# I2C Interfacing on eYFi-Mega Board

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Indian Institute of Technology, Bombay

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- Can be multi-master.
- Ensures transmission by acknowledgment.

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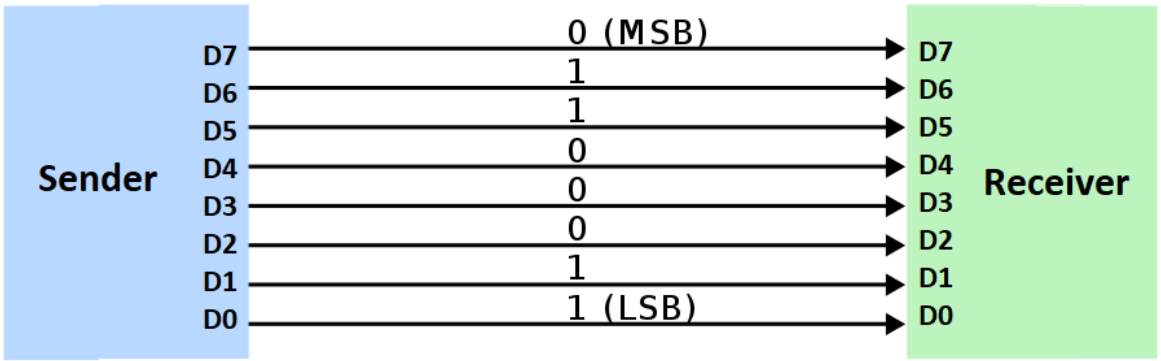


Figure: Parallel Communication

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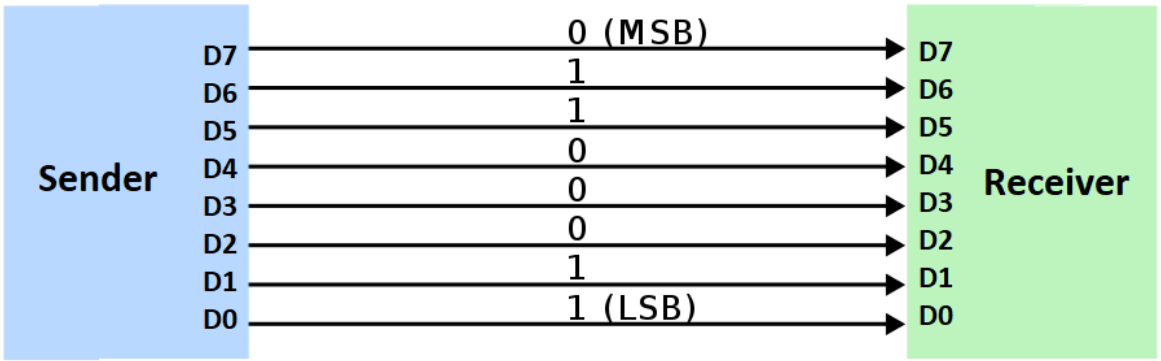


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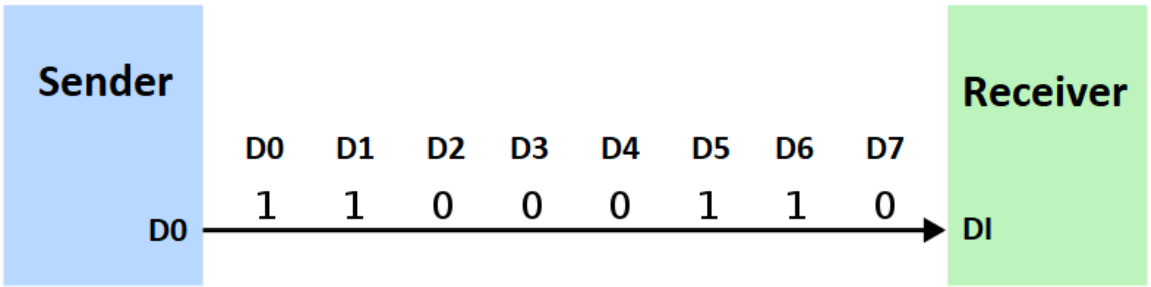


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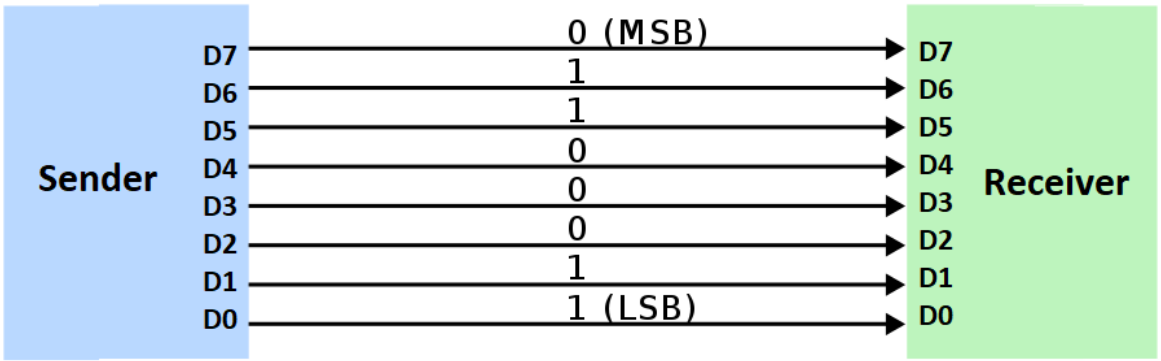


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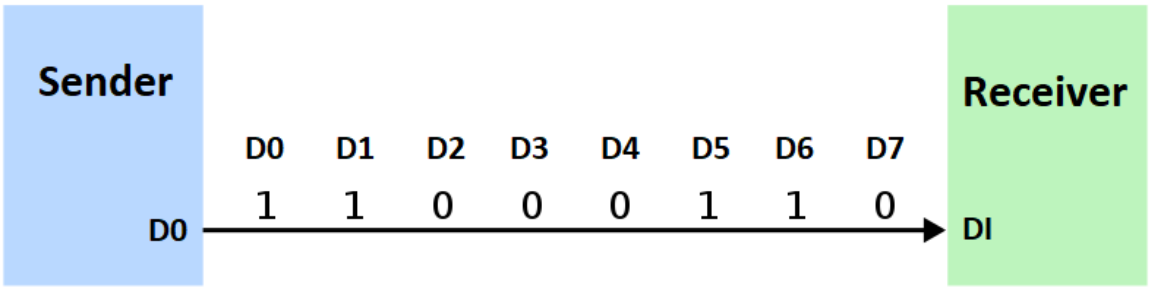


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One bit is sent at a time.

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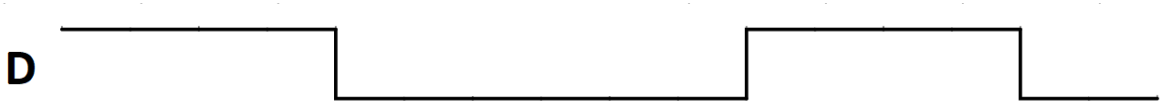


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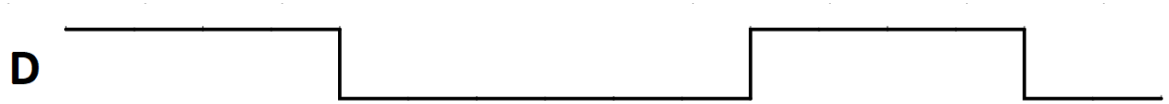


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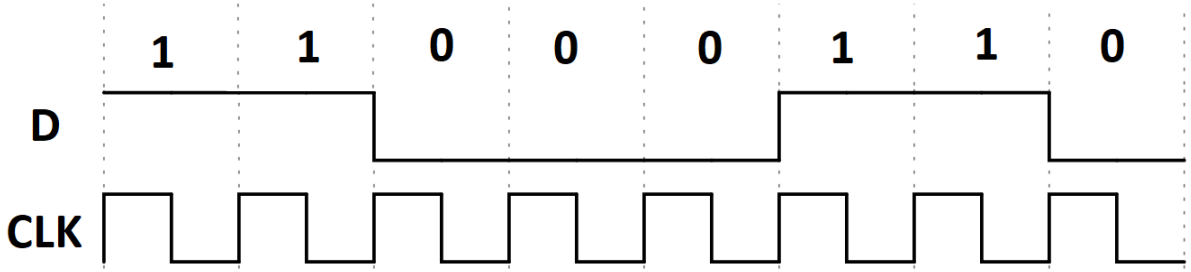


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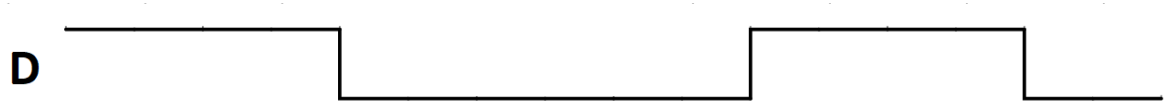


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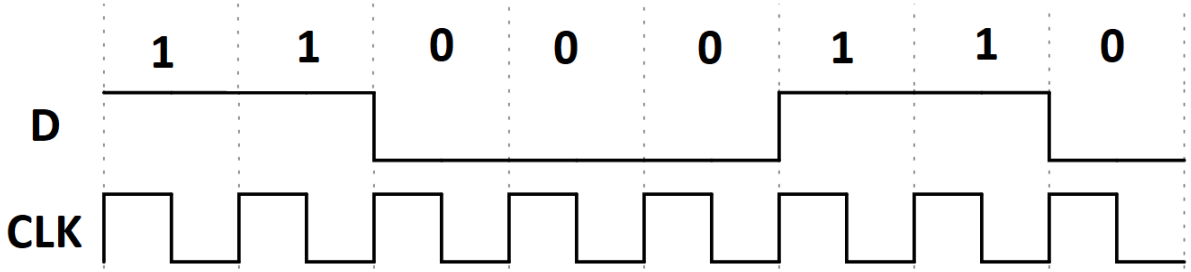


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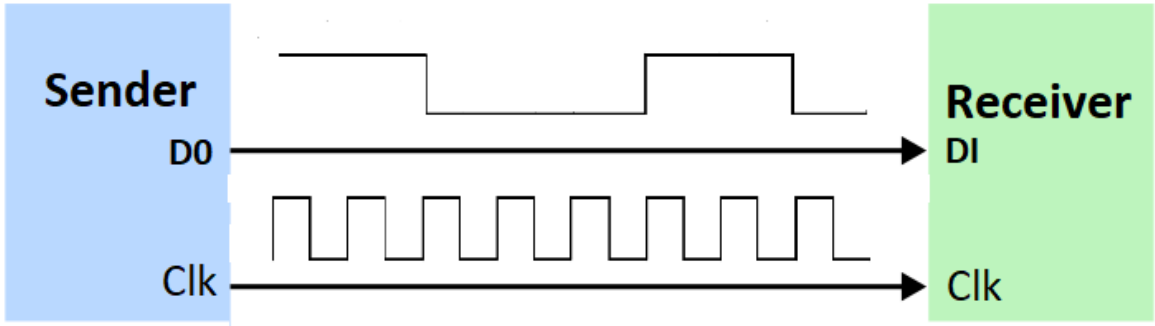


