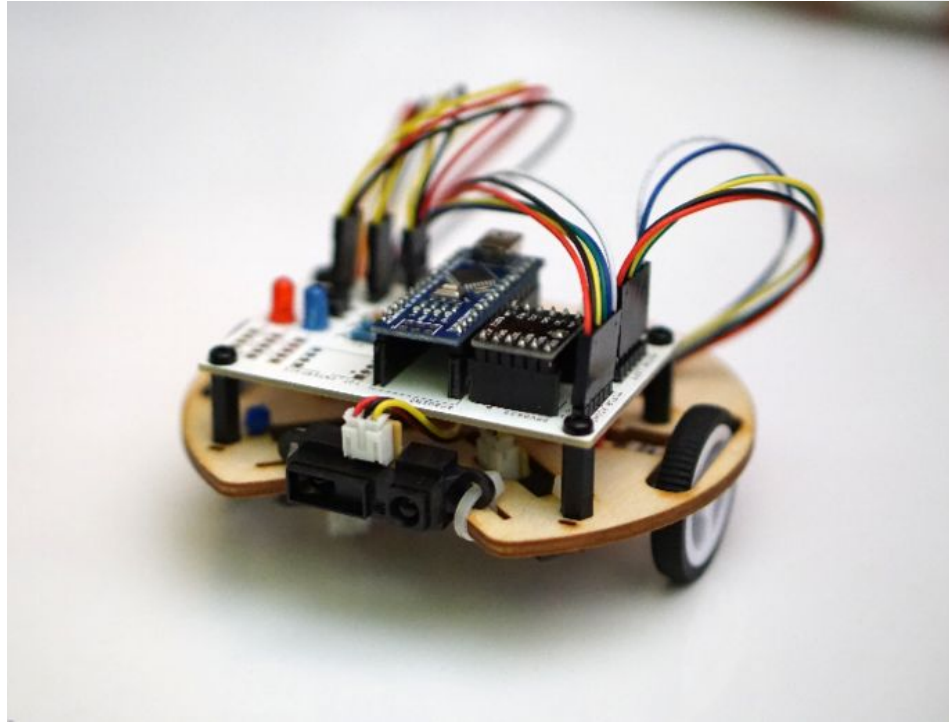


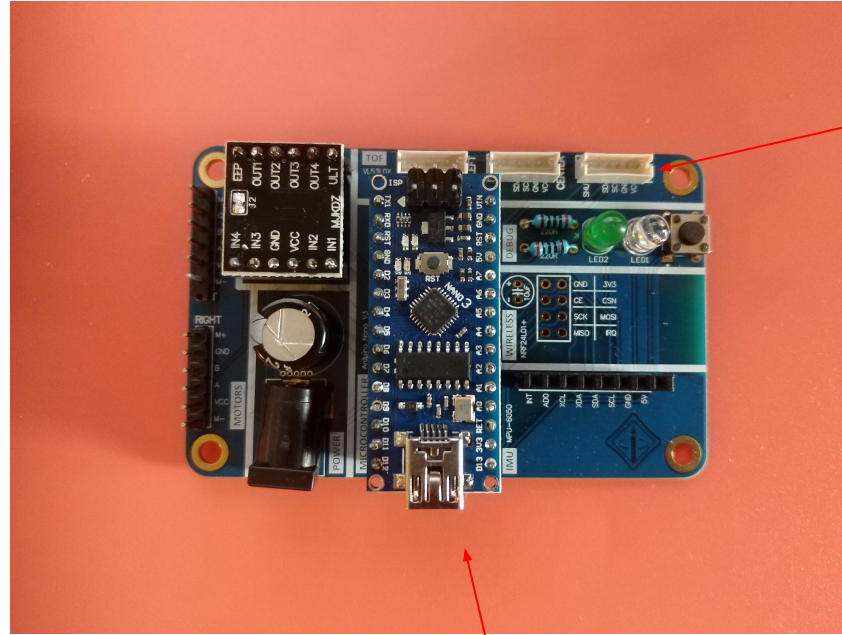
IEEE Micromouse DeCal

Week 3: Sensing Part 2

Micromouse Hardware Kit



Micromouse PCB Parts

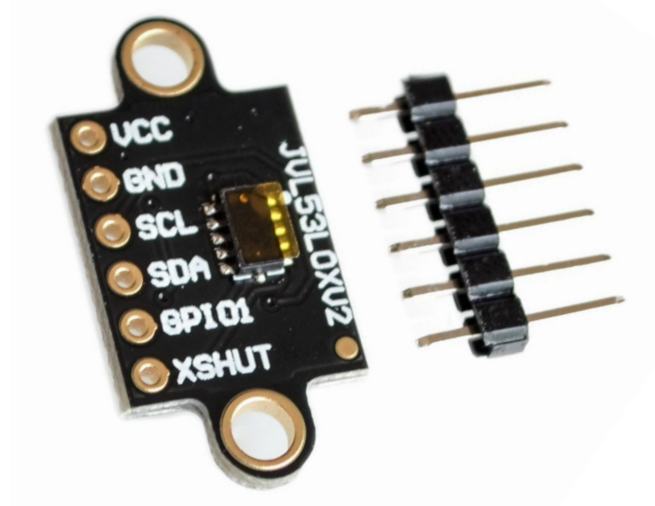


ToF Sensor
Connectors

Arduino Microcontroller

ToF Sensors

- “Time of Flight”: Sends out a pulse of light, measures how long it takes to bounce off an object and come back



Sensor Communication

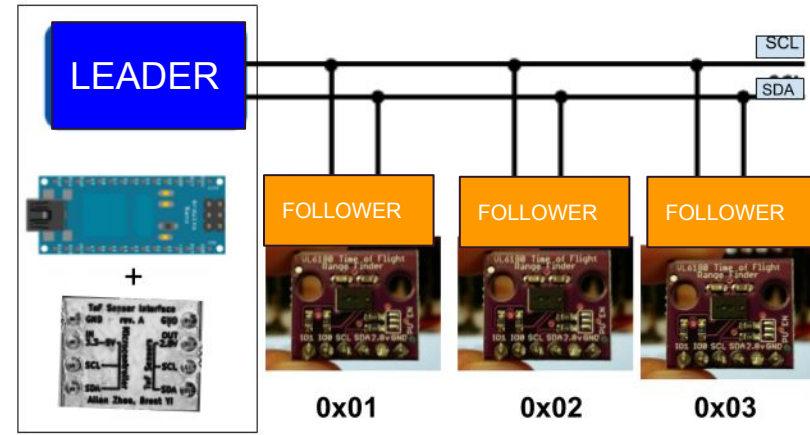
- How do we read values from sensors?

