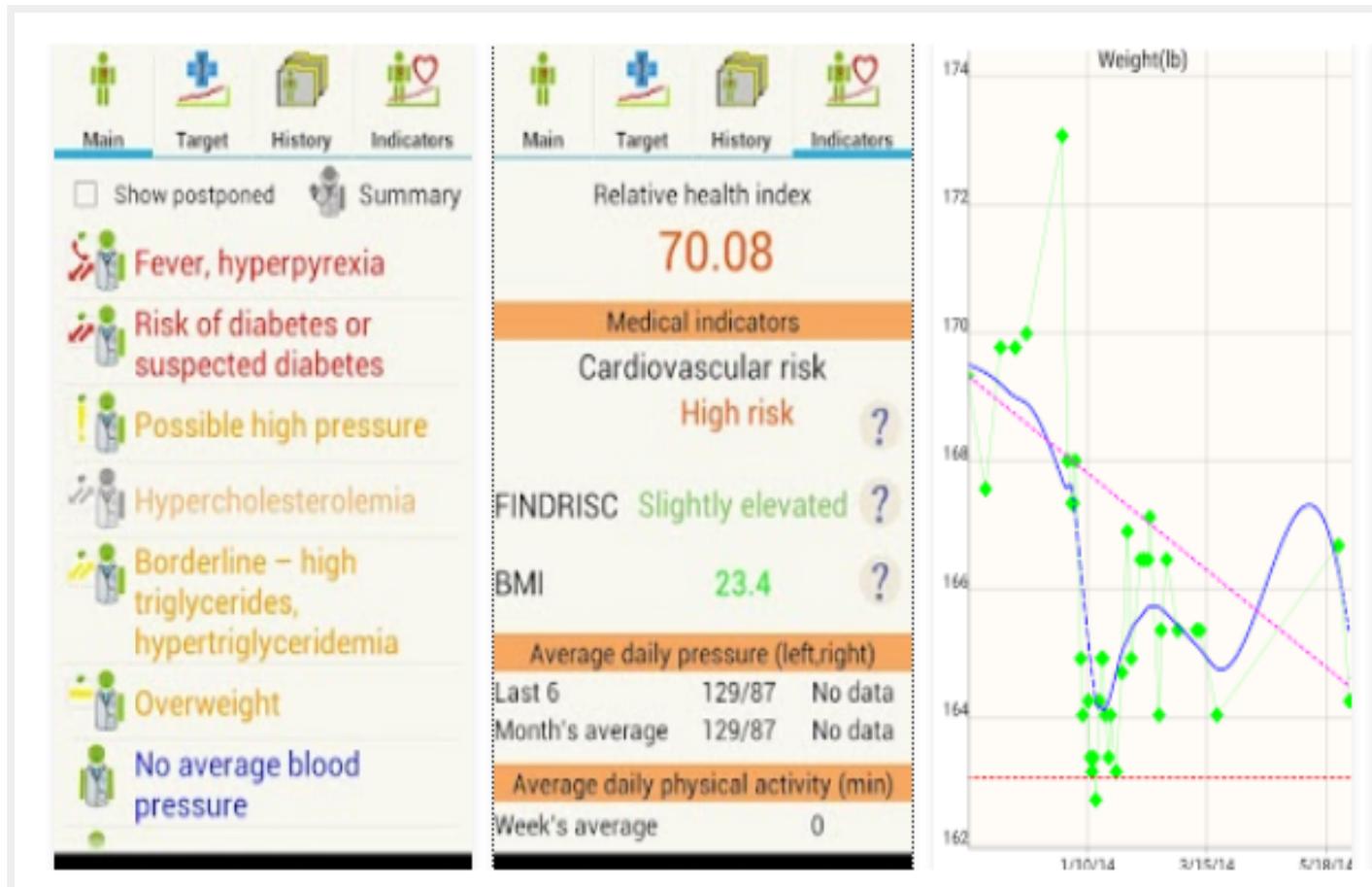


fig 5.My Health Assistant App



# SPORTS

Includes a combination of physical sensors and mobile applications which are used during sport activities to record various metrics and help to improve the performance of the athlete user.