Figure: I2C Communication between Two Devices

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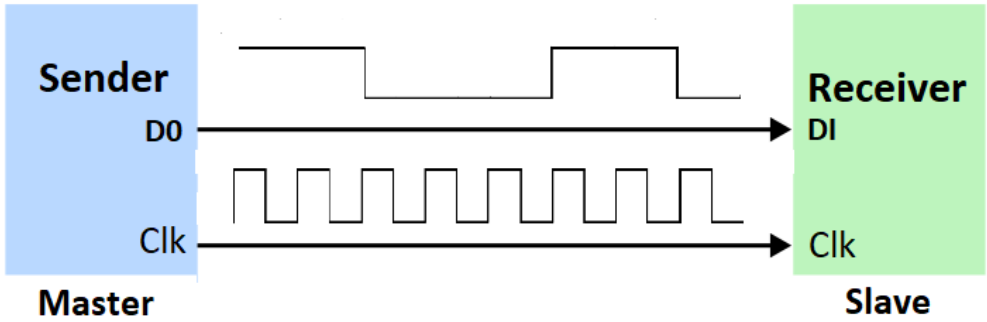


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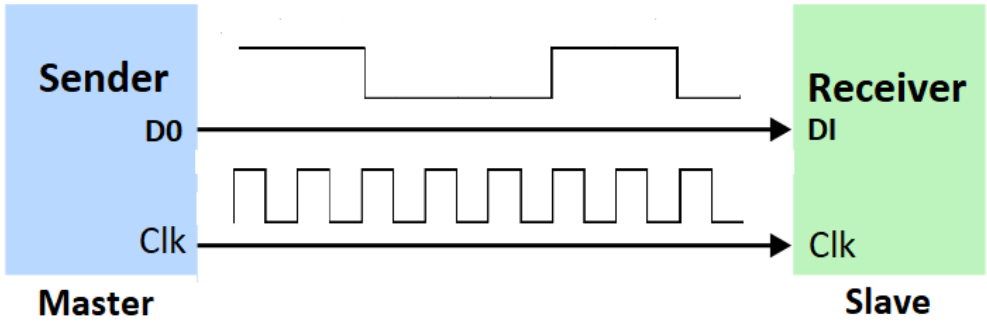


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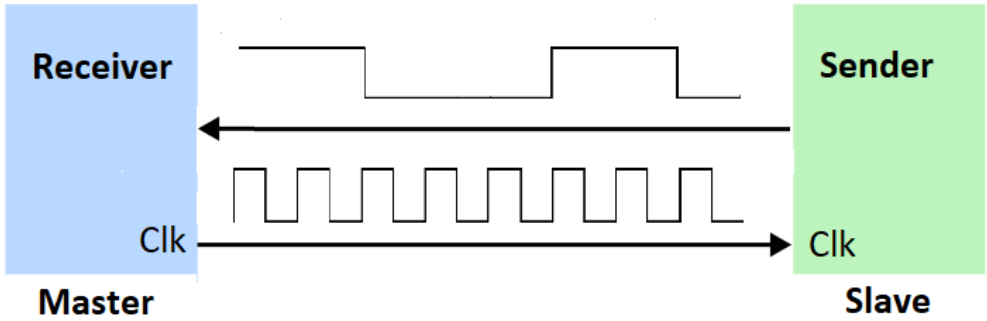


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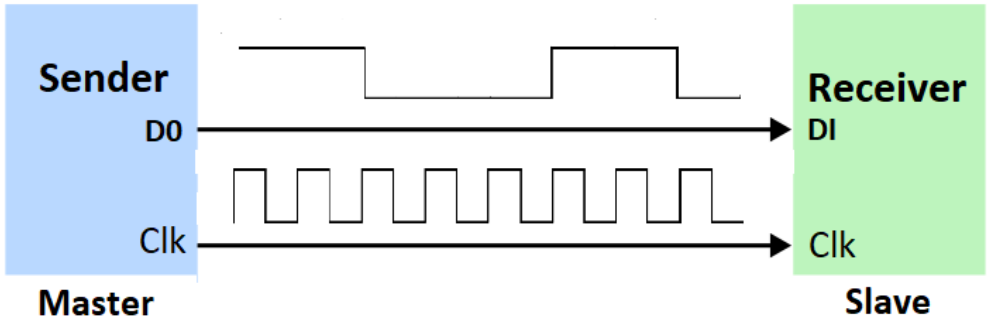


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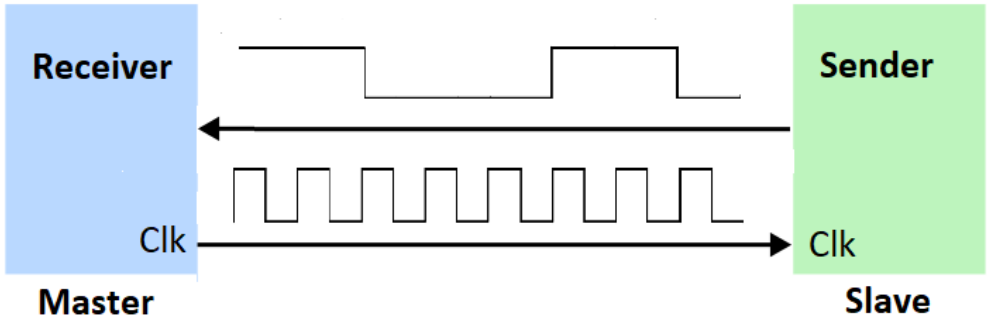


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I2C is a Half-Duplex communication.

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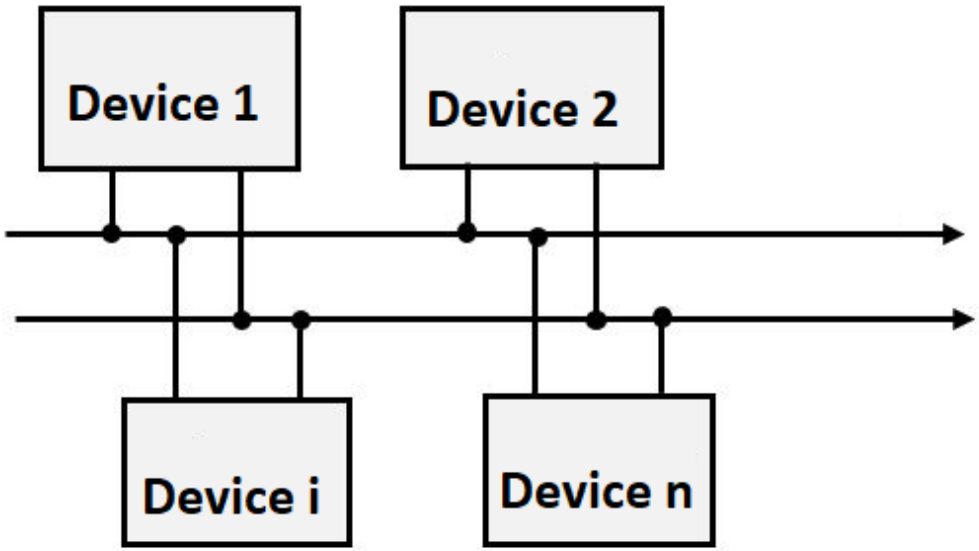


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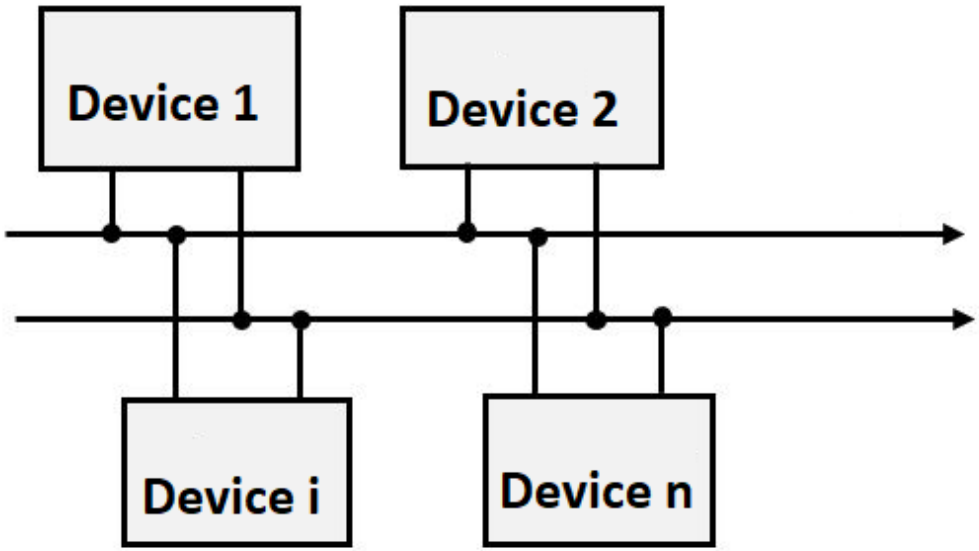


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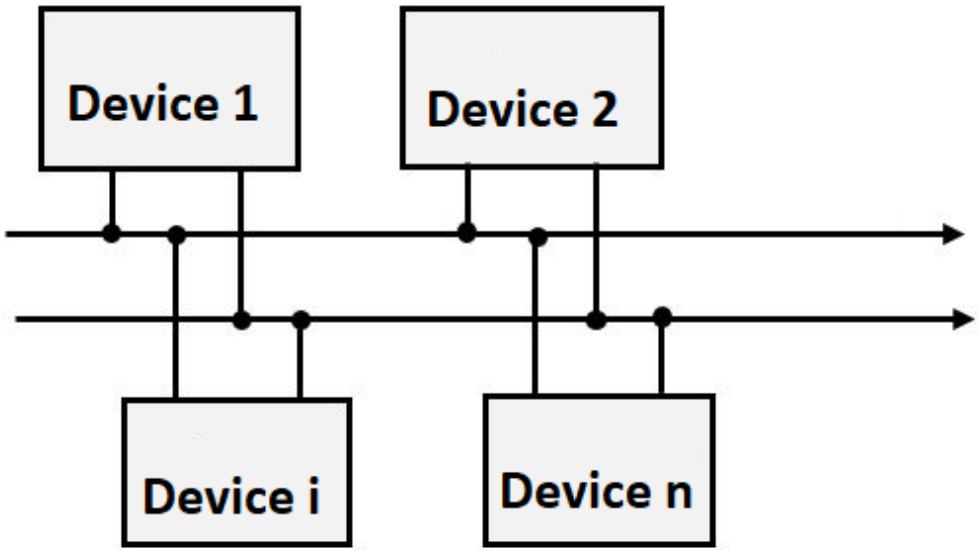


