

Section 1

MANE 3351

Subsection 1

Lecture 3

Classroom Management

Agenda

- GitHub Classroom Setup
- GitHub Account Creation
- Raspberry Pi Programming
- Circuits
- Laboratory Session will meet today

Subsection 2

Resources

Handouts

