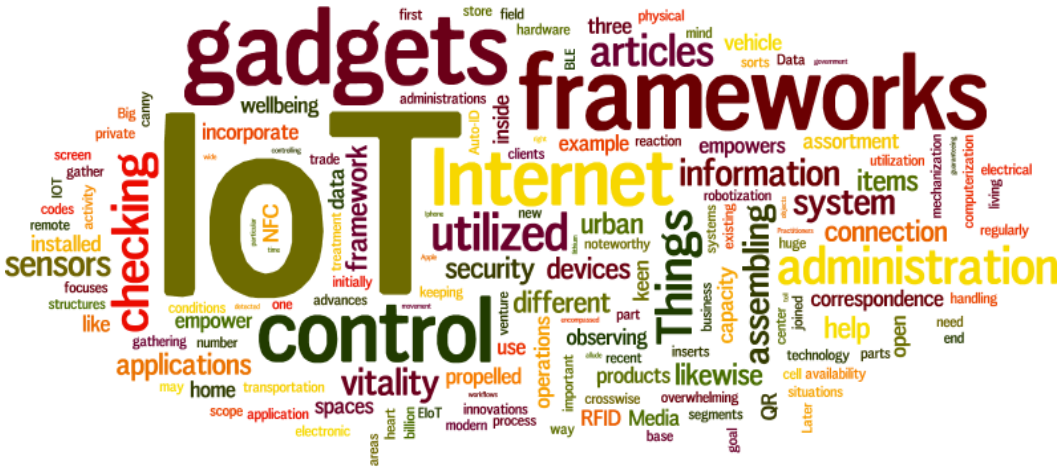
CS578: Internet of Things

Course Plan



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CS578: Internet of Things

- **3 Lectures/Week**
- No Lab component, but has two course projects
- Slot in Time Table: **F**
- Class Time :
  - Monday (12 p.m. – 1 p.m.)
  - Tuesday (12 p.m. – 1 p.m.)
  - Friday (11 a.m. – 12 p.m.)
- Teaching Mode: Online
- Course material:
  - PPTs in http://manaskhatua.github.io/teaching.html
  - Videos / Audio Embedded PPTs in Microsoft Teams Group for CS578

Evaluation Process

Theory

- Multiple Short Quizzes : 20%
- Assignments : 10%
- End-Sem (online/offline) : 20%

Hands-On

- DIY IoT Hardware Project : 25%
  - Individual Project
- SRI-D Project
  OR : 25%
- Advanced IoT Project
  - Group Project

* Samsung R&D Institute India-Delhi (SRI-D)

About Projects

DIY IoT Hardware Project

Project Report Format

1) Main objective
2) Implemented Attributes
3) Configuration Diagram
4) Sample Outputs
5) Codes
6) User Manual
7) 5-10 min video on Demo

Individual Project

Advanced IoT Project

Project Report Format

(use IEEE Conference Paper Format)

1) Abstract
2) Introduction
3) Related Works
4) Proposed Scheme
5) Experiment/Simulation Results
6) Conclusion
7) References

Group Project

- Both the project report must be written in LaTex
- Plagiarized Report / Video / Code will be penalized heavily

Objective of the Course

- UG/PG course on **Computer Networks** teaches
  - TCP/IP communication protocol stack and different applications for Internet,
  - mainly designed for efficient data communication and networking between computers,
  - not suitable for resource constrained networking devices and ubiquitous networking.

- **Internet of Things (IoT)** course is designed to learn:
  - IoT Ecosystem,
  - Core technologies that make up the IoT,
  - How the IoT technologies are applied in different application domains: smart home, smart agriculture, smart healthcare, industry 4.0, etc.

- Finally, we will get knowledge on
  - the components of IoT application and services including AI and data analytics
  - protocols for data communication and networking in IoT i.e. the core of IoT
  - skills required to design a new system using IoT

Syllabus

- *Introduction to IoT*: What is IoT?, Impact of IoT, IoT Challenges, IoT Ecosystem, IoT framework, IoT Components
- *IoT Hardware Hands-on*: Arduino, Node MCU, R Pi, UART communication, Serial communication protocol, Arduino Programming, Configuring small IoT network, connect with cloud server, data visualization
- *IoT Network Architecture & Design*: oneM2M, IoTWF, Core functional stack, Data management stack
- *"Things" in IoT*: Sensors, Actuators, Smart objects, Basics of Sensor Networks.
- *Communicating smart objects*: Communication criteria, IoT access technologies – IEEE 802.15.4, IEEE 802.15.4e, IEEE 802.11ah, IEEE 1901.2a, NB-IoT
- *IoT Network Layer*: IP as IoT network layer, 6LoWPAN, 6Lo, 6TiSCH, RPL
- *IoT Application Layer*: IoT application transport methods, CoAP, MQTT
- *Data and Analytics for IoT*: IoT Middleware, Data analytics for IoT, AI and ML, Big Data analytics tools and technology
- *IoT Security*: Privacy and security issues in IoT, IDS for IoT, Blockchain for IoT
- *IoT Application case study*: Smart City, Smart Grid, Smart Transportation, Smart Manufacturing, Smart Healthcare
- *Industrial Perspective of IoT* will be covered by the Faculty of Samsung R&D Institute India – Delhi.

Text & Reference Books

Text Books:

1) "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", by David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry; 1st Edition, 2018, Pearson India Pvt. Ltd.

2) "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti, 1st Edition, 2015, Universities Press (India) Pvt. Ltd.

Reference Books:

1) "21 Internet of Things (IOT) Experiments: Learn IoT, the programmer's way", by Yashavant Kanetkar and Shrirang Korde, 1st Edition, 2018, BPB Publications.

2) "Internet of Things – Architecture, Implementation and Security", by Mayur Ramgir, 1st Edition, 2020, Pearson India

3) Research Papers on IoT

Thanks!