# APPLICATION

- Bike Net

# BIKE NET APPLICATION

- **GOAL :** Give a holistic picture of the cyclist experience, not only by measuring various metrics, but also by sharing this information within the online cycling community
- **DESCRIPTION :**
  - Cyclist Experience mapping
    - By tracking wheel gear, & pedal speed vs. slope, they were able to derive a level of fitness
  - Collects and analyzes personal cyclist performance and communal environment data.
  - Web portal provides social networking among other cyclists

# BIKE NET



fig 6.Bike net Application



# AGRICULTURE

Related to smart farming practices to improve productivity, management of livestock and increase consumer satisfaction and transparency

## APPLICATION

- Herdwatch

# HERDWATCH

- **GOAL :** A herd management system which allows cattle farmers manage their beef or dairy herds via a smartphone or tablet.
- **FEATURES :**
  - Easy Remedy and Feed Purchase Compliance for Cattle and Sheep
  - Easy Sprays Compliance for new pesticides regulations
  - Fast Weight Recording and Analysis
  - Herd Management & Reports

# HERDWATCH



fig 7.Farmer controlling the cattle using the app



# GAMING

This category is about virtual games which consider the physical presence or status of the mobile user to enhance the gaming experience.

## APPLICATION

- Minecraft

# MINECRAFT



fig 8.Minecraft game being played in Virtual Reality



# TRANSPORTATION

A growing domain in which the sensing features of the mobile phone are harnessed for better driving experience and convenience of parking.

## APPLICATION

- Waze

# WAZE

- provides up-to-date traffic conditions, live-routing and maps, comprehensive voice-assisted navigation, alerts about road hazards, and even notifications when a Facebook friend is heading toward the same destination.
- FEATURES :
  - Automatically reroute around traffic as conditions change on the road
  - Know how long your drive will take before you start driving
  - Find gas stations and the cheapest gas prices on your drive
  - Get a sound alert if you exceed the speed limit with the speedometer
  - Save time looking for parking with Waze parking suggestions by your destination

