# Lesson 8
# Programming Embedded Device Platforms for the Internet Connectivity

# Using the Ethernet and WiFi Libraries

- Arduino Ethernet Library and header files in the library
- Enable the usage of Serial IO functions between Arduino SPI port
- Enable IO utility
- Ethernet shield, Ethernet client, Ethernet server
- DNS
- vDHCP and
- UDP protocol functions.

# Using IP Library

- Downloadable from Arduino library website
- A set of built-in codes and the codes which enable use of the functions of the library for creating stack for the TCP/IP protocols based communication
- Library functions lwIP (lightweight Internet Protocol)
- Enables TCP/IP communication with the little memory requirements (nearly 40 kB flash/ ROM and few tens of kB RAM

# IP Library

- Buffering in communication for incoming packets and for outgoing unacknowledged packets.
- The library functions µIP (micro Internet protocol library) TCP/IP communication with very little memory requirements (few kB RAM)
- µIP use when buffering of packets not required
- When small amount of data communicate

# Using Cryptographic Library

- Assume that the device-end has a user ID, say A1 for authentication at another end
- A cloud, web application or service end has an application ID, say A2 for authentication at user's end.
- The A1 needs to store at the application or service end database and A2 needs to store at user end database

# Using Cryptographic Library

- A1 communicates for authentication at other end
- The application matches received A1 with the database stored A1
- If match is successful, then the user end stands authenticated.

# Security Risk

- One is during communication to another end
- Some system in-between, for example, a switch or router or server S1 reads A1 or A2 received from another end and resends the same to authentication end

# Security Risk

- Another security risk that some system modifies A1
- The application will authenticate the S1 authentication code in place of the user end. Similarly, user end can wrongly authenticate the application or get a modified text.

# OAuth 1.0 protocol

- Cryptographic library Authentication And Encryption Of Data
- A set of built-in codes and the codes
- Enables use of the cryptographic functions
- OAuth 1.0 protocol functions
- The OAuth 1.0 functions enable securing the data from modifications or replaying that by some other software

# Summary

We learnt

- Things communicate to Internet using functions at Ethernet, WiFi and IP.
- Internet Connectivity of Embedded device Platforms
- Using the Ethernet and WiFi Libraries
- Using IP Library
- Using Cryptographic Library

# End of Lesson 8 on Programming Embedded Device Platforms for the Internet Connectivity