# Group one-on-one meeting – Feedback on Milestone 1

Each team will have a 10 mins slot, which is still pretty limited, so come to me prepared (with questions or things to discuss). The sign up sheet is on Piazza.

There are 12 slots for 10 teams, so the form is FIRST COME FIRST SERVE, once the time slot is selected by a team, it is blocked for other teams, only 1 response is needed for each team. Please sign up by 4:45 pm (class time) Wednesday (9/28).

The more we hear from you, the better we can assist with your project.

# Assignment 2 – Second part

## Delivery

There are two deliverables.

- Fusion 360 shareable link: please make your file visible to anyone who has the link and submit the link in elms.
- 3D printed part: Submit in person on Oct 5th. **Bring your printed model to the classroom assembled with the ultrasonic sensor and the servo**.

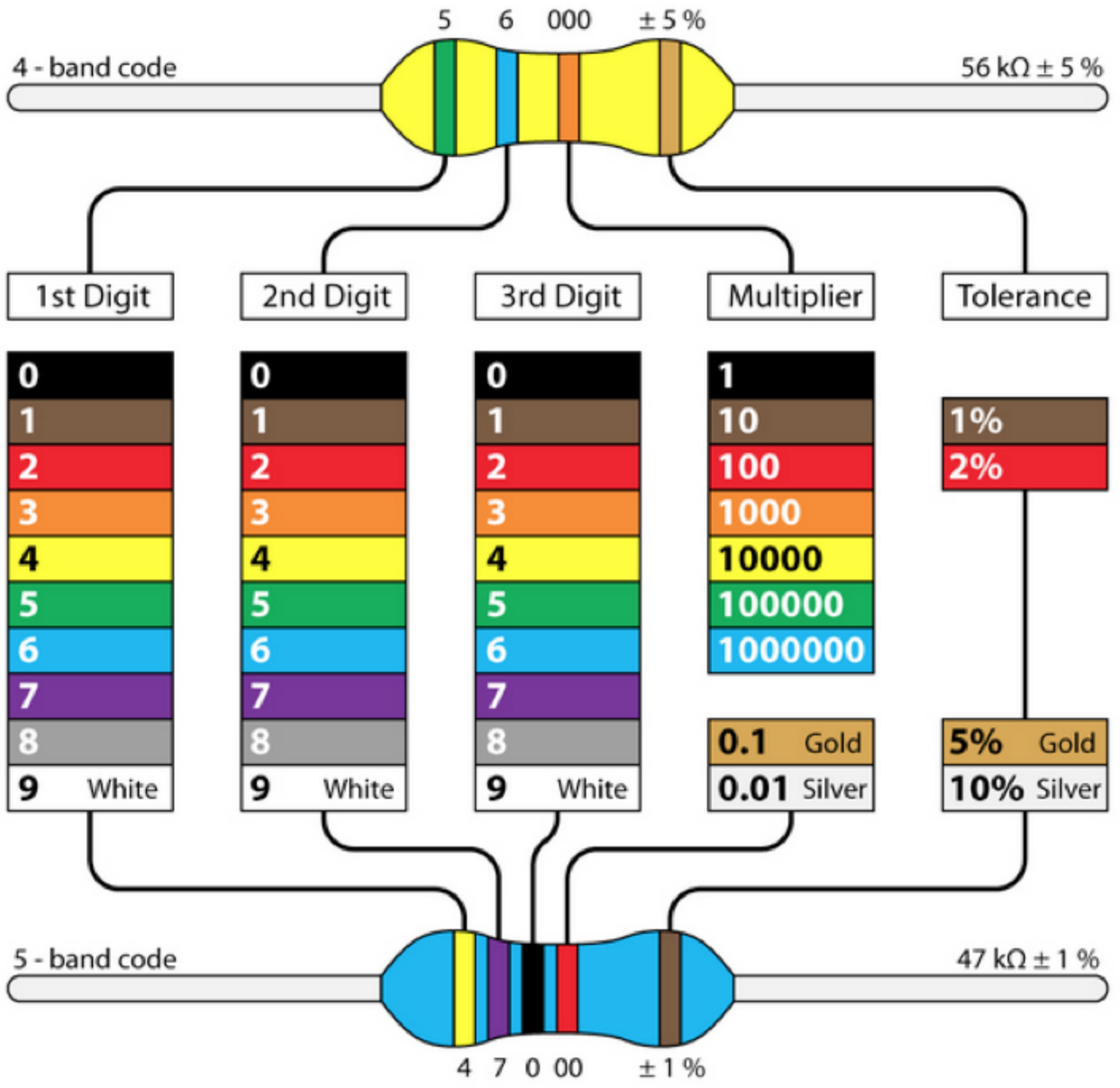
## Due Date

**Wed Sep 14th, 11:59 PM EST** for the Fusion 360 shareable link. You can iterate the design even if you have made a submission. We will grade based on the latest submission by the deadline.