# WAZE

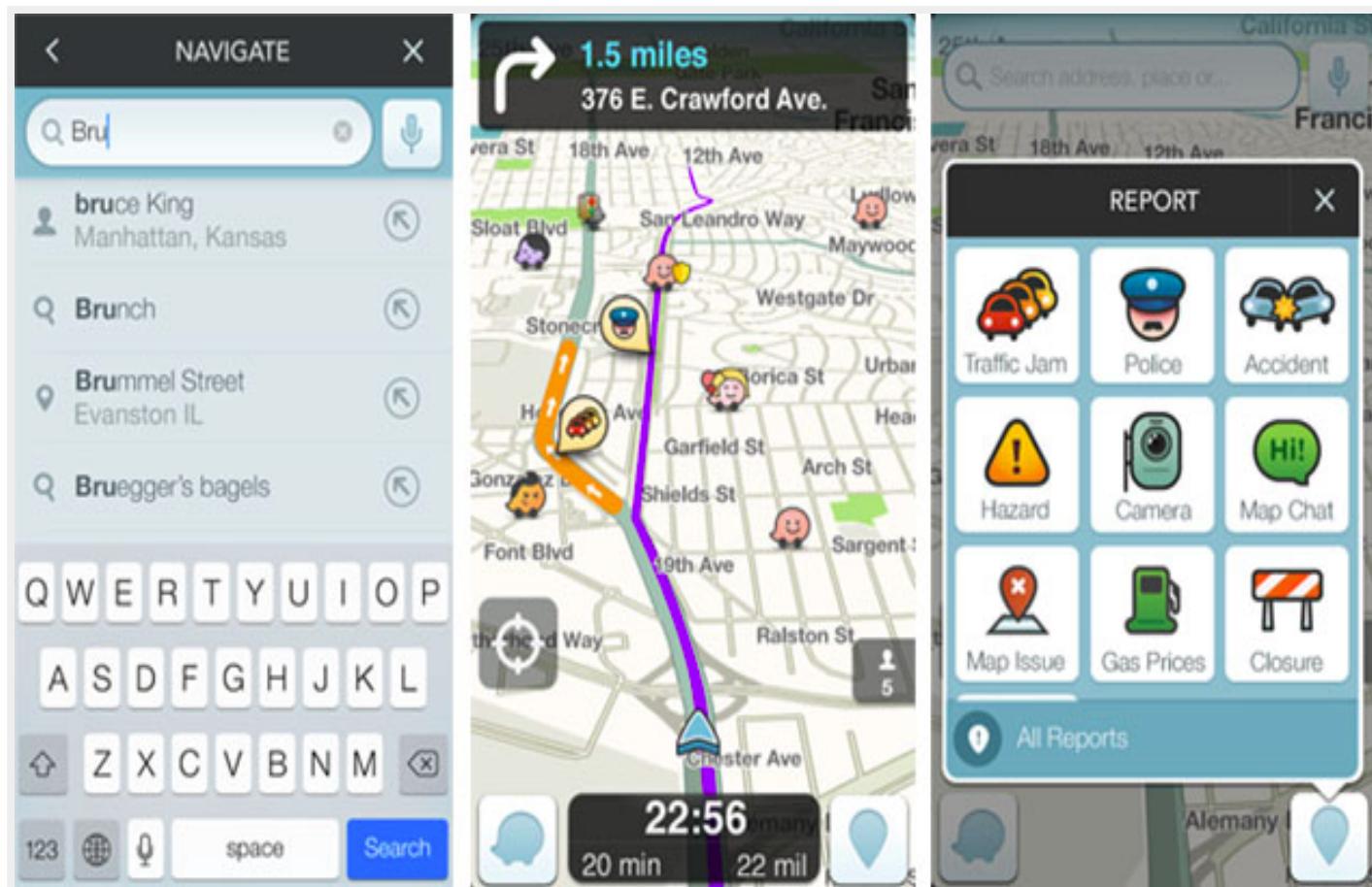


fig 9.Waze app



# INTERACTIONS WITH THINGS

This is the broader category as it relates to efforts which focus on interacting with Web-enabled physical entities available in the nearby environment, as for example tagging technologies.

## APPLICATION

- Pay Pal

# PAYPAL

- PayPal offer credit card payment systems connected directly to mobile phones.
- FEATURES :
  - Send money or pay online to almost anywhere in the world in just seconds
  - Send a request for money that allows people to pay you back with just a tap.
  - transfer money from anywhere any time

# PAY PAL

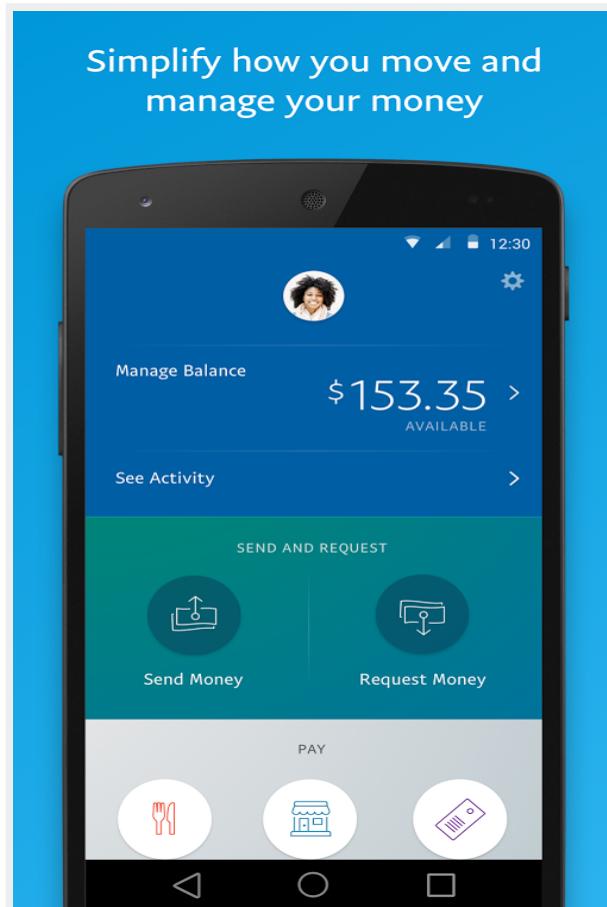


fig 10.PayPal app



# SOCIAL INTERACTIONS WITH PEOPLE

If we broaden the WoT to involve humans, we can identify various mobile apps that combine information from online social networking sites with information from the mobile phones of nearby users, to offer an augmented social experience.

