Physical Computing And Internet of Things (CM3040)

Course Notes

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Contents

Week 1 **3**
1.001 Introduction to the course 3
1.101 Introduction to physical computing and IoT 4
1.103 Background to IoT, IoT stack and IoT architecture 4
1.105 IoT stack and IoT architecture 4

Week 1

Key Concepts

- Should be able to explain what IoT is, IoT stack and IoT architecture
- Should understand what microcontrollers are, how they are used and why
- Should be able to install and set up Arduino IDE with drivers and relevant libraries

1.001 Introduction to the course

Course learning objectives:

1. Demonstrate understanding of electricity, electronics, and transducers
2. Program microcontrollers and understand how they receive, interpret and send data from/to transducers
3. Develop practical skills of building circuits
4. Use communication protocols for inter-computer and inter-device communication
5. Understand the principles of physical interaction design, including:
   a) monitoring bodily movement
   b) making mechanical movement
   c) design of tactile physical interfaces
   d) control of sound and light
6. Design and build complete physical computing systems

Course Topics:

1. Microcontrollers
2. Electricity and circuits
3. Sensors
4. Physical Interaction Design
5. Physical Computing Projects

6. Motors and actuators
7. Communications protocols
8. Networked Devices
9. Bodily Monitoring
10. Robots

1.101 Introduction to physical computing and IoT

Physical Computing refers to the creation and use of devices that sense, reason, and react to the world around them. Internet-of-Things (IoT) describes the network of physical objects.

1.103 Background to IoT, IoT stack and IoT architecture

As shown in Iot Building Block figure 1 below, the communication networks play a central role allowing all other nodes to communicate with each other.

A Typical IoT node is composed with several modules which are shown in figure 2 below.

Figure 3 describes how a set of IoT nodes form an ecosystem:

1.105 IoT stack and IoT architecture

- Cheruvu, S, A. Kumar, N. Smith and D.M. Wheeler Demystifying Internet of Things security: Successful IoT device/edge and platform security deployment. (New York, NY: Apress, 2019) Chapter 2.
- Tamboli, A. Build your own IoT platform: Develop a fully flexible and scalable Internet of Things platform in 24 hours. (New York, NY: Apress, 2019) Chapters 1, 2 and 3.
- Faiza, A., 'Evolution of the web: web 1.0, web 2.0, web 3.0, web 4.0, web 5.0 and beyond' ahmadfaiza.blog.