Sensor Communication

- How do we read values from sensors?
 - Digital inputs (like encoders, buttons)
 - Analog inputs (variable voltage)
 - Digital communication buses!
 - I²C
 - SPI - Too many pins!
 - CAN
 - UART - No clock!
 - ...

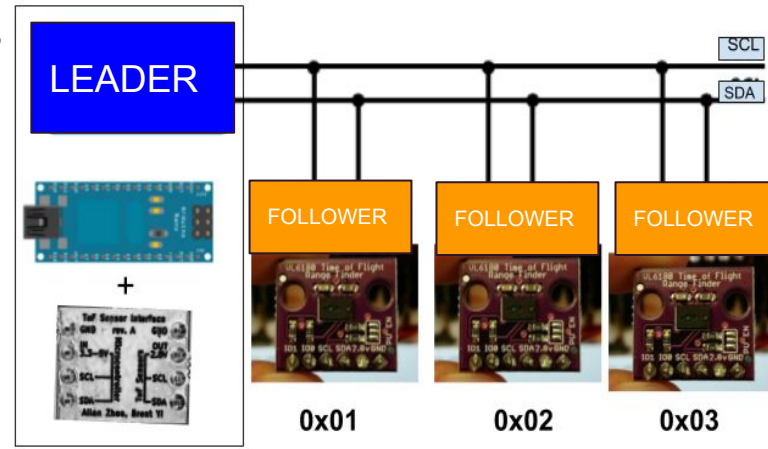
I²C

- SERIAL communication - data sent bit by bit
- Allows leader device(s) to talk to many follower devices using **only two** wires (SCL & SDA)
- SCL - Clock line
- SDA - Data line