**Wed Oct 5th, 3:30 PM EST in class** for the 3D printed fixture assembly. We will hand-over the class kit next week so that you can start to work with the actual sensor and the servo.

Note that the weekly assignment is usually due at midnight on the Wed of the upcoming week. For assignment 2, you will have multiple weeks to accomplish it, as you will need time to go through the iterations for your 3D printed part.

# Resistor colour code



# Analog Input & Output

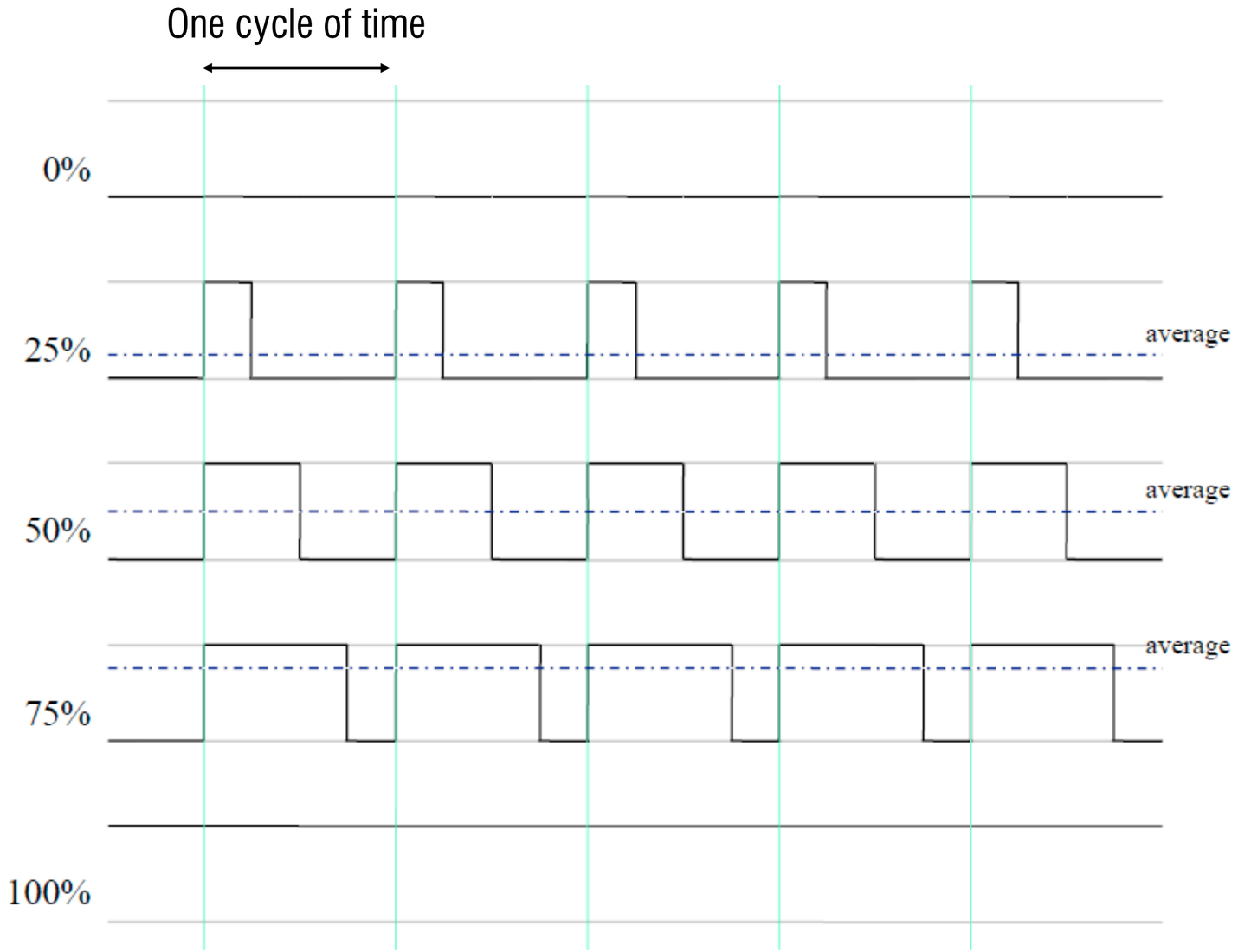
Huaishu Peng | UMD CS | Fall 2022

# Pulse Width Modulation (PWM)

A technique for getting **analog** results with **digital** means

Pausing the power supply **ON** and **OFF** at a certain **frequency**
And with a certain pause **width**

It allows us to control the light intensity, speed of the motor etc.




