Introduction to Big Data

ECAP456

Dr. Rajni Bhalla

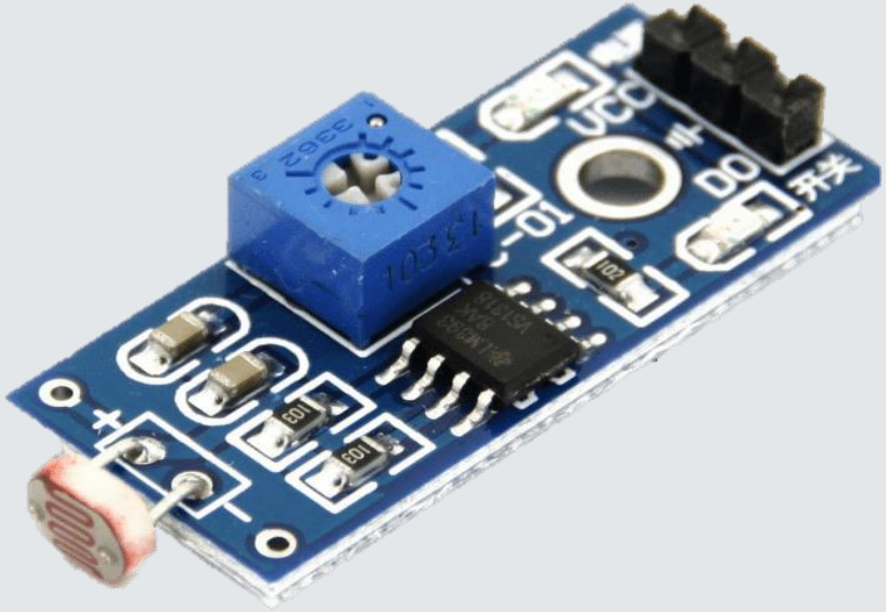
Associate Professor

Learning Outcomes

After this lecture, you will be able to

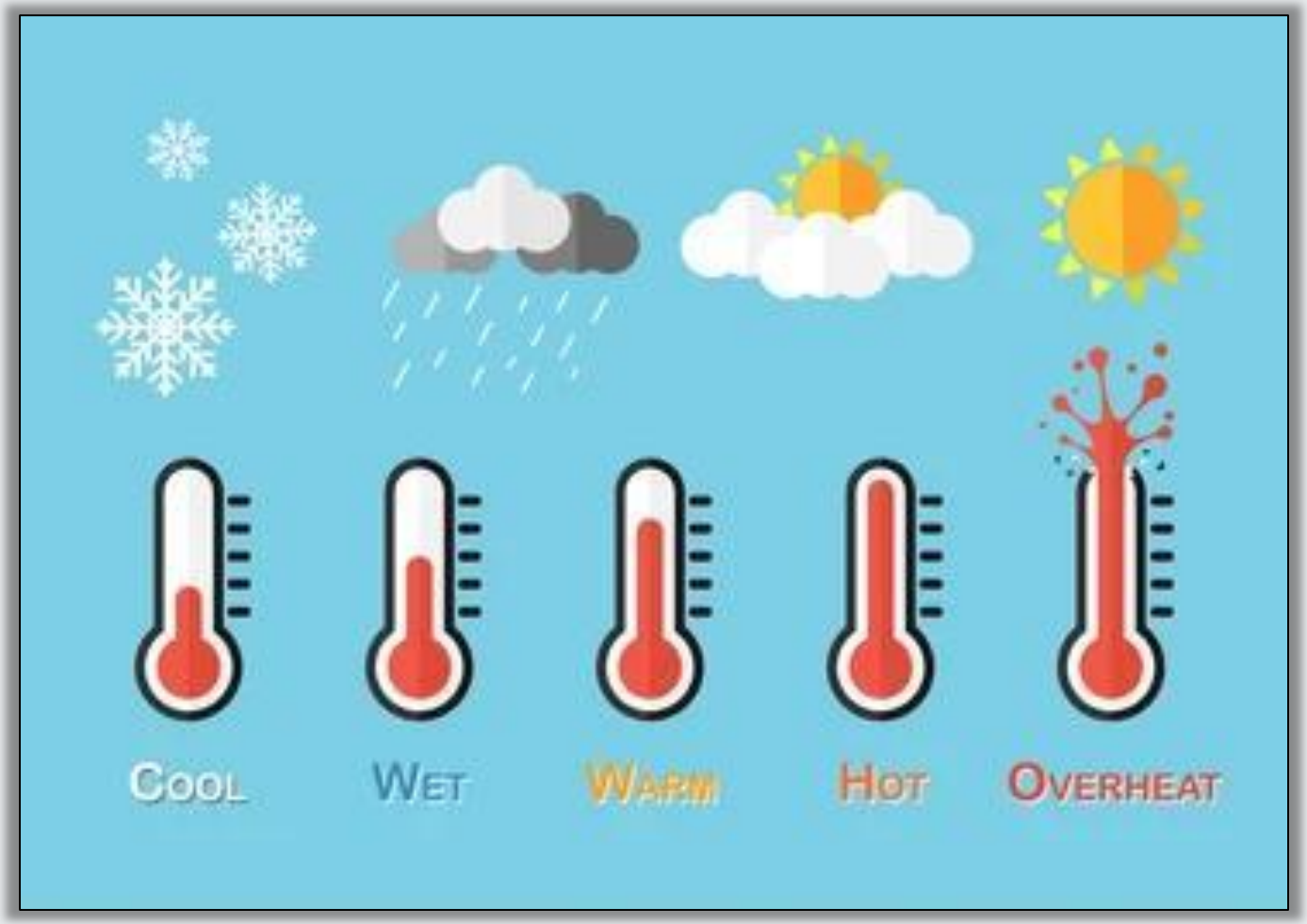
- exploring streaming sensor data.