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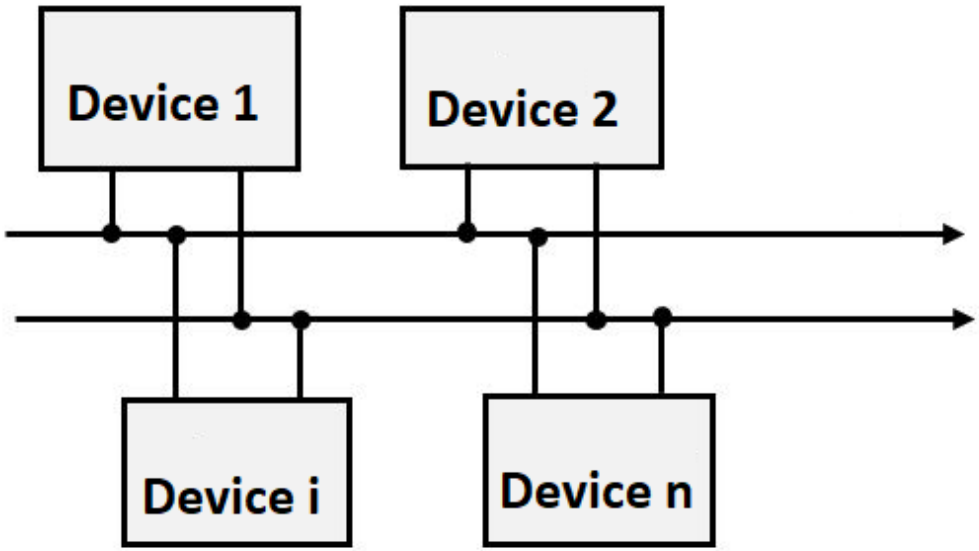


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At a time only one device will act as a master
Each device in I2C is addressed by its unique address

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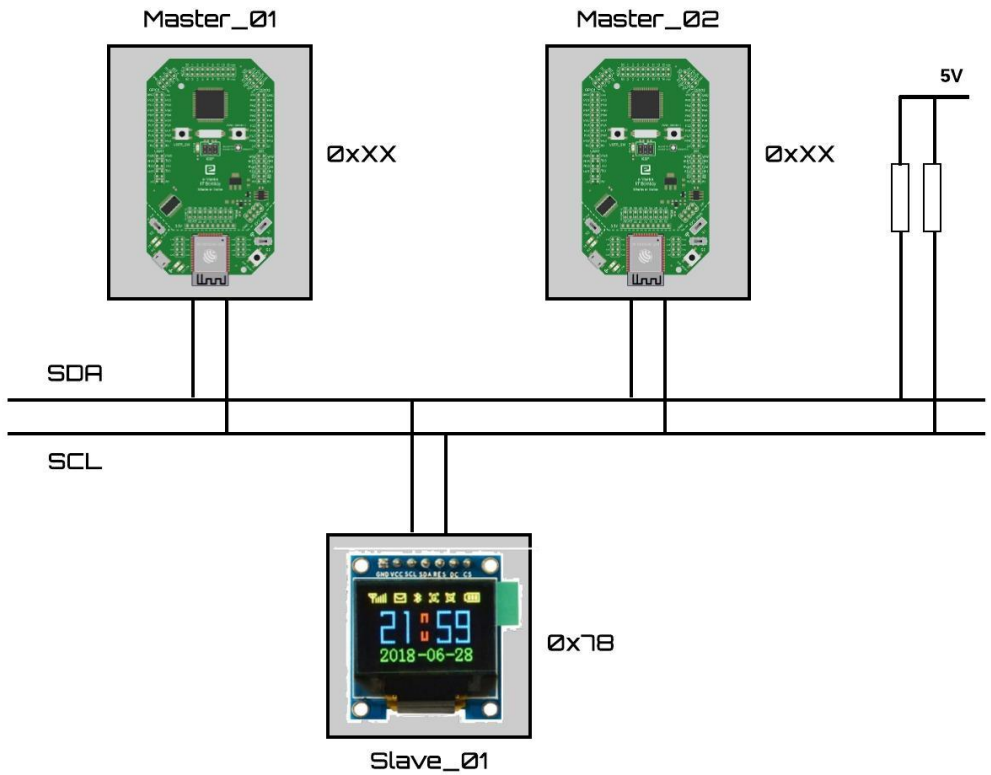

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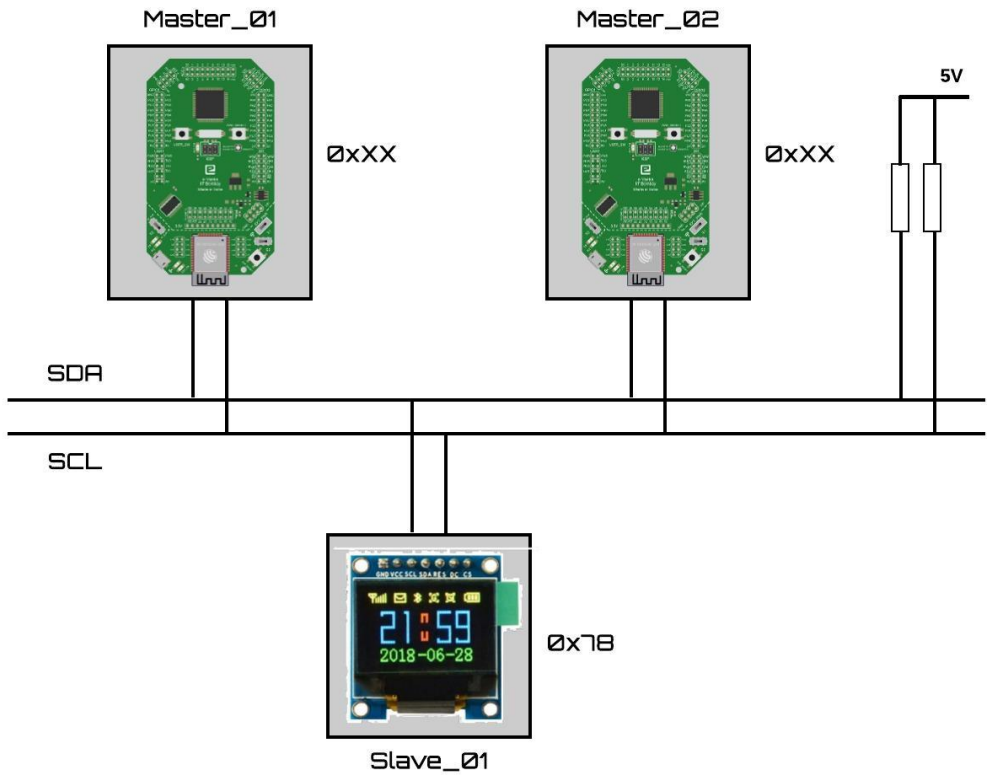


- Pins required for I2C:
  1. SDA: Serial Data Line - To send and receive information.
  2. SCL: Serial Clock Line - To synchronize the communication.

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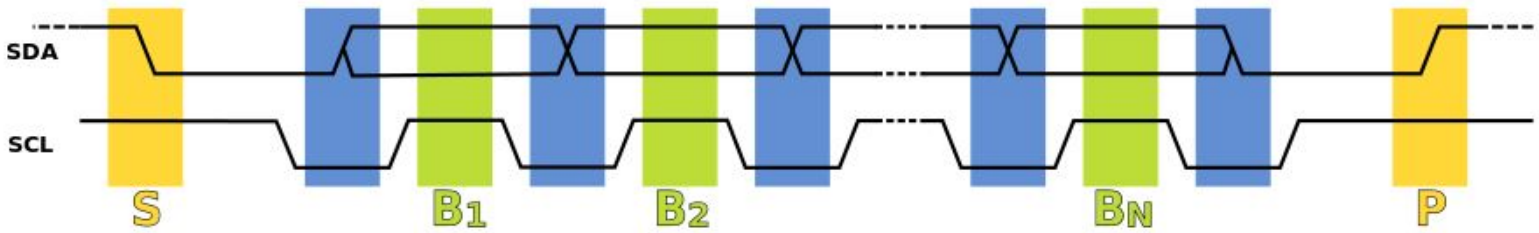

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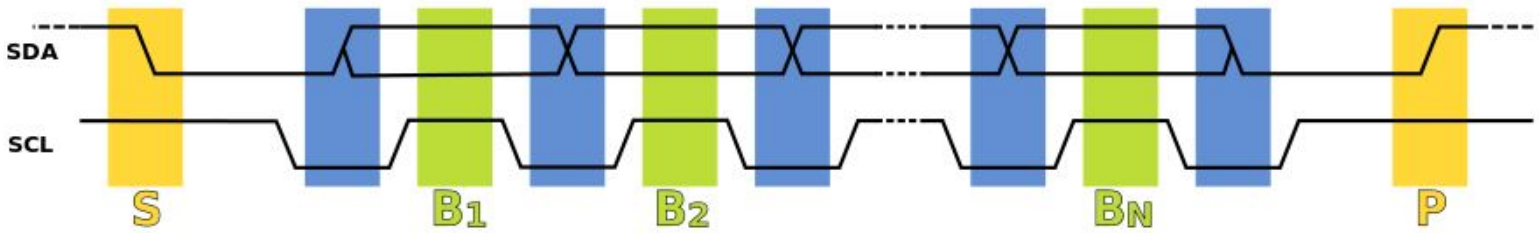


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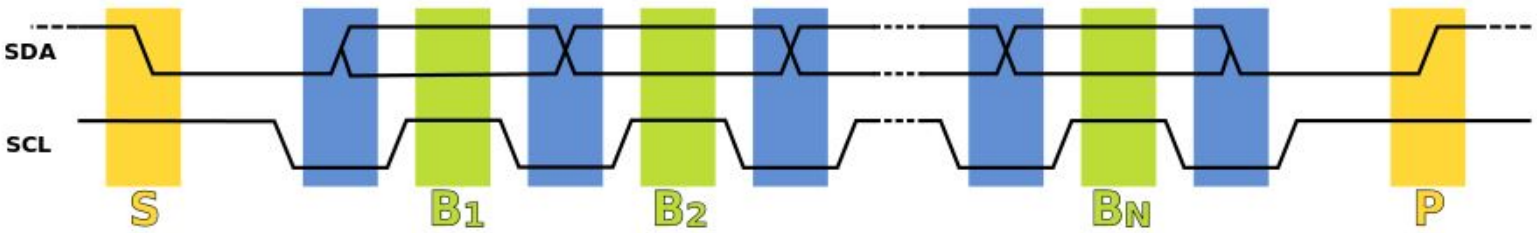