analogWrite() is on a scale of 0 (always off) – 255 (always on)
Pins that support PWM: 2, 4, 5, 12-19, 21-23, 27, 32, 33

Mini program 1: Breathing effect

1. Find the Red LED
2. Create a fading/breathing effect - change the LED's light intensity with analogWrite()

analogWrite() is on a scale of 0 (always off) – 255 (always on)
Pins that support PWM: 2, 4, 5, 12-19, 21-23, 27, 32, 33

**Hint:**

- Use GPIO32 to control LED

# Analog Input

# Analog Input (Analog-to-Digital Converter or ADC)

you can measure varying voltage levels between 0 V and 3.3 V – Provide us a richer understanding of the environment.


Arduino functions

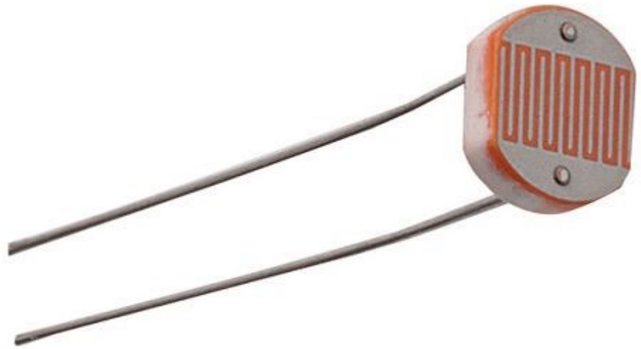
– int analogRead(pin) to read the voltage value of a pin

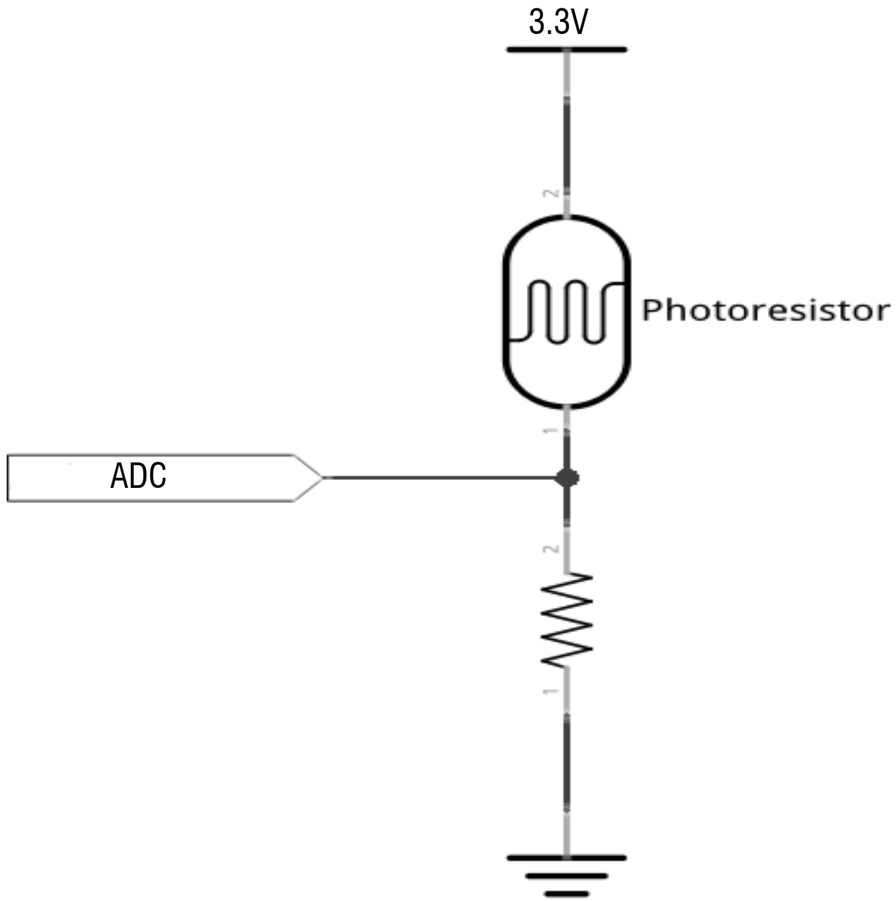
– Depending on the board you use, the Analog Pin and it's resolution may vary.