Introduction



Low-power sensor hardware

Introduction

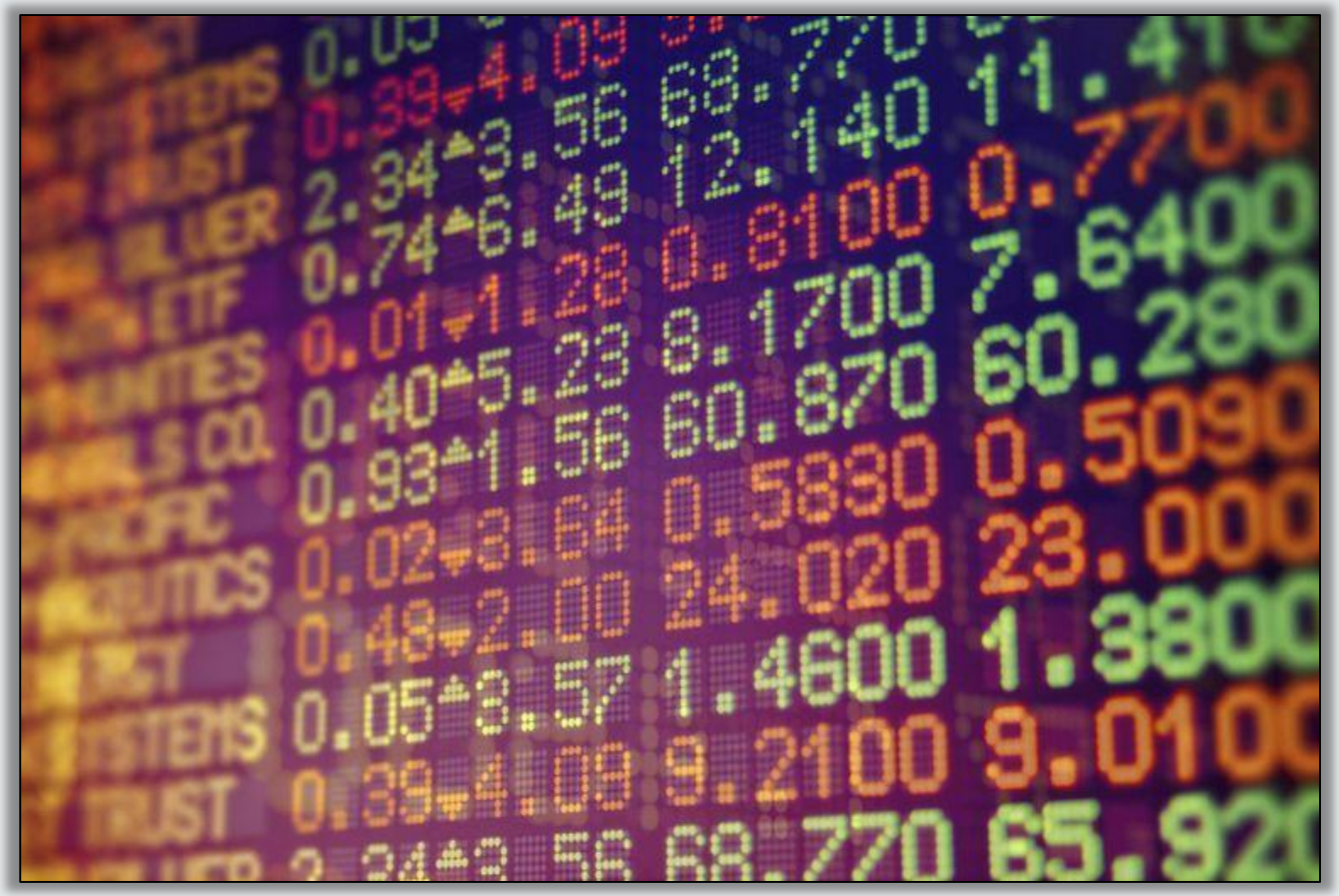


Introduction

Road Traffic

Introduction

Introduction



Prices on the stock market

Introduction

Introduction

Detailed information about the situation people are in

Introduction

ambient
information everywhere.™

Detailed information about the situation people are in