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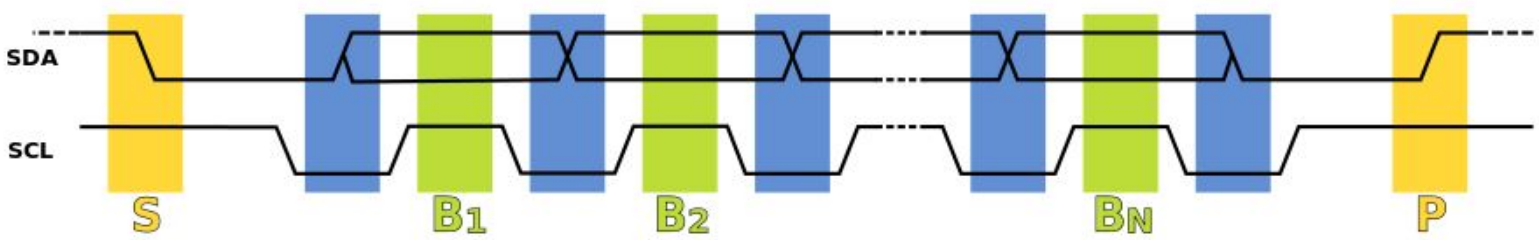


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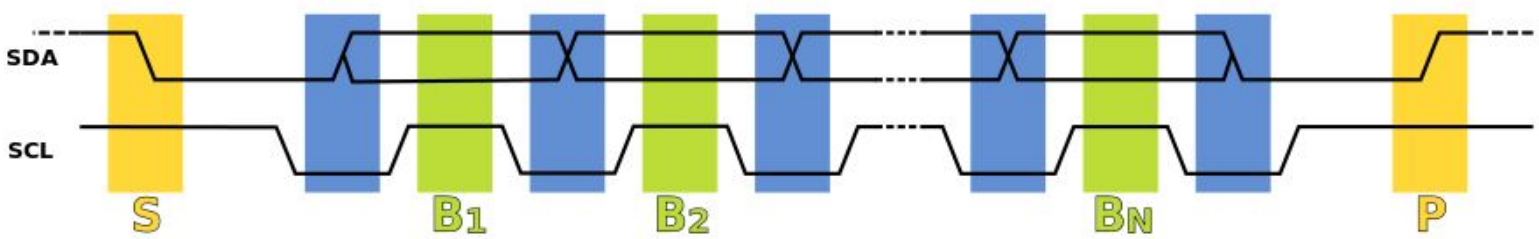


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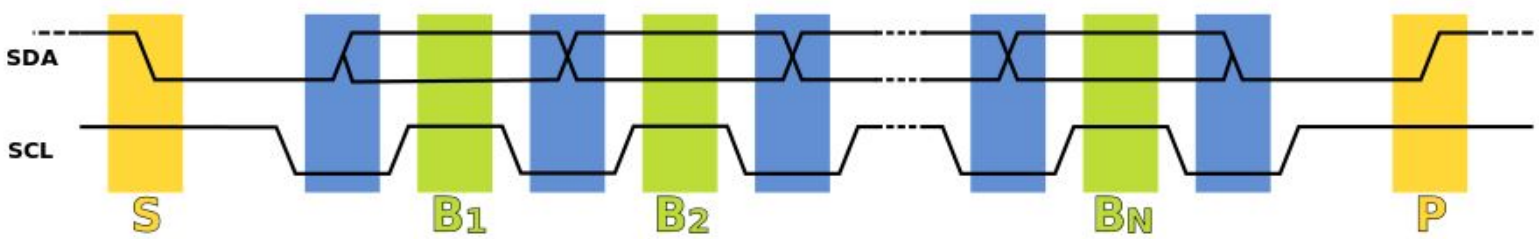


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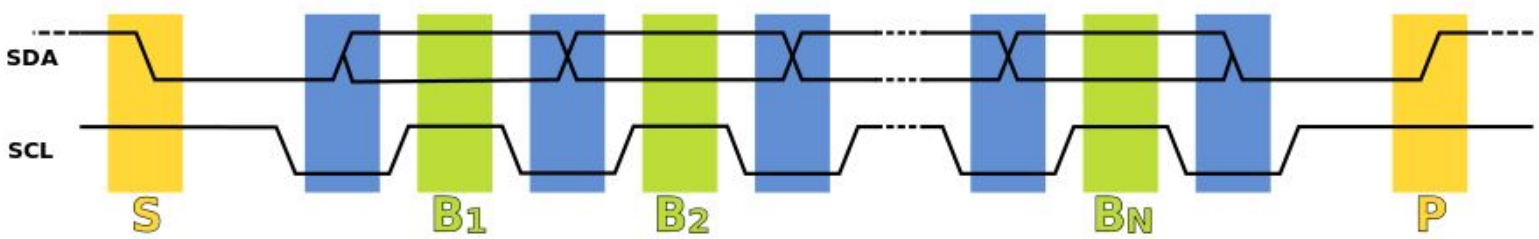


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6. A stop bit (P) is signaled when SCL rises, followed by SDA rising.

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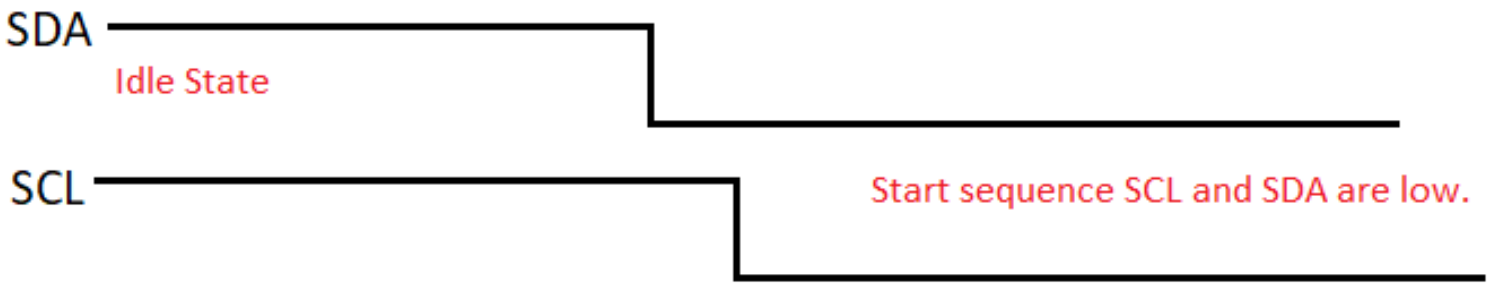
- Start condition marks the start of the protocol.
- SCL line is pulled down by lowering the voltage.

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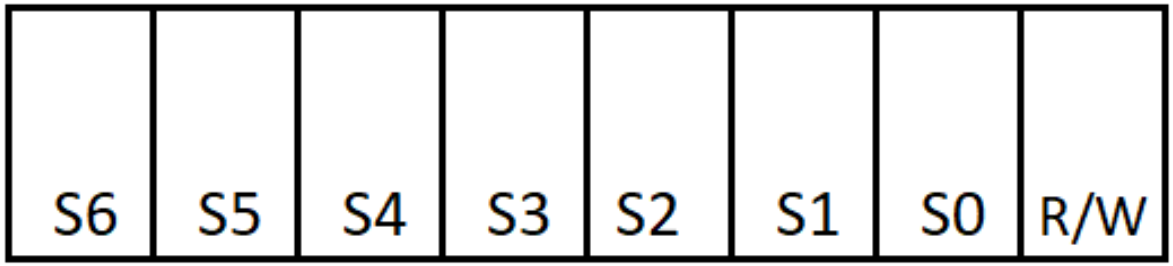
Start + Slave Addressing + Ack + Data transfer + Ack + Stop


- Slaves are selected by sending 7 or 10 bit along data line.




- R/W bit decides the read or write operation.

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- Data is transferred (Read or Write) b/w master and selected.


- The direction of data transfer is determined by R/W bit.

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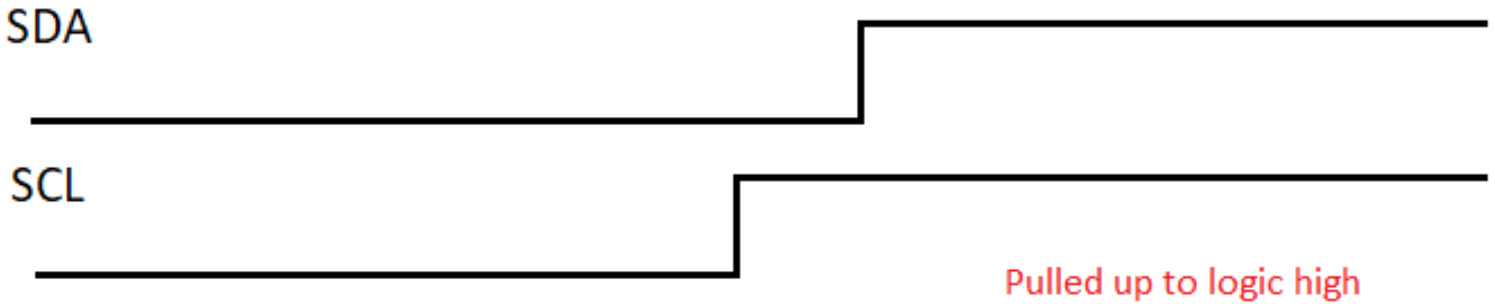
- Stop condition marks the End of the protocol.




- SCL and SDA lines are released.