– For the ESP32 we are using: we can use up to 18 ADC channels

- *Result [0 ... 4095] with 0 → 0V and 4095 → 3.3V*

# Photoresistor

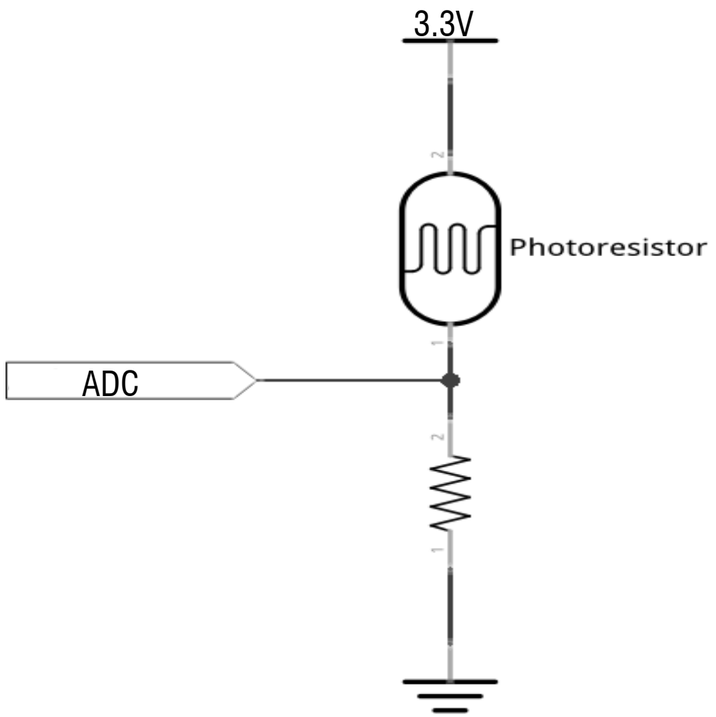




# analogRead(A0)

Mini program 2: Print the value of the photoresistor

1. Using photoresistor to sense the light intensity
2. Print out the reading at the same time




## Hint:

- Use GPIO23 as the 3.3V output
- Use GPIO36 as the ADC pin
- Use the 1M resistor as the voltage divider

Mini program 3: mapping the LED light based on the photoresistor value

1. Read the environmental light with the photoresistor
2. Convert the photoresistor value to the proper range of your LED
3. Map the LED light with the converted value, so that when you cover the photoresistor the LED gets dimmer and vise versa.

Mini program 3: mapping the LED light based on the photoresistor value

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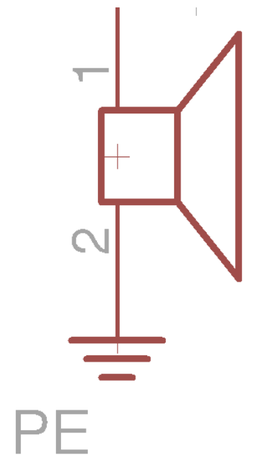
## Formatting tools

- int map(value, fromLow, fromHigh, toLow, toHigh)
  - Maps values between [fromLow, fromHigh] and [toLow, toHigh]
  - Lows can be lower than Highs
  - Does not constrain values
- constrain(x, a, b)
  - Constrains **x** to be between **a** and **b**

# Sound

Basic setting
- PWM frequency give the tone
- Pulse width give the amplitude




Arduino:
- Start a tone on a pin at a given freq. : tone(pin, frequency)
    - *tone(pin, frequency, duration)*
- Stop a tone on a pin: noTone(pin)