Introduction

Bridging the gap between sensor data and application information

Supply side: sensors

Supply side: sensors

Supply side: sensors

motion

Supply side: sensors

motion	acceleration

Supply side: sensors

motion	acceleration	angular velocity

Supply side: sensors

motion	acceleration	angular velocity	magnetic field

Supply side: sensors

motion	acceleration	angular velocity	magnetic field	pressure

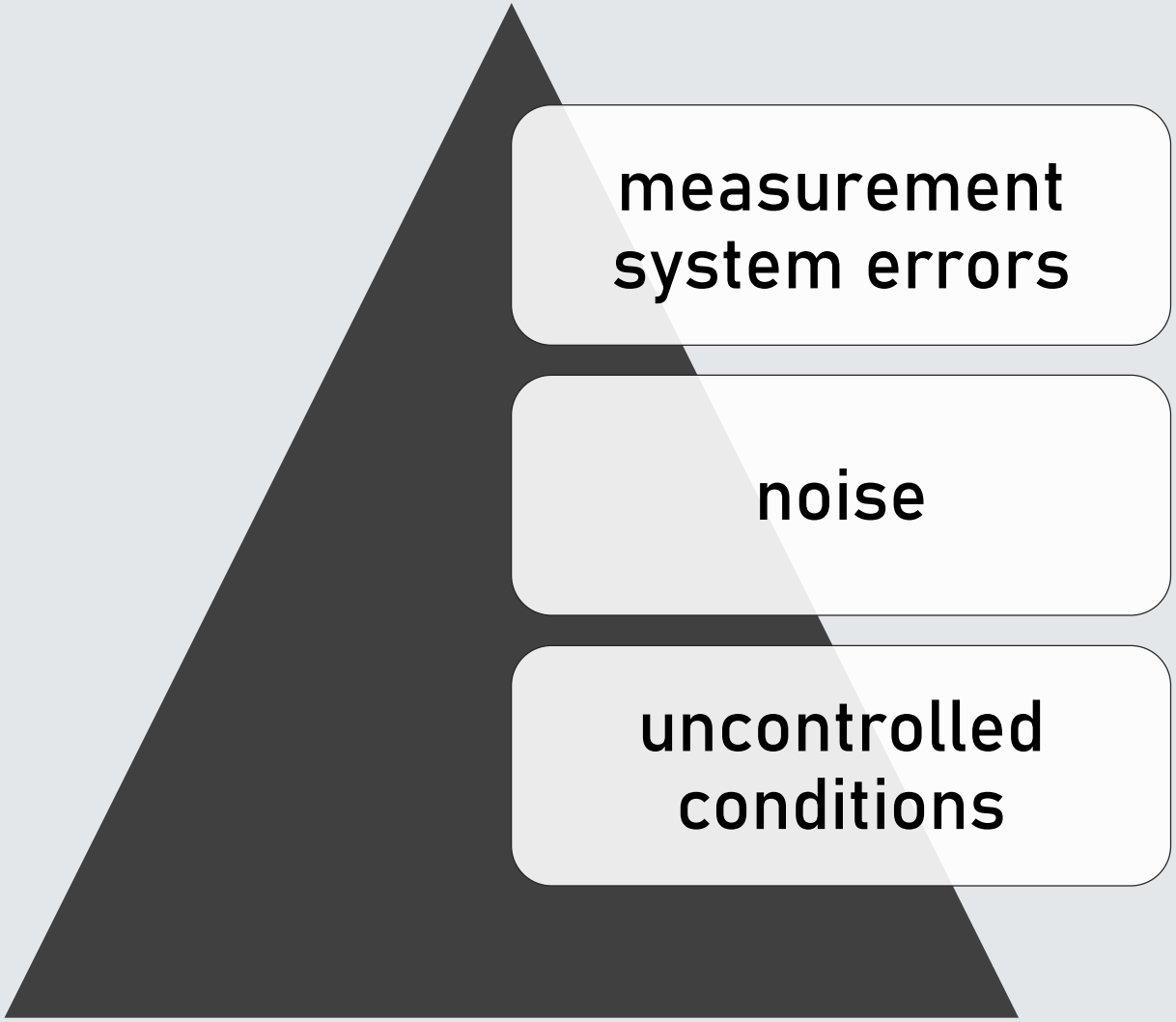
Supply side: sensors

motion	acceleration	angular velocity	magnetic field	pressure	altitude

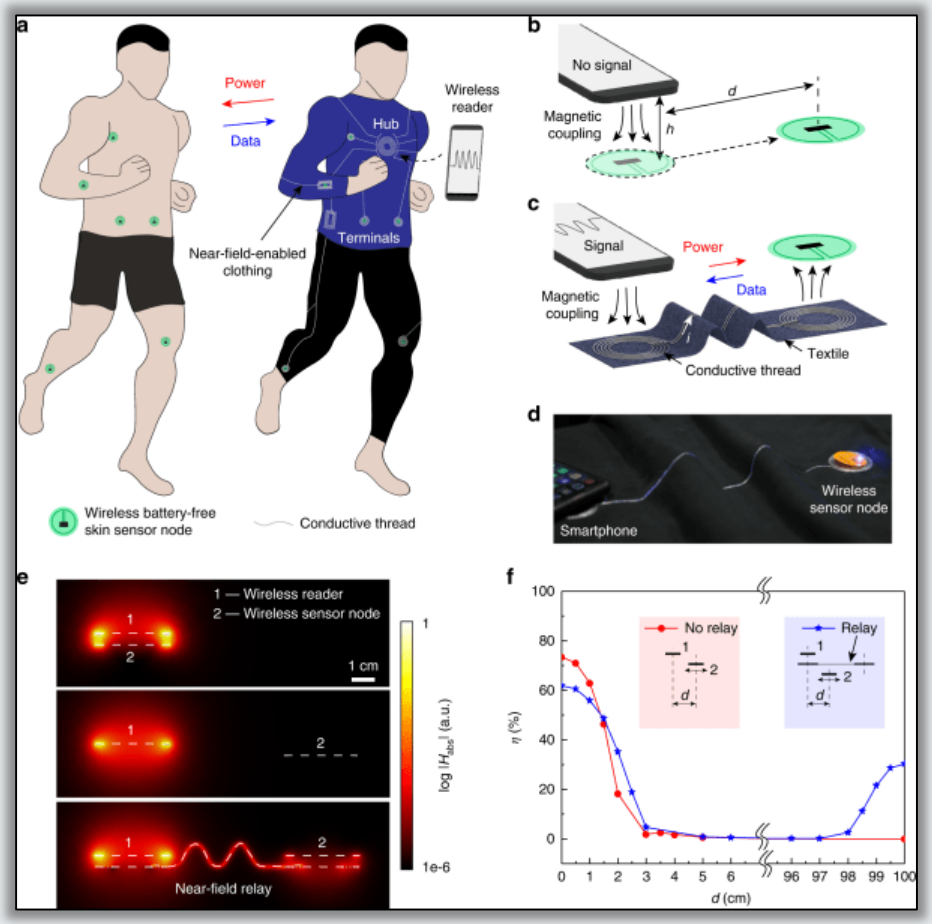
Supply side: sensors

motion	acceleration	angular velocity	magnetic field	pressure	altitude	temperature