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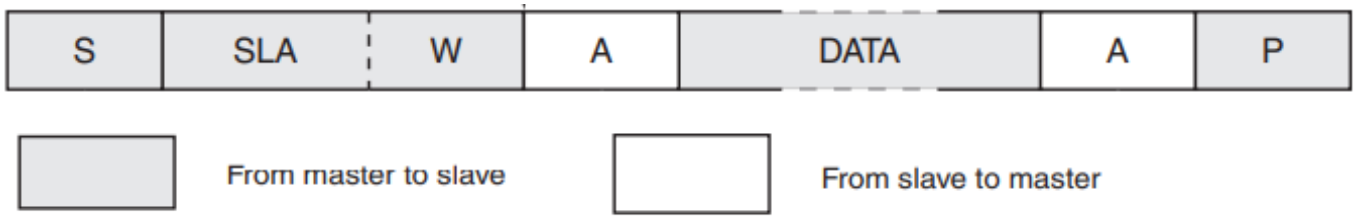


Figure: Master Transmitter

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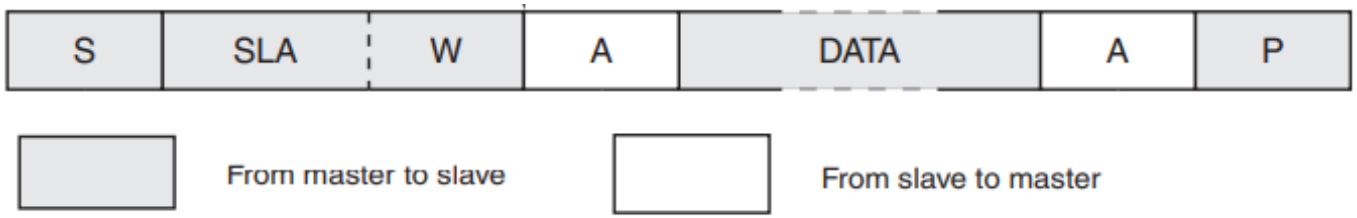


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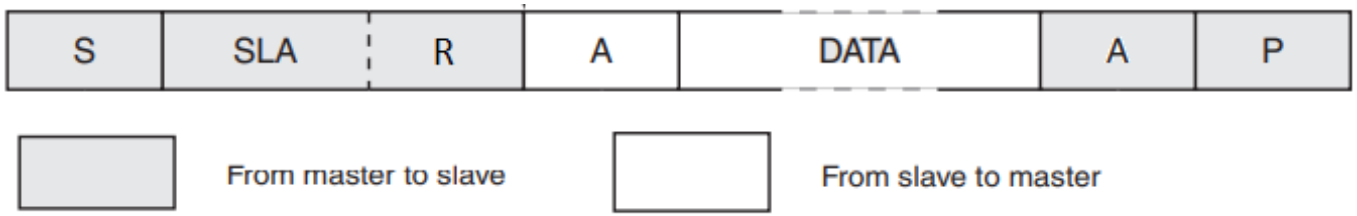


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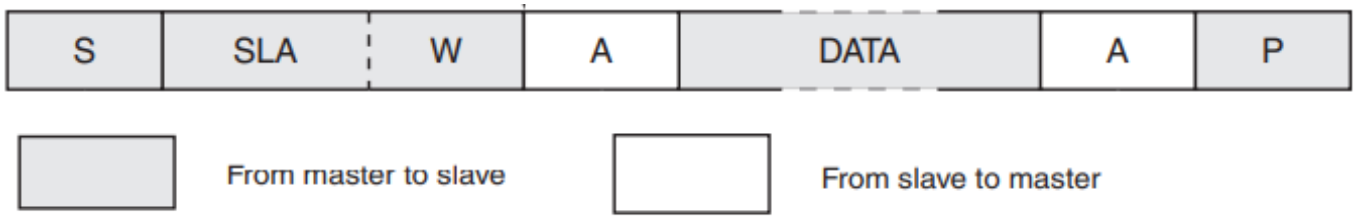


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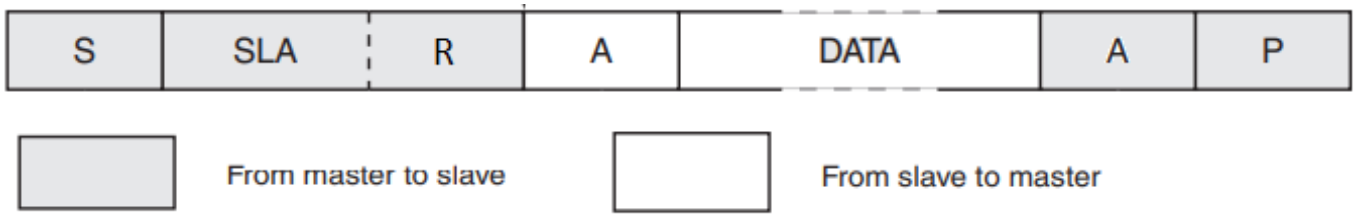


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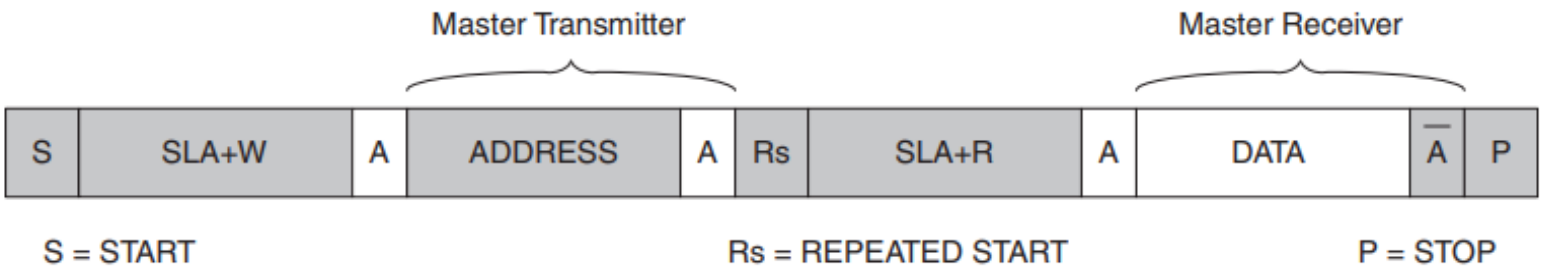


Figure: Master Transmitter and Receiver

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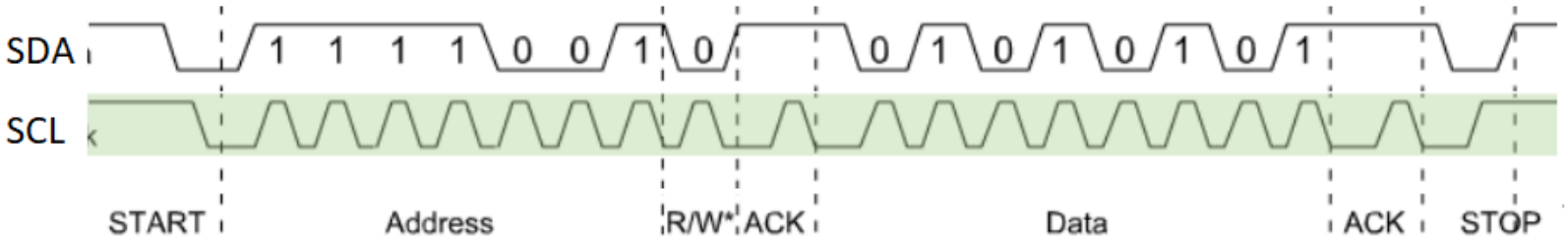


Features of I2C:

- Bus Arbitration: When multiple devices initiates a communication
- Clock Stretching: When slave wants to take control of the clock

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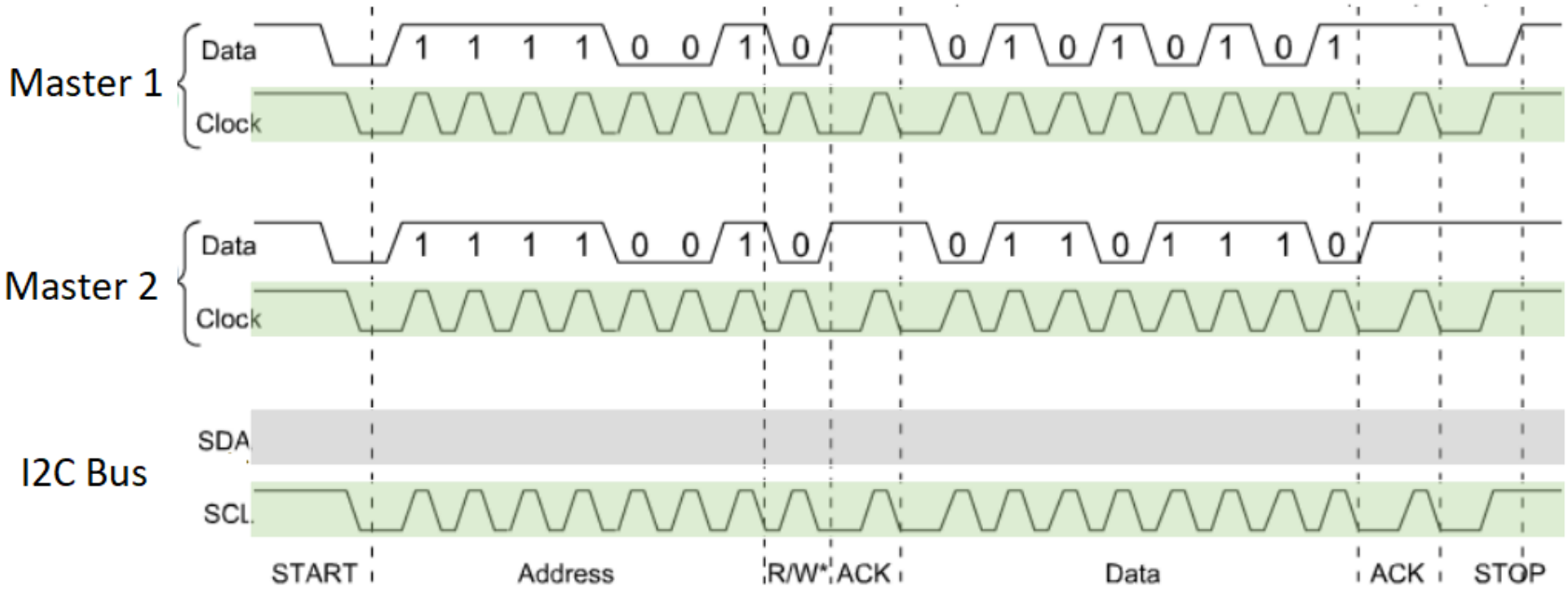