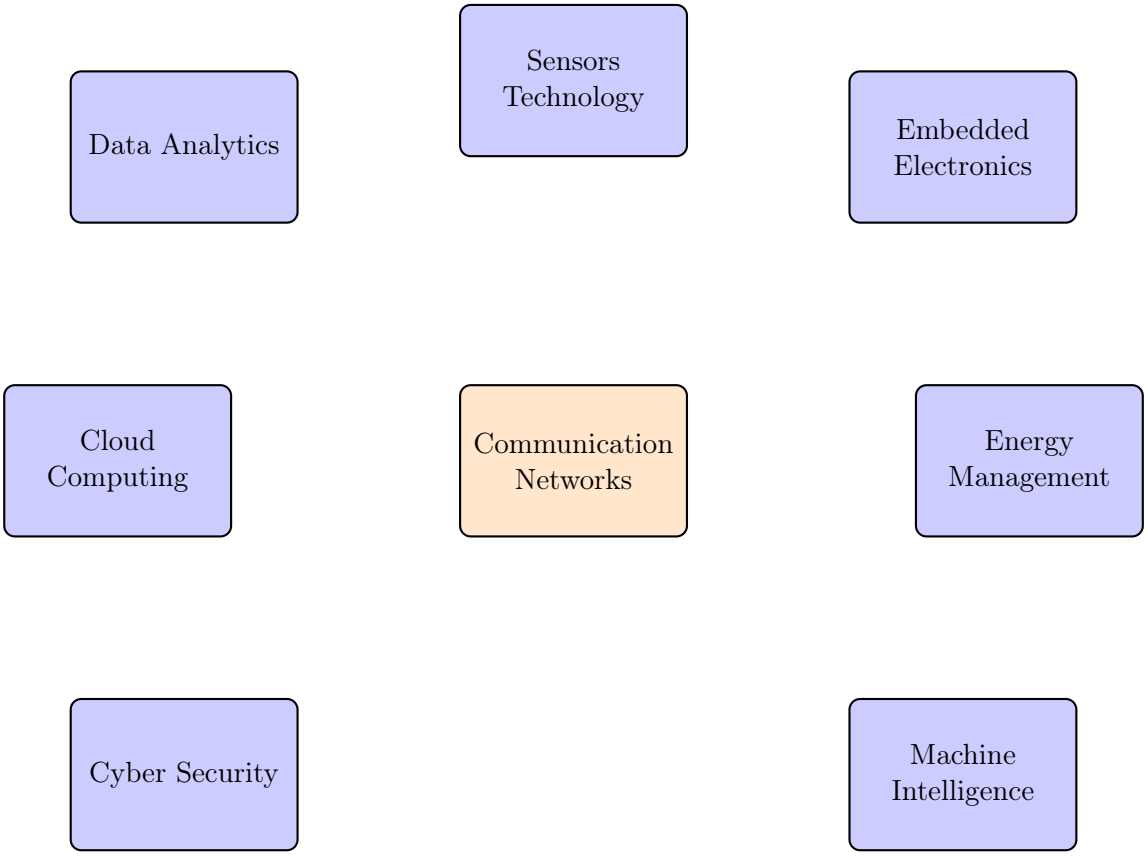

Figure 1: IoT Building Block

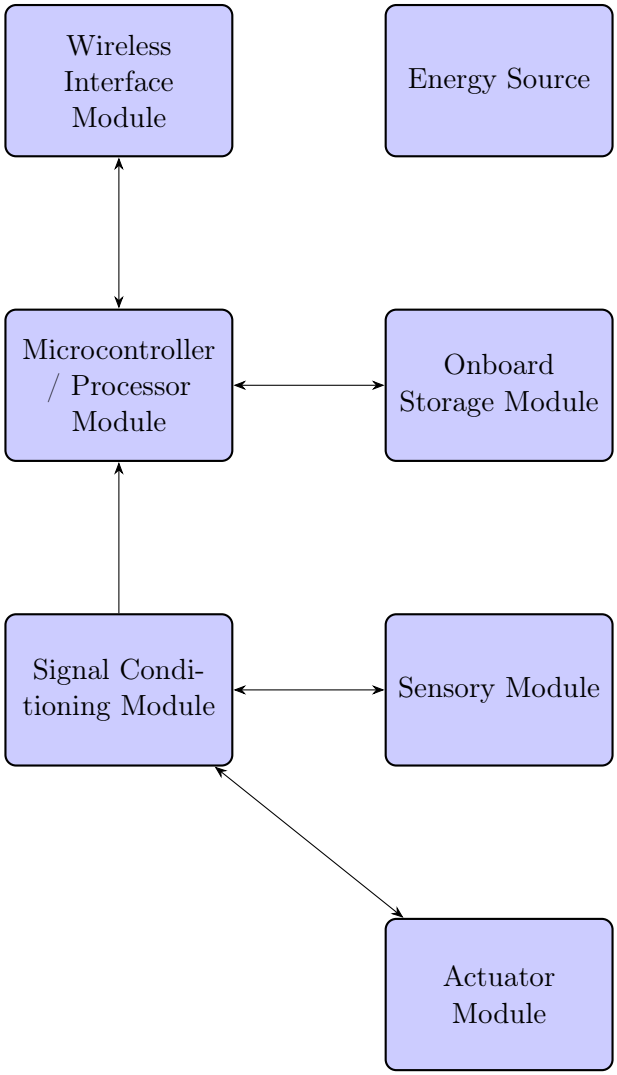

Figure 2: Typical IoT Node

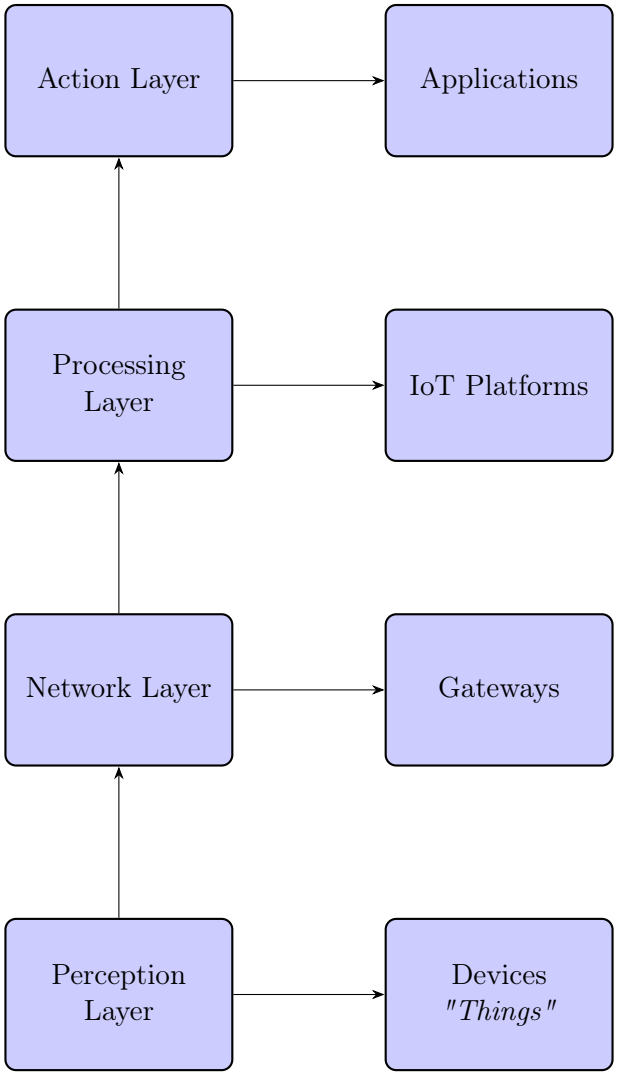

Figure 3: IoT Ecosystem