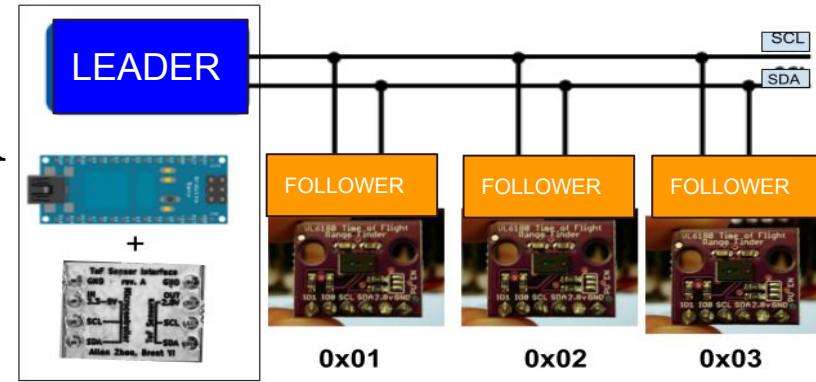
I²C

- The leader has two lines: SCL, SDA
- **EACH** follower has two lines: SCL, SDA
- Follower SCL and SDA lines connect to Leader SCL and SDA lines
- Why do we need a clock?



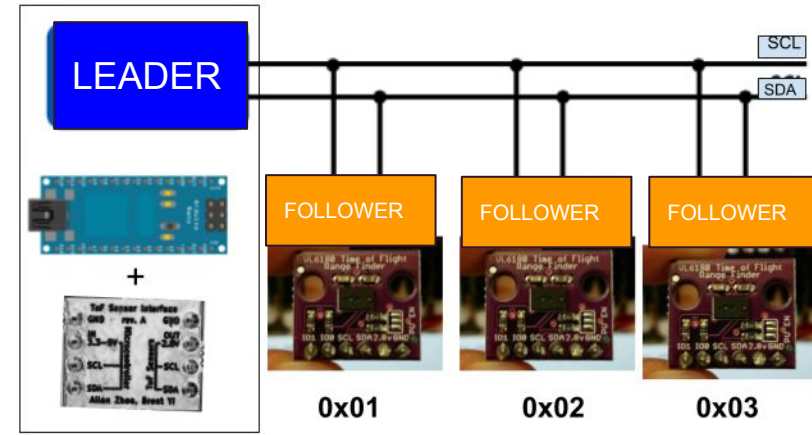
I²C

- SCL allows devices to agree on data rate
- Rate at which leader sends data should be virtually the same as rate at which follower samples/reads the data. WHAT COULD GO WRONG?
- Request-response model
- Correct recipient?



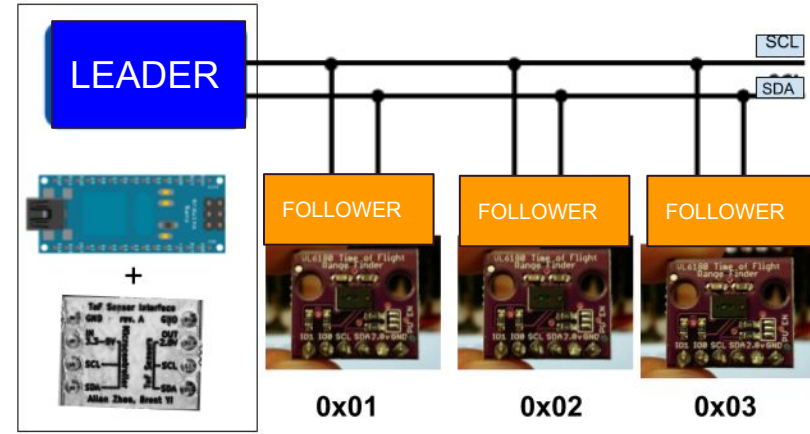
I²C

- Assign each follower an address
- Broadcast address before each message
- Follower only responds to messages that start with its address