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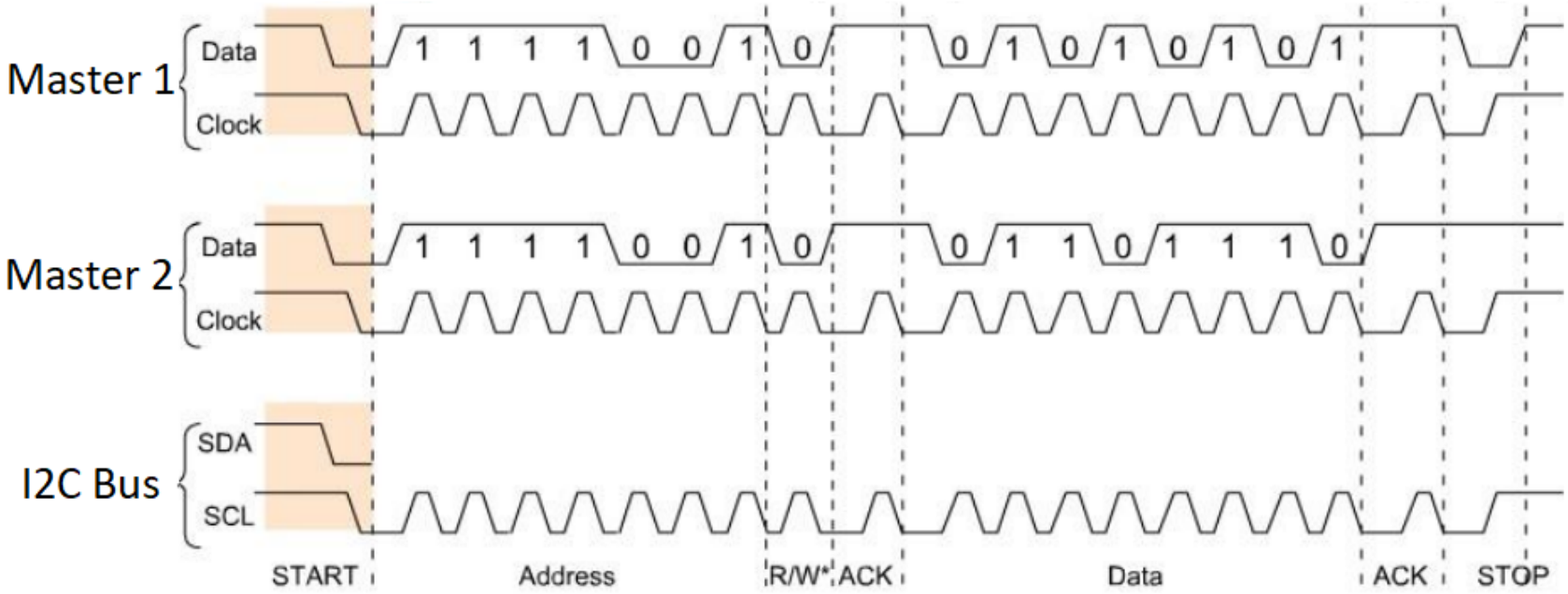

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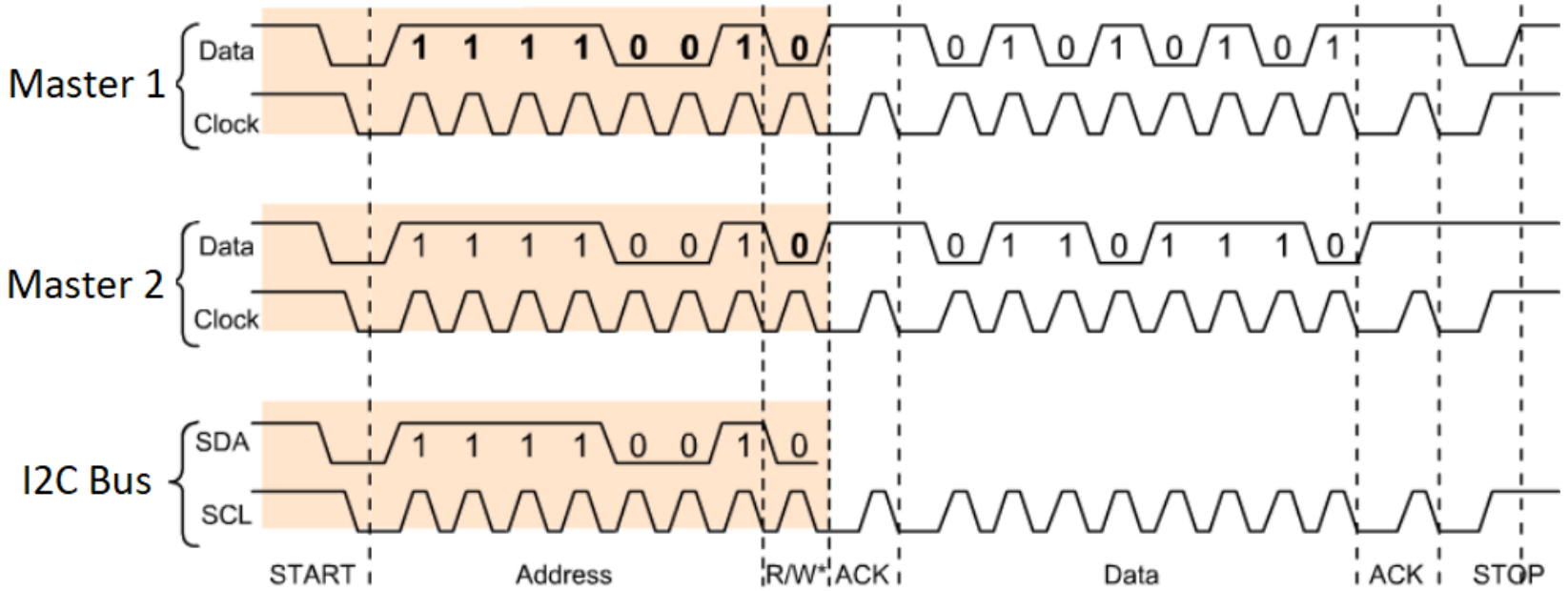

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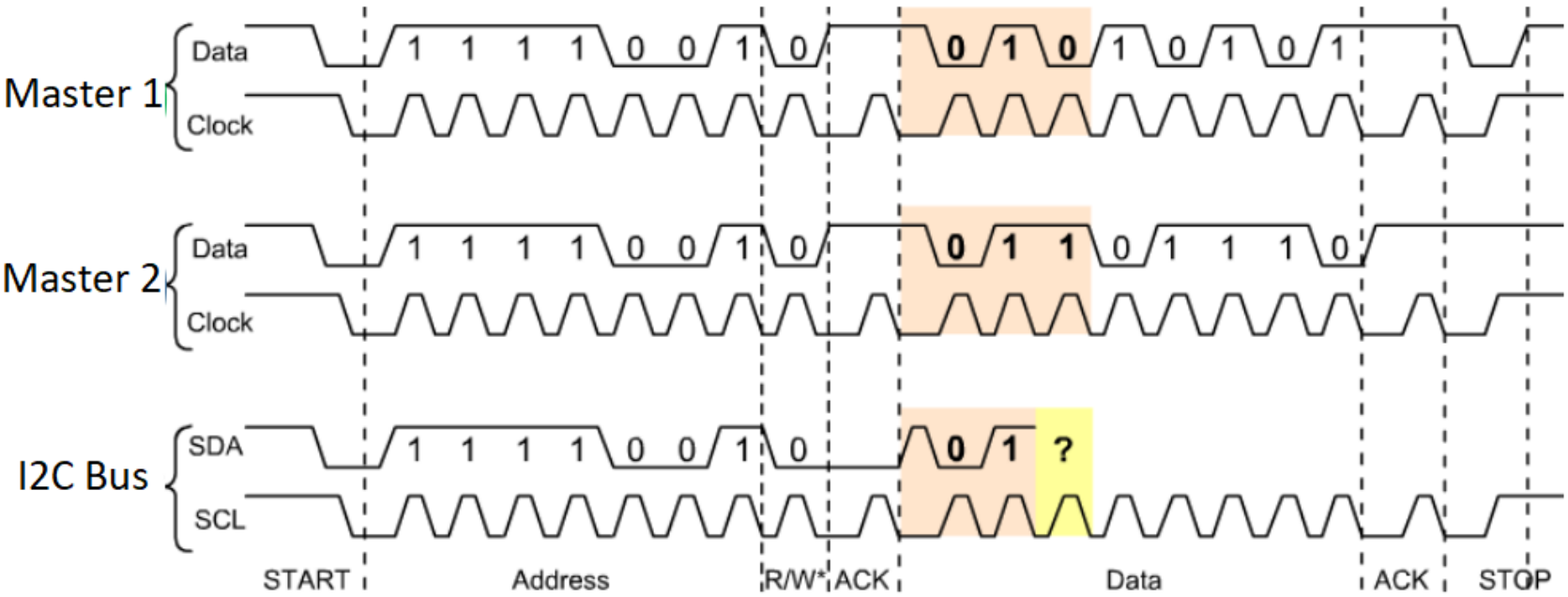

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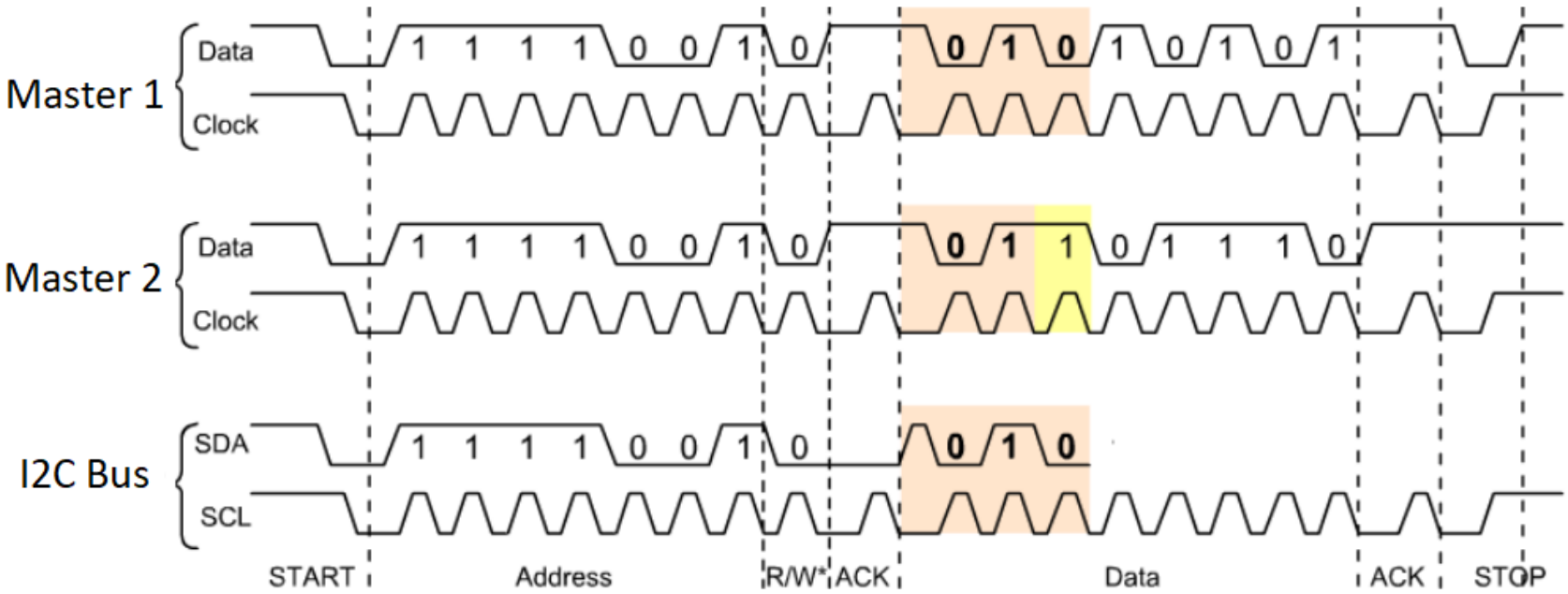