## APPLICATION

- CenceMe

# CENCEME

- CenceMe is the first application that integrates sensing of human activity into social networks.
- FEATURES :
  - Automatically discerns human activity (e.g., sitting, standing, walking, and running)
  - shares the activity, audio presence, weather condition, location, and more with Facebook
  - can add friends to the friend list

# CENCEME



fig 11.CenceMe app



# DISCUSSIONS AND ISSUES

# ANALYSIS OF RELATED WORK

- The built-in sensors of the mobile phone are used in a participatory manner to co-create knowledge on the Internet/Web
- The mobile phone is used as a tool for getting feedback about the nearby environmental conditions and/or the personal energy footprint of the user using Internet/Web protocols
- The mobile phone uses Internet/Web principles to control physical devices such as electrical appliances, which are located either nearby or remotely
- The mobile phone acts as an intermediary between body sensors and the Internet/Web, for health/sports applications.
- The built-in sensors of the mobile phone are used to enhance the gaming experience of the user in Web-based, mobile or cyber-physical games.
- The mobile phone interacts with real-world objects, using knowledge available on the Web to better inform the user about these physical things
- The mobile phone becomes a credit card payment system.

# OPEN ISSUES

- It is either because of IoT/WoT devices/services that provide proprietary communication protocols or because of Some users might ask for real-time information while some others might need historical data.
- Some IoT/WoT-enabled mobile applications require

Recommended approaches include

- How can the sensing opportunities and sensing quality be measured?
- How to deal with incomplete, noisy and unreliable data?
- How many mobile users can provide enough sensing opportunities to achieve the required sensing quality?
- How to tackle the fact that people always move around a set of popular locations, instead of purely random movements?
- How to tackle the fact that each individual shows preference for some particular locations?
- How to avoid using up significant battery that could prevent users from accessing their usual services?

- This occurs because
  - (e.g., if the user is traveling quickly), if the event is local and spontaneous (e.g., a sound) or the sensor requires more time to gather a sample (e.g., air quality sensor).
- It is a top priority in mobile computing, and becomes more important when interacting with the IoT/WoT. One practical consideration is
  - (e.g., WoT-enabled devices/services) against misuse by unauthorized mobile users.

- Privacy in terms of one of the most important research challenges.
- It becomes important especially in health monitoring applications that involve body area networks. In these cases, and the corresponding mobile applications needs to be able to identify anomalies and faults at the data, which could create false alarms.

- It is crucial for locating nearby, local and/or relevant real-world devices (and/or people), exploiting their services for the creation of more advanced knowledge.
- It is expected to give significance to the interaction with the IoT/WoT through mobile computing.  
Mobile computing, personalized to a user's profile, empowers him/her to make more informed decisions across a spectrum of WoT-enabled services.

- The most important efforts in understanding emotions and measuring feelings by monitoring the affective states of the mobile user ,concluding that affective sensing offers exciting research opportunities
- Persuasion in mobile computing is an open area,  
, more sustainable life, environmental awareness, etc.

- It is a necessary step in most participatory sensing applications, in order to extract useful information from vast amounts of real-world data streams.
- These are required to prove the market potential of the IoT/WoT and mobile computing, showcasing that the merging of digital and physical world through Web technologies and mobile computing is profitable to enterprises worldwide.

# CONCLUSION

- The practice of combining mobile computing and the IoT/WoT seems to offer tremendous new opportunities in many real-life domains
- However, this openness comes together with various risks in privacy, security and reliability of information, and also various challenges

# THANK YOU

