Special Topics in Design I
DSL 810

Topic 5
Input Devices

Instructor: Jay Dhariwal,
Asst. Prof., Dept. of Design,
IIT Delhi

3rd September 2019

Announcements

- Project Development till Minor Test 1: 11th September
- Project Development till Minor Test 2: 15th October
- Assignment 1 evaluation: Google form for re-evaluation. Skill learnt during this semester, you can get full marks.
- Assignment 1 and 2: Ask me
- Assignment 3: Sanju
- Assignment 4: Sachin

How to insert code in a webpage?

```
<!-- Whatever is written in pre and code tags is
inserted as code in an html webpage. -->
<!--
<pre><code>
void setup() {
  // initialize digital pin LED_BUILTIN as an output.
  pinMode(12, OUTPUT);
}
</code></pre>
-->
```

Few notes

- Student pages at http://web.iitd.ac.in/~jay/dsl810/dsl810_studentpages.html
- Learn from each other
- All at different levels. That's okay. Different strengths.
- This Saturday is Tuesday timetable. We will meet. By the end of this week, all students should have completed all assignments till now. We will work with you.
- Please have everything on web server and not on your google drive so that it can be transferred. Digital repository for the course.

Input Devices

- Sensors
- Different types of sensors to measure temperature (thermistor), distance (ultrasonic sensor), force (strain gauge), light, sound
- Do you know of any sensors that you use in your everyday life?
- What makes your smart phone so smart? Link

Sensors in your phone

- Download [Sensoduino](#) app (FREE) for Android
- SensorLog for iOS users
- Find what sensors
your phone has and
log sensor data
- [Techbitar](#) [instructable](#)
- Lux meter for light sensing
- Compass for orientation