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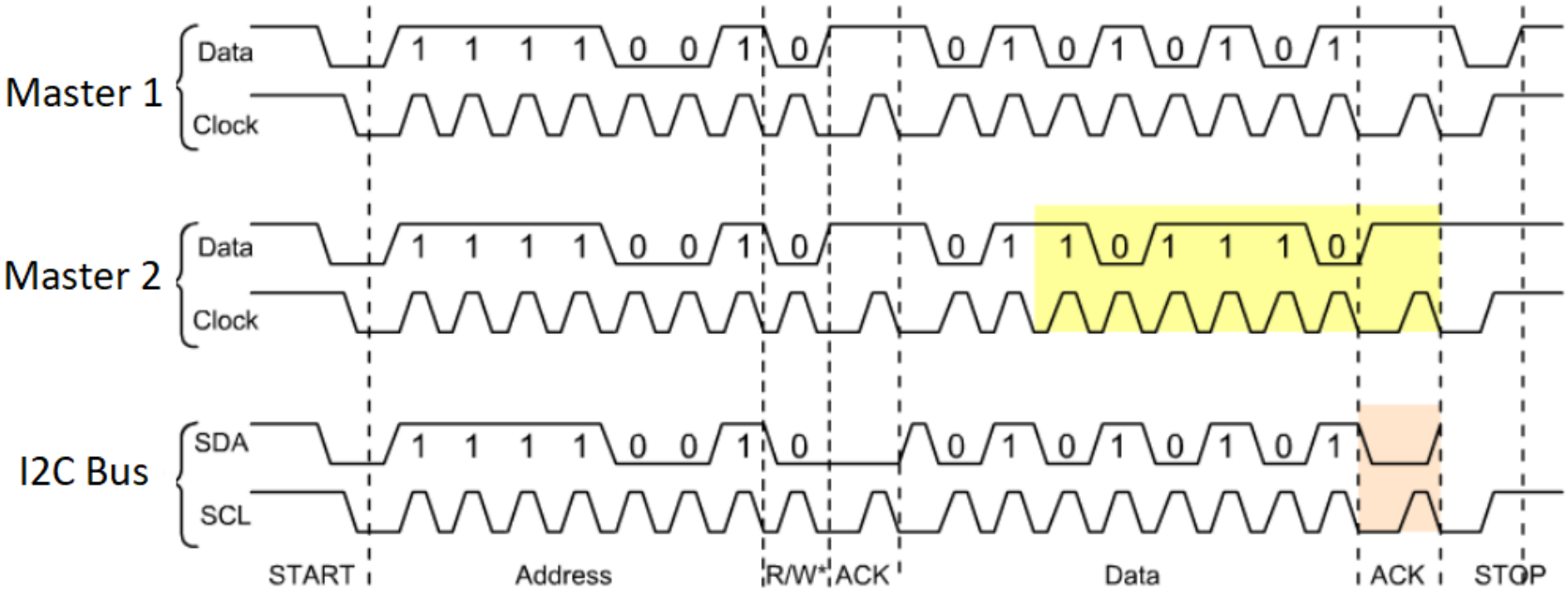

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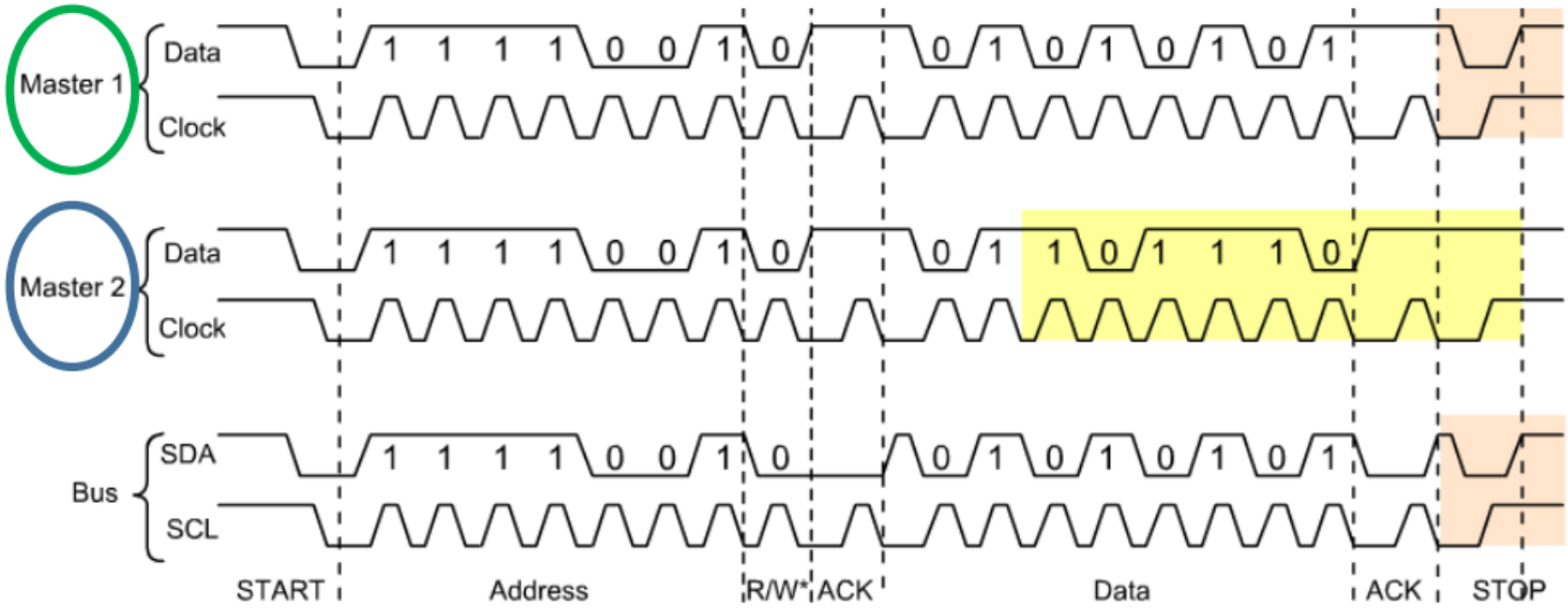


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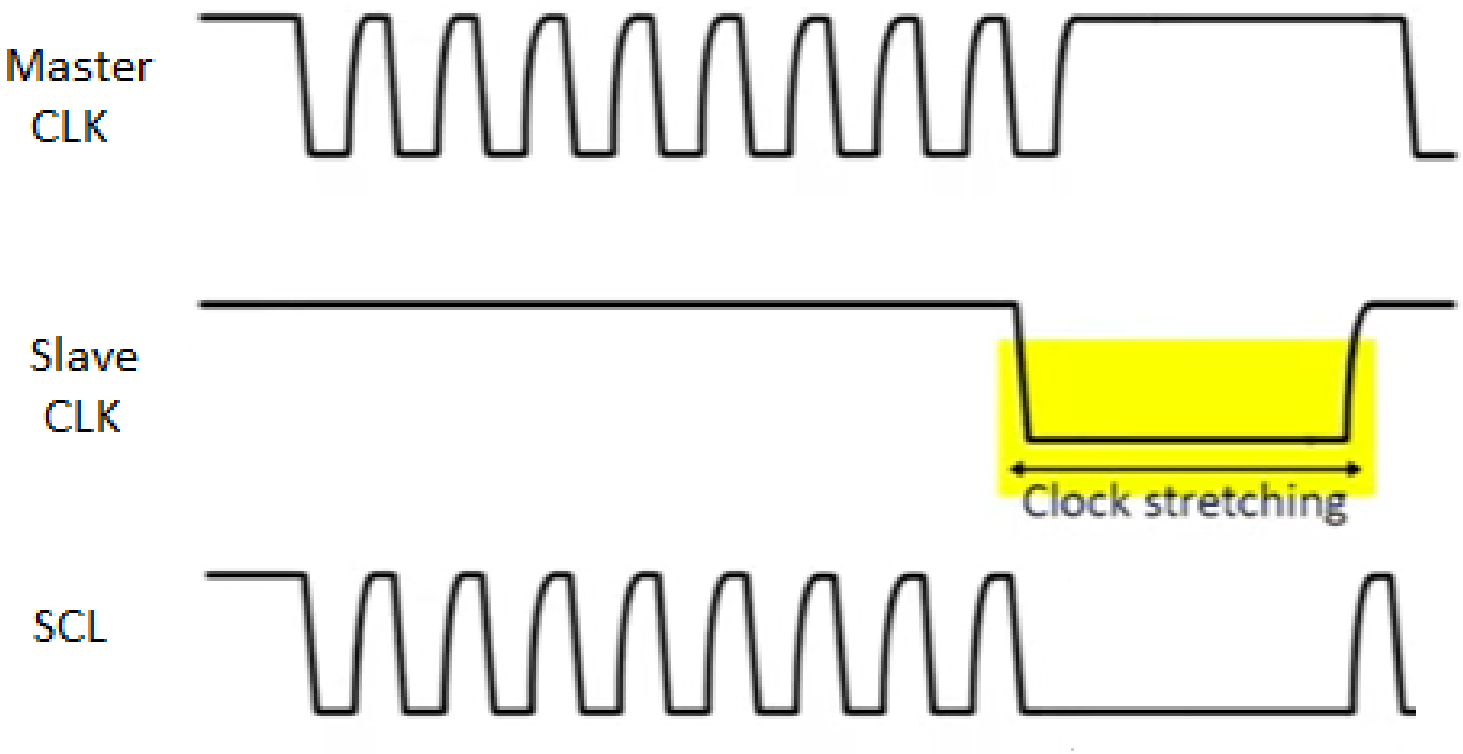

