21ES614 Internet of Things

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Course Outcomes

- Understand the concepts and principles of IoT.
- Implement communication protocols related to IoT and machine to machine communication (M2M)
- Familiarize key technologies in an IoT framework.
- Develop IoT based solution for real world applications.

21ES614 INTERNET OF THINGS 3-0-2-4

- Introduction to IoT - Definitions, frameworks and key technologies. Functional blocks of IoT systems: hardware and software elements- devices, communications, services, management, security, and application. Challenges to solve in IoT.
- Basics of Networking & Sensor Networks - Applications, challenges - ISO/OSI Model, TCP/IP Model. Sensor network architecture and design principles. IoT technology stack - overview of protocols in each layer. Communication Protocols. Communication models, Application protocols for the transfer of sensor data. Infrastructure for IoT: LoRa-Wan, 6LoWPAN, 5G and Sigfox. Operating systems and programming environments for embedded units.
- Introduction to Cloud, Fog and Edge Computing- Modern trends in IoT – Industrial IoT, Wearable. Applications of IoT - Smart Homes/Buildings, Smart Cities, Smart Industry, and Smart Medical care, Smart Automation etc.

TEXT BOOKS / REFERENCES:

- 1. Andrew S. Tanenbaum and David J. Wetherall, *"Computer Networks",* 5th Edition, Pearson Education, 2011.
- 2. Holger Karl and Andreas Willig, *"Protocols and Architectures for Wireless Sensor Networks",* John Wiley and Sons Ltd., 2005.
- 3. Olivier Hersent, David Boswarthick and Omar Elloumi, *"The Internet of Things: Key Applications and Protocols"*, Wiley, 2012.
- 4. Rayes, Ammar, Salam, Samer *"Internet of Things from Hype to Reality"* 2nd edition
- 5. Boris Adryan, Dominik Obermaier, Paul Fremantle *"The Technical Foundations of IoT"* Artech House 2nd edition

Component	Weight (%)
One Periodical	15
Term work	30
Laboratory Work	25
End semester	30

Evaluation Pattern

70-30

Details

1. Periodical Exam I: Pen & paper. Conducted out of 50 marks for 2 hours and converted to 15 marks.
2. End Semester: Pen & Paper. Conducted out of 50 marks for 2 hours and converted to 30 marks.
3. Term work: Total of two mid-term evaluations and one final evaluation for 25 marks.
4. Laboratory Work: Min eight experiments for 25 marks.

Lab

- **Hardware**

1. Development of sensor node
   a) Interfacing sensor to a microcontroller (Analog Sensor, Digital Sensors – Direct Interfacing, Digital sensor using protocols - UART, I2C, SPI, etc)
   b) Interfacing communication modules to a microcontroller(through UART, I2C, SPI, etc)
   c) Optional - Interfacing of display, actuators, etc.

- ARM 7,Arduino(uno,mega,due,lillypad,pro-mini,bluepill), MSP, Mbed, Node MCU,RPi,

Communication Technology

Zigbee,WiFi RF,Lora,CAN,BLE,Ethernet.

Display

I2C Oled display,Rpi Display

Software side

NS3/NS2, Netsim

IoT protocols

Python based

- Server client/ publish subscribe
- Front end.
- Database.

IoT platforms

Ubidots

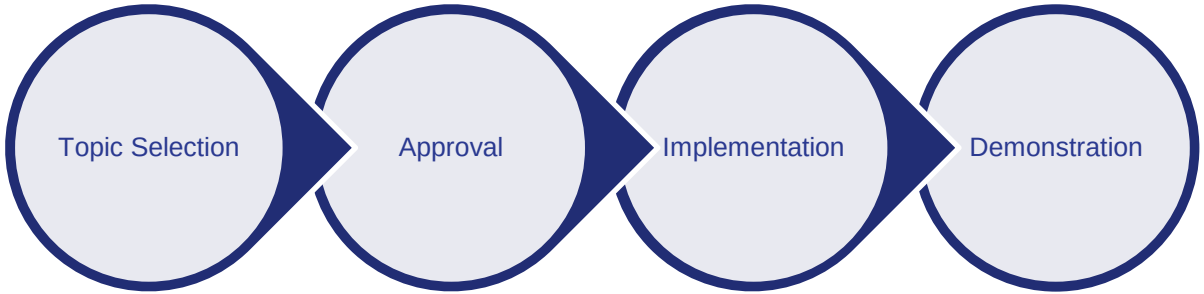
Thingspeak

adafruit

Lab Experiment Rubrics

	Components	Marks	Instrument	Guidelines
1	**Internal Evaluation**	**20**		
1.1	**Functionality**	**5**		
		5	Computer/table	0-5 Features/logical correctness/incorporation of concepts
1.2	**Skill and understanding**	**5**	Viva/table/Computer	0-5 use of tools and implementation of concepts
1.3	**Result**	**5**		
		5	Computer	0-05 Correctness of output
1.4	**Report**	**5**		
	Report formatting and content	5	Report	2 – Default Format 0-3 Content
	Total	**20**		

Term Paper



All the best!!!