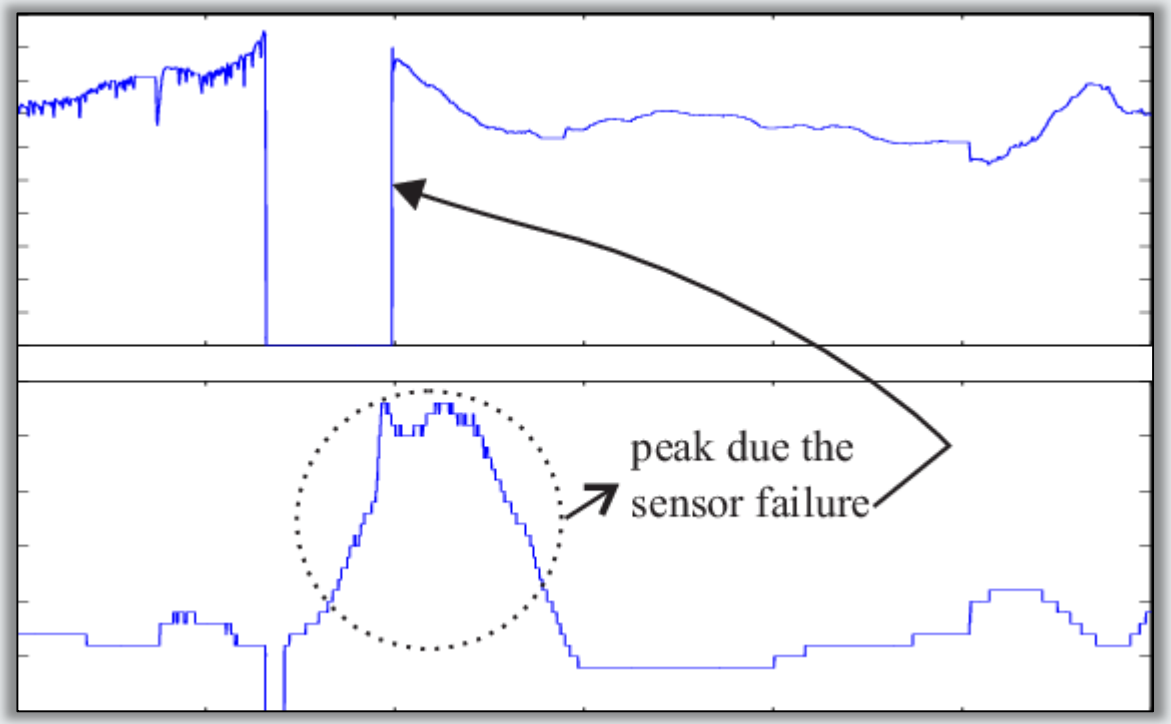
Supply side: sensors



Supply side: sensors

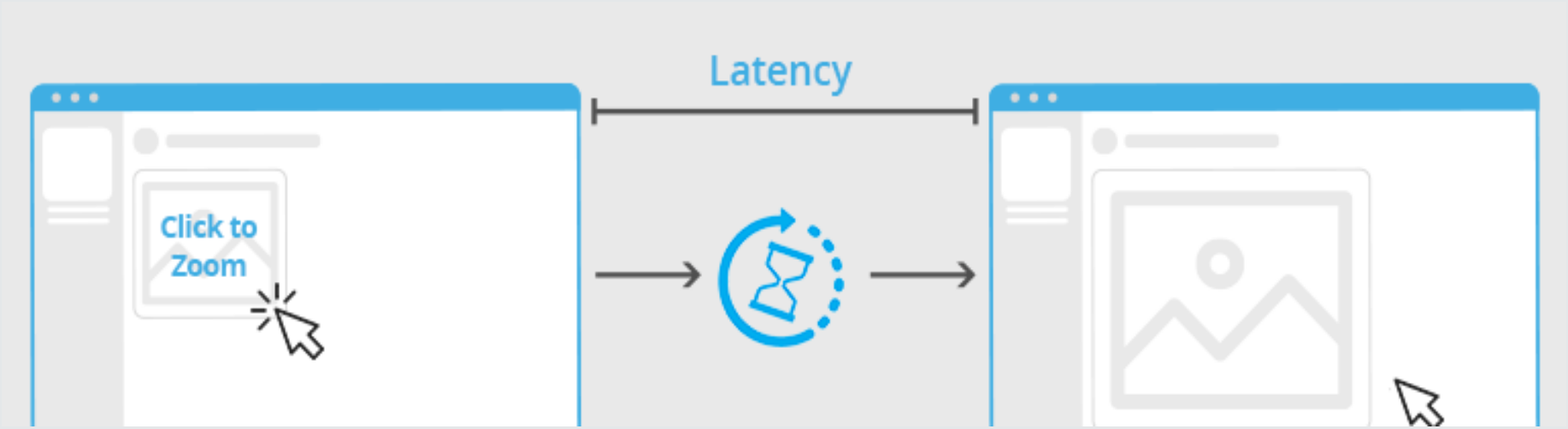


Supply side: sensors



Sensor failure

Supply side: sensors



Network latency

Supply side: sensors

Sensors come and sensors go.

Sensors do not produce clean data.

The same sensor may be used for different purposes

The data rate and latency may differ greatly between sensors/algorithms, and over time.

They might only produce data “on demand”

A couple of remarks to sketch the situation:

Demand side: applications

Demand side: applications

Demand side: applications

- Applications come and go
- They might want to know what kind of sensors are around,
- They might be totally decoupled from sensors
- They might have (static or dynamic) requirements
- They might demand a ‘memory’ from the environment
- They might be interested in trends or summaries

Demand side: applications

- Applications come and go
- They might want to know what kind of sensors are around,
- They might be totally decoupled from sensors
- They might have (static or dynamic) requirements
- They might demand a ‘memory’ from the environment
- They might be interested in trends or summaries