## Hint:

- Use GPIO16 for the buzzer
- Check the Arduino examples

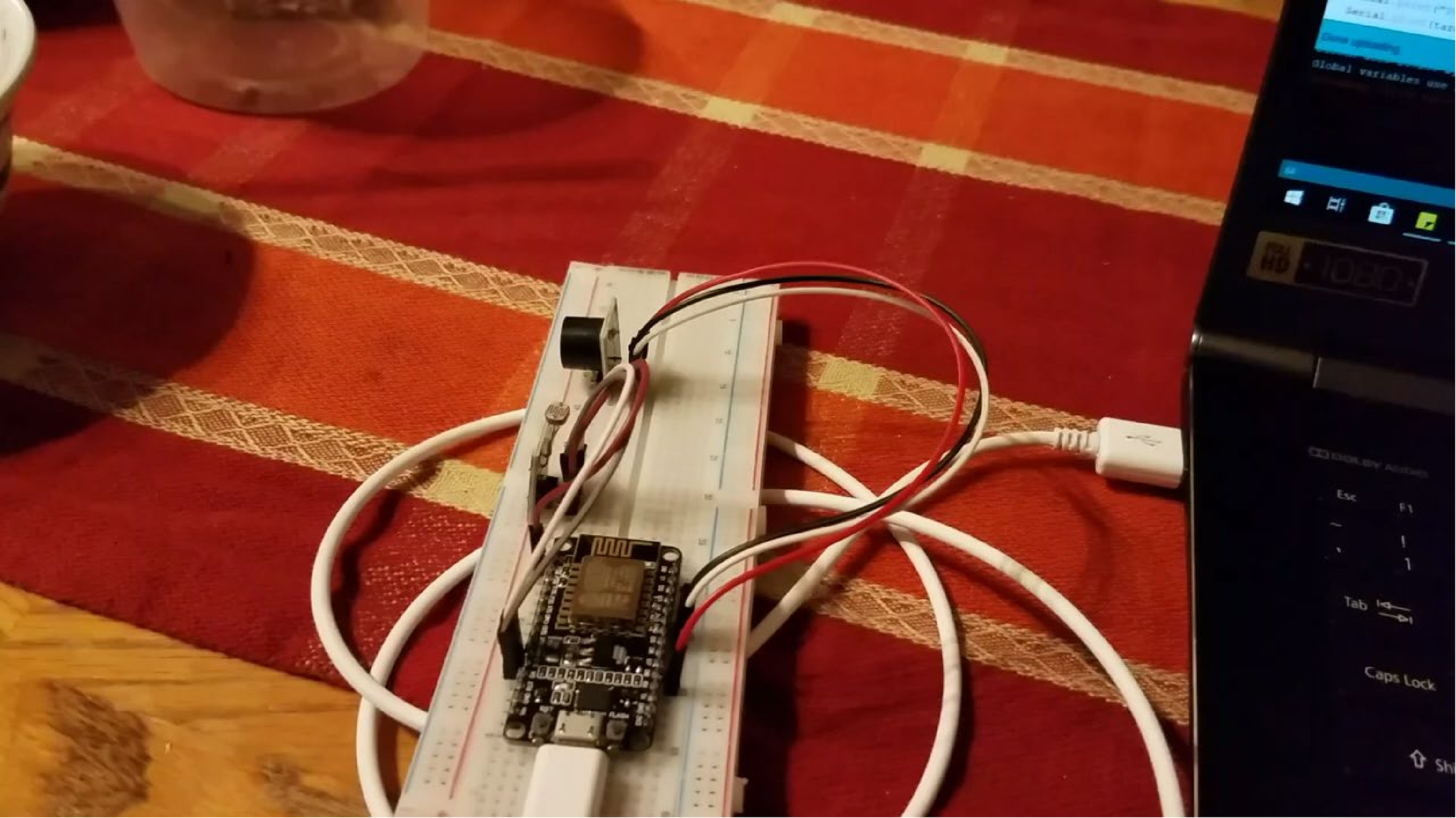
# Assignment

## Light Game

## For this assignment:

1. Generate a random number at the beginning of the game
2. The number represents the targeted ambient light intensity
3. Play a simple melody to indicate the beginning of the game
4. The player can now change the ambient light to approximate the target
5. If the number gets closer, the buzzer plays higher pitch
6. If the number gets further from the target, play the lower pitch
7. If the player reaches the target number within 10s, play a simple winning melody
8. If the player loses the game, play a different melody
9. Press a key on your keyboard to restart the game

How to play a simple melody:
https://www.arduino.cc/en/Tutorial/toneMelody


Esc
Tab
Caps Lock