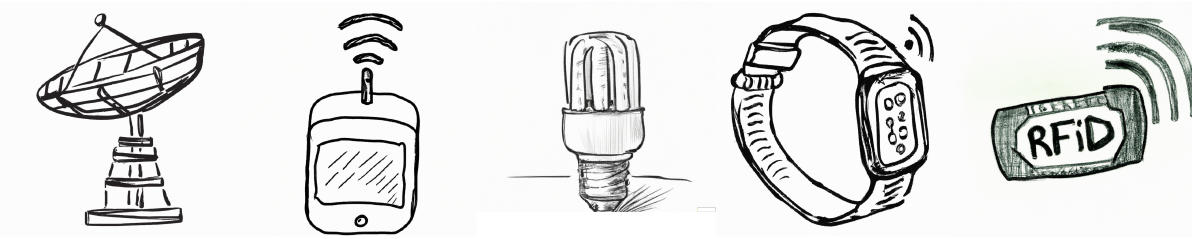


# Wireless Networking aka “Wireless for IoT Class”

## Course code: CS4222/CS5422

**Semester 2, 2022/2023**

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# TUTORIAL 3 for WEEK5 (Starting 6th of February 2023)

[1] **Question 1:** What sensors does your phone or wearable device (such as a Fitbit) use to estimate the number of steps you have taken? How does it perform step-counting? For one possible approach, you can read the reference paper:

- A.R. Jimenez, etal, “A comparison of pedestrian Dead-Reckoning Algorithms using a Low-Cost MEMS IMU,” WISP 2009. (Sections II and III)

[2] **Question 2:** Please list the sensor(s) you plan to use to support the following application scenarios.

| **Application scenario** |
| --- |
| Detecting metallic objects that are buried in the soil |
| Detecting blood oxygen levels on a wearable device |
| Determining water level in a tank situated on top of a building |
| Generate a 3D mapping of historical structures |

[3] **Question 3:** Molex produces thin-film/flexible batteries rated capacity of 10 mAH and voltage 3V.

a. Can you calculate the battery life when powering the following components of IoT devices exclusively (no other components are being powered)?

- BME 280: Pressure, Humidity, Temperature Sensor (Sampling at 1Hz), current 3.6 microamperes
- ADXL 337: Accelerometer, supply current 300 microamperes
- OPT 101: Light sensor, current 120 microamperes
- HM01B01: Camera, current approx. 1500 microamperes

b. How can you extend the battery life to a much longer duration than what was calculated in Part 3(a)? How do the characteristics of the application assist in making this decision?