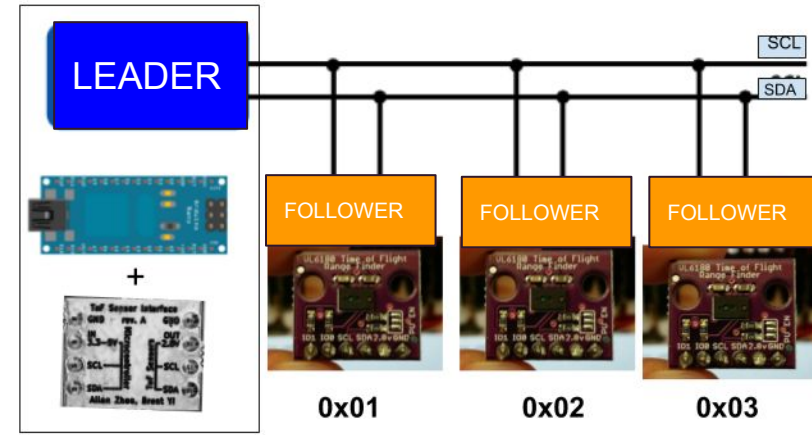
I²C

- For those who are interested, this [link](#) explains what a message from the leader looks like:
- It is also in the lab doc.

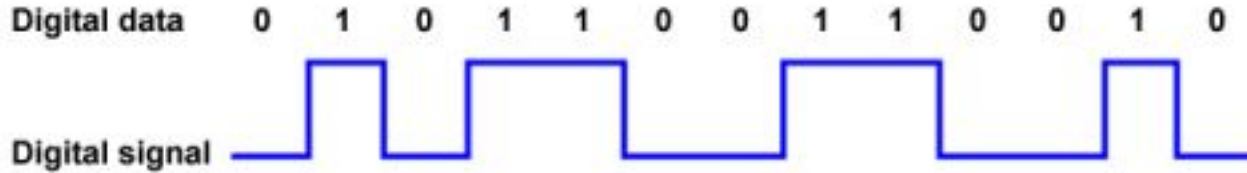


I²C

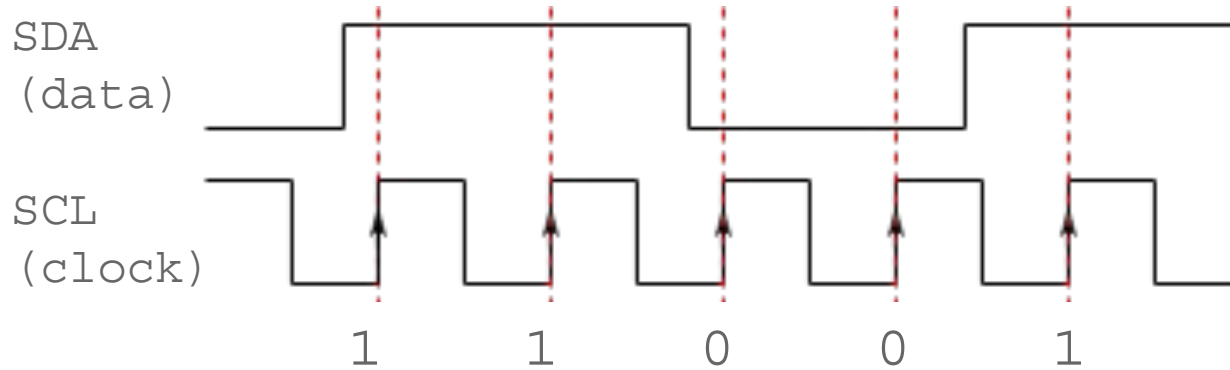
- Reading a distance value:
 - Leader sends the desired follower address (ie 100)
 - Leader sends a request for the distance reading
 - Device with address 100 responds, **on the same data line**



Why two wires?



Why two wires?



Misc

- There's a third pin on your sensors, XSHUT
 - Pulling this HIGH resets the sensor

Questions?