Uses of sensor data

Uses of sensor data

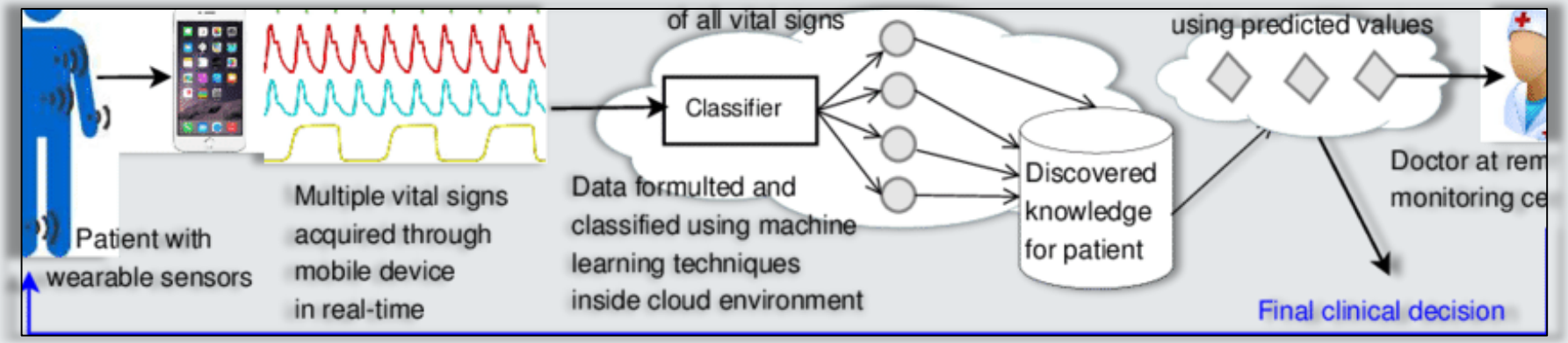
Health industry

Weather prediction

Sound analysis

Video streaming

Health sensor data



Heart rate

Electrodermal activities

Brain waves

Health sensor data

ICT Technology to diagnose patients

Weather data

Sensor data from IOT things

Raspberry Pi

Sensor data from IOT things

Raspberry Pi

Apple Watch

Sensor data from IOT things

Smart Phone

Sensor data from IOT things

Smart Phone

Health watches

Exploring streaming sensor data from a weather station

```
sensor master 7d ➜ ./stream-data.py
0: 1539956354   0R1,Dn=000#,Dm=000#,Dx=000#,Sn=0.0#,Sm=0.0#,Sx=0.0#

1: 1539956355   0R1,Dn=000#,Dm=000#,Dx=000#,Sn=0.0#,Sm=0.0#,Sx=0.0#

2: 1539956356   0R1,Dn=000#,Dm=000#,Dx=000#,Sn=0.0#,Sm=0.0#,Sx=0.0#

3: 1539956357   0R1,Dn=000#,Dm=000#,Dx=000#,Sn=0.0#,Sm=0.0#,Sx=0.0#

4: 1539956358   0R1,Dn=000#,Dm=000#,Dx=000#,Sn=0.0#,Sm=0.0#,Sx=0.0#

5: 1539956359   0R1,Dn=000#,Dm=000#,Dx=000#,Sn=0.0#,Sm=0.0#,Sx=0.0#

6: 1539956360   0R1,Dn=000#,Dm=000#,Dx=000#,Sn=0.0#,Sm=0.0#,Sx=0.0#

7: 1539956361   0R1,Dn=000#,Dm=000#,Dx=000#,Sn=0.0#,Sm=0.0#,Sx=0.0#

8: 1539956362   0R1,Dn=000#,Dm=000#,Dx=000#,Sn=0.0#,Sm=0.0#,Sx=0.0#

9: 1539956363   0R1,Dn=000#,Dm=000#,Dx=000#,Sn=0.0#,Sm=0.0#,Sx=0.0#

10: 1539956363  0R2,Ta=16.7C,Ua=30.2P,Pa=886.2H
```


That's all for now...