



Part 5

I2C communication

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3h30

Part 5 – I2C communication

Lesson : 30mn

Lab 1 : I2C provided tools

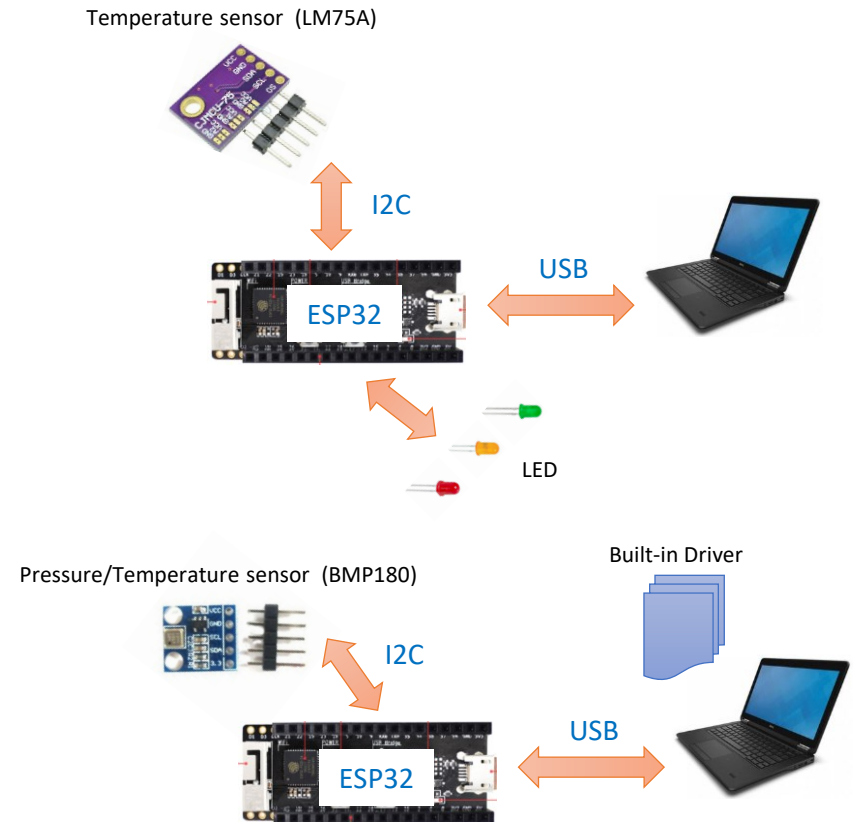
1h

- I2C Connections

Lab 2 : Slave sensor with I2C

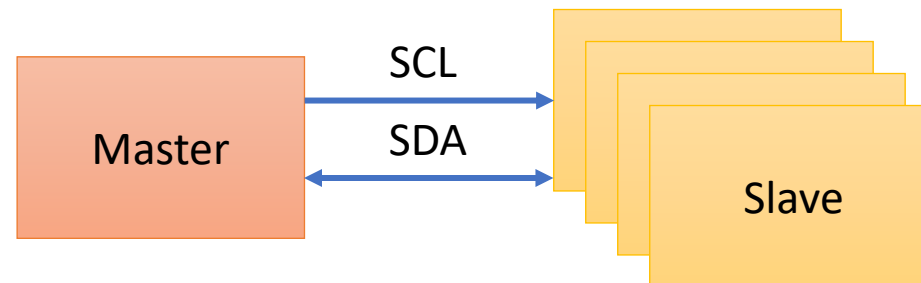
1h

- Temperature sensor (LM75A)
- Interrupt with the temperature sensor



I2C - Inter Integrated Circuit

- Serial communication protocol
- Only 2 data lines required
- SCL
 - Serial Clock
 - The line that carries the clock signal
- SDA
 - Serial DATA
 - The line for the master and slave to send and receive data
- Multiple devices on the same bus
- One master and many slaves

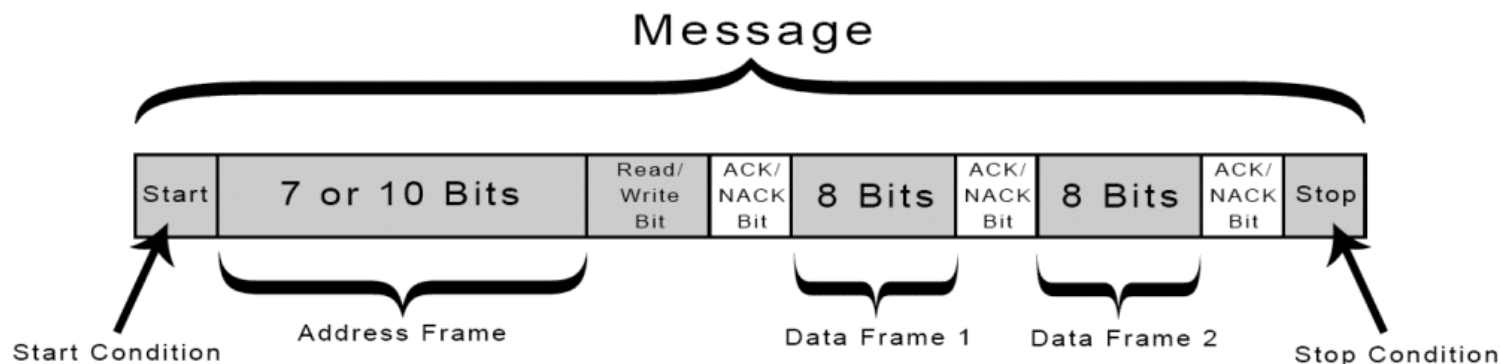


Specifications

- Synchronous communication (SCL line)
- Maximum speed
 - Standard mode : 100 Kbps
 - Fast mode : 400 kbps
 - High speed mode : 3.4 Mbps
 - Ultra fast mode : 5 Mbps
- 1008 maximum slaves

How I2C works

- Messages are broken up into *frames* of data
- Each message has an address frame that contains the binary address of the slave
- one or more data frames that contain the data being transmitted
- Include
 - *start* and *stop* conditions,
 - *read/write* bits,
 - *ACK/NACK* bits between each data frame



Support for I2C with ESP32

- 2 channels I2C buses
- Either bus can act as a master or slave
- Configurable GPIO for SDA and SCL

Conclusion

- Each device has
 - an address
 - Registers (read or/and write access)
- Specific access in 2 steps for each message
 - Write to a register as a command
 - Read data one byte or more than one byte
- The specifics on how to communicate to the device is defined in the datasheet of the device