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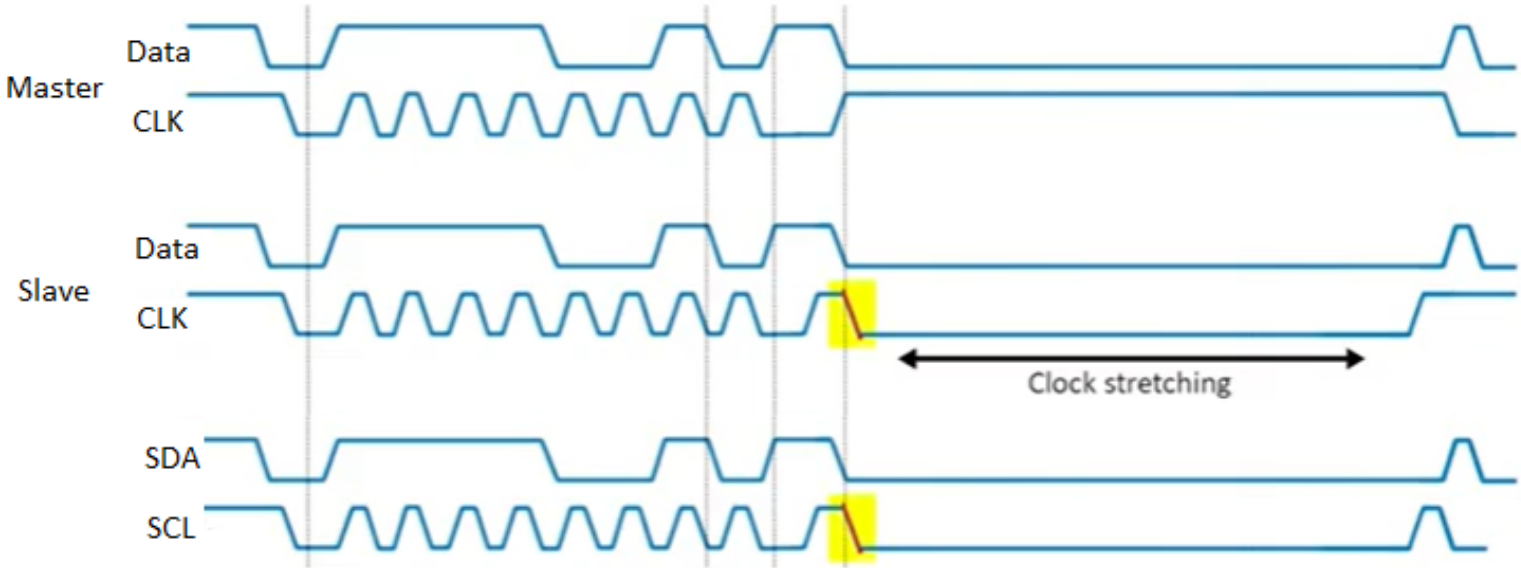

# I2C Header on eYFi-Mega Board

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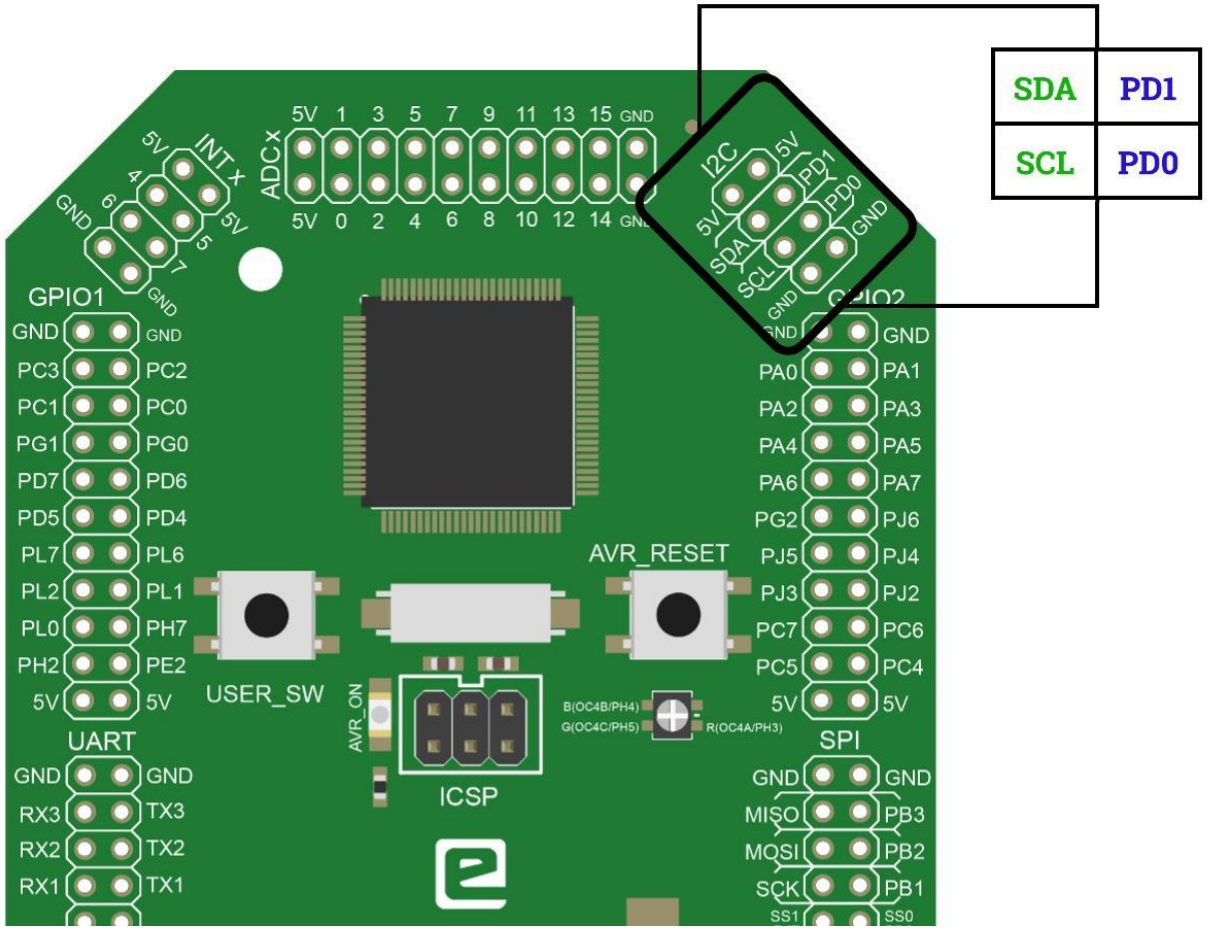


# OLED Display

# OLED Display

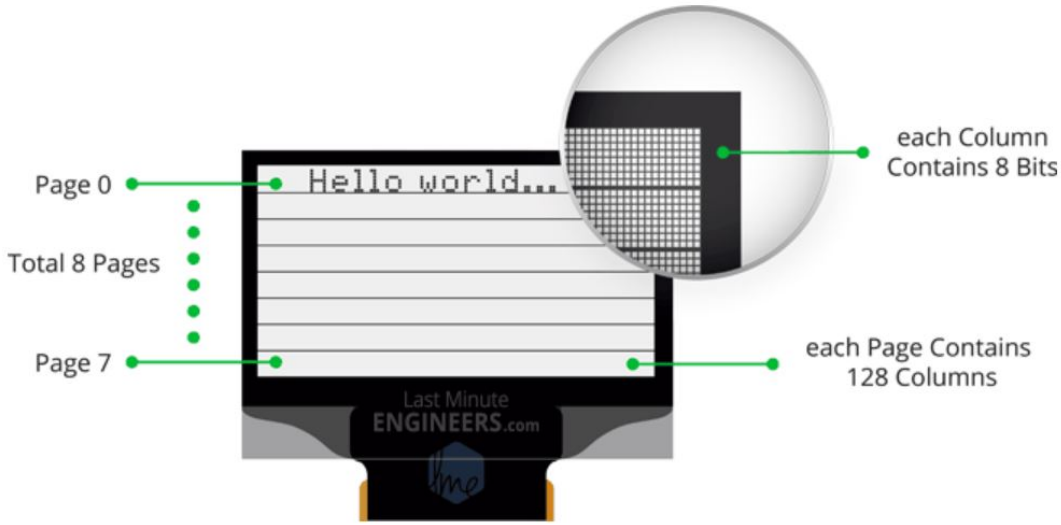
- OLED (Organic Light Emitting Diodes) is a flat light emitting technology.
- Used to display Text, Images and moving pictures.
- Communicates with microcontroller using SPI or I2C.
- Comes in different sizes and colors, for example: 128x64, 128x32, with white OLEDs, Blue OLEDs and Dual Color OLEDs.



# OLED Memory Map

# OLED Memory Map

**SH1106 OLED:**




- Display divided into 8 Pages.
- Each Page - 128 Columns.
- Each column - 8 bit data.

Each bit represents particular OLED pixel on the screen which can be turned ON or OFF programmatically.
Graphic Display Data RAM (GDDRAM) = **1KB**.

# OLED Working

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Start + Slave Addressing + Ack + Register Addressing + Ack + Data transfer + Ack + Stop

# OLED Interfacing

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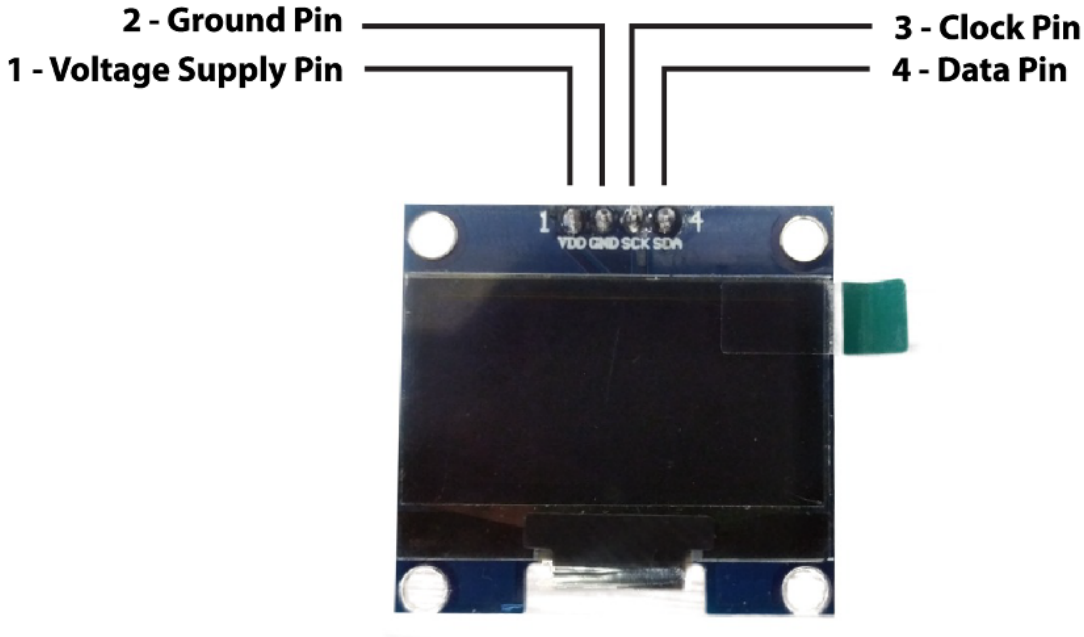
## SH1106 OLED:



# Library functions available for OLED

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display.setTextColor(SH110X_BLACK, SH110X_WHITE);
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# Thank You!

Post your queries on: helpdesk@e-yantra.org