SensoDuino

Hazim Bitar   Tools

Map My Ride GPS Cycling Riding

MapMyFitness, Inc. **Health & Fitness**

JIA SARAI

DDA MIG FLATS
QUTAB ENCLAVE

Shaheed Jeet Singh

JIA SARAI

South Ave

IIT Delhi
Hospital

India
of Te

1.78
DISTANCE (KM)

13:27
DURATION

64
CALORIES
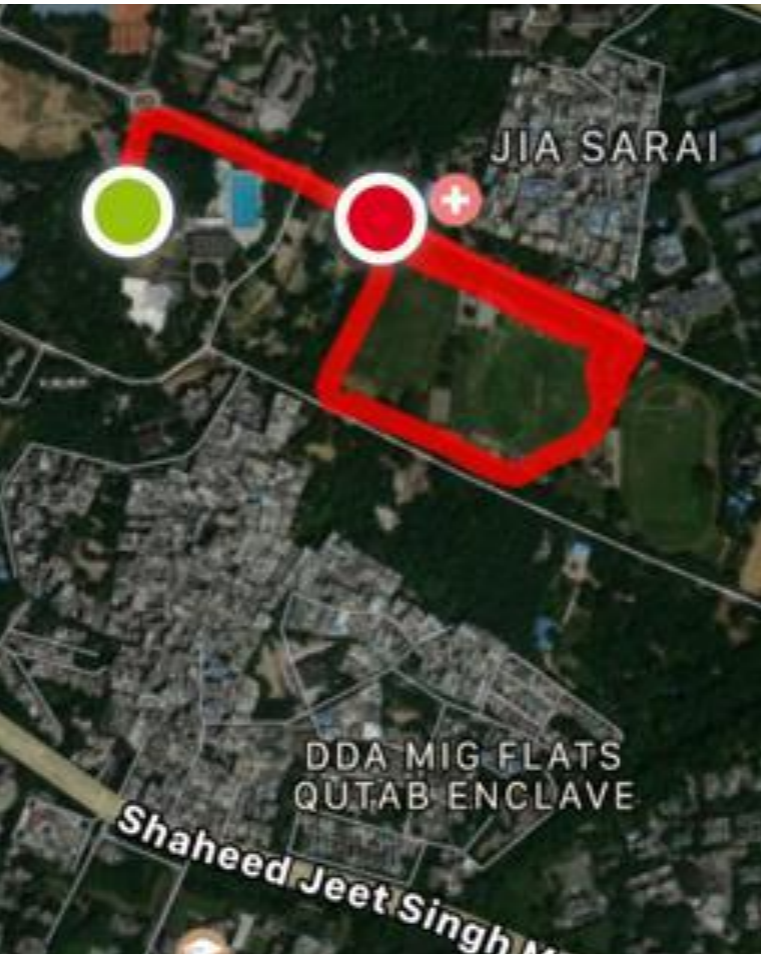
GPS sensor

- Sensoduino data

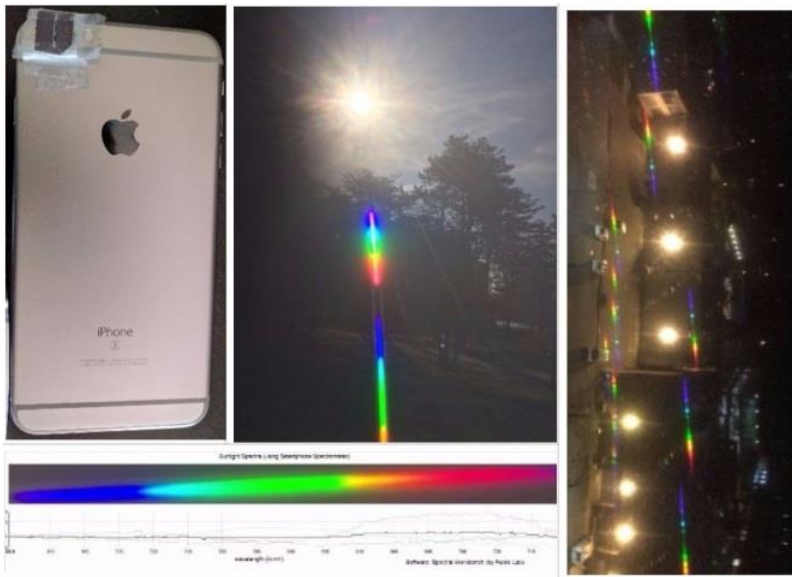- Read csv file (latitude, longitude, time) into GPS visualizer.

- [Arduino GPS data to google maps](#)
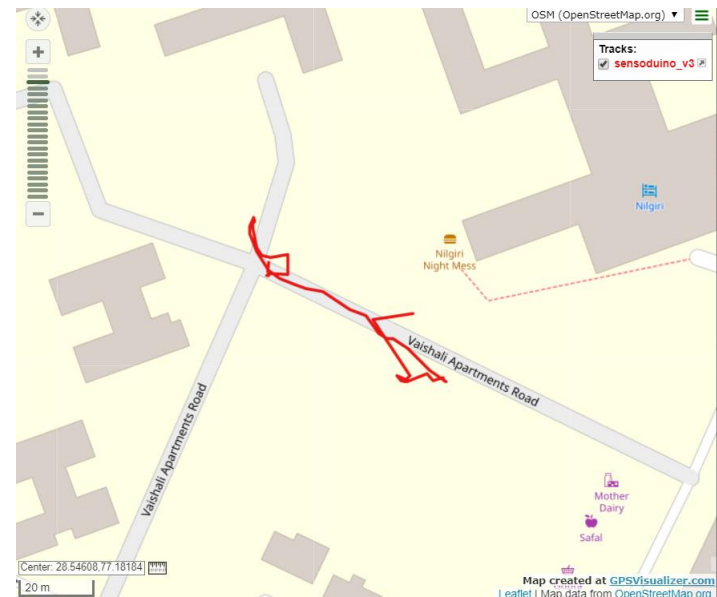
Design solutions for Mobile phones

- Mobile apps, add-ons to connect digital and physical worlds

- [Thermal imaging attachment for smart phone](#)

[DIY Smart Phone Spectrometer using CD as diffraction grating](#)

Innovating for billions

- Ramesh Raskar, Camera Culture group, MIT Media Lab – innovating for billions

- eye-NETRA REDX.io

- INK talk: Idea Hexagon for innovation

- Scaling up of design solutions?
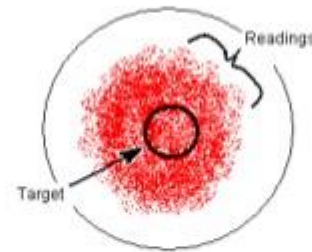
- Mobile phone users in India

Sensor features

- Sensor vs transducer

- Sensor resolution, range, speed of response, cost, reliability (datasheet)

- Sensor calibration
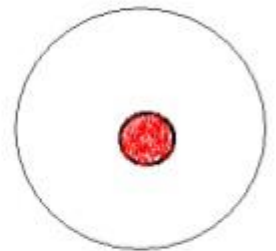
Accuracy vs. Precision
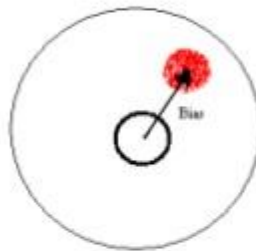
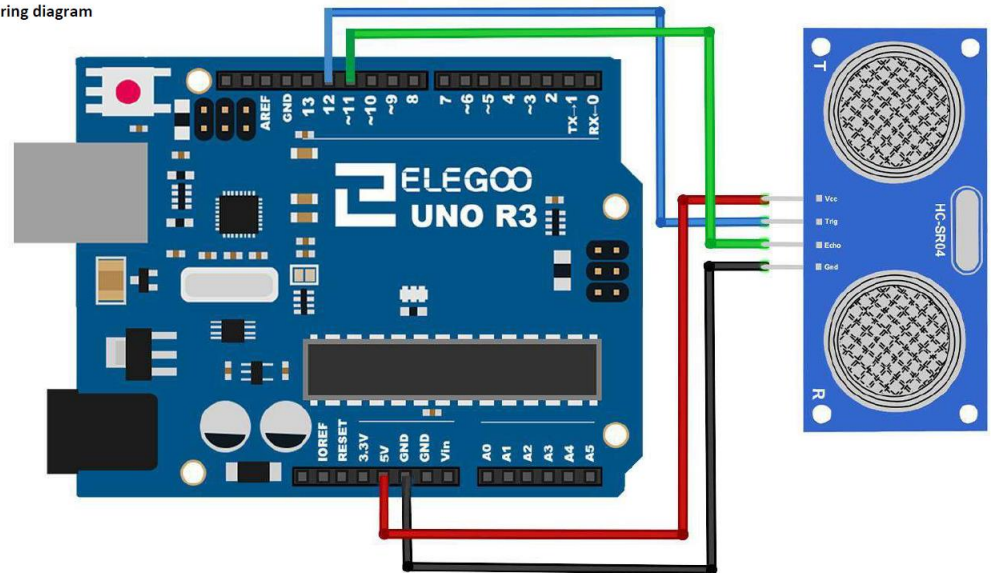Precision without accuracy

Accuracy without precision

Precision and accuracy

Distance Measurement

- Ultrasonic sensor module (Lesson 10)
- Read datasheet (2 cm- 400 cm range)
- Lesson 1 (install library)
- Reading library
- Smart cane, other

applications

Wiring diagram

4X4 Keypad module

- Lesson 11
- Applications: cell phones, ovens, door
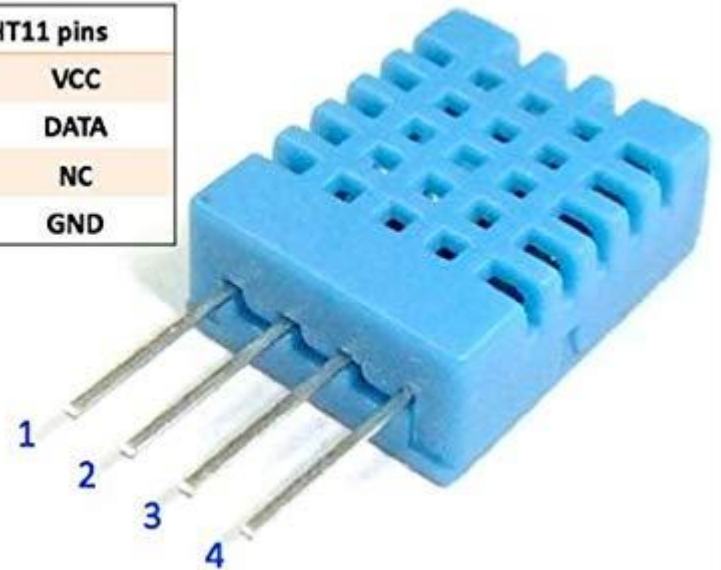
Locks, keyboards

Temperature, RH measurement

- DHT11 sensor (Lesson 12)
- DHT22 sensor
- Datasheet

Assignment 5

- A. What are the different sensors in your phone and what do they do? Conduct an experiment to measure and analyze the data in a log and report your findings.

- B. Measure something: add a sensor to a microcontroller board and read it. Document the process. Find an application for it in the real world around you.

Summary

- Smart phone sensors

- Sensor characteristics

- Examples: Ultrasonic sensor, Keypad module, Temp/RH

- Fab Academy [webpage](#) [video](#)

- Think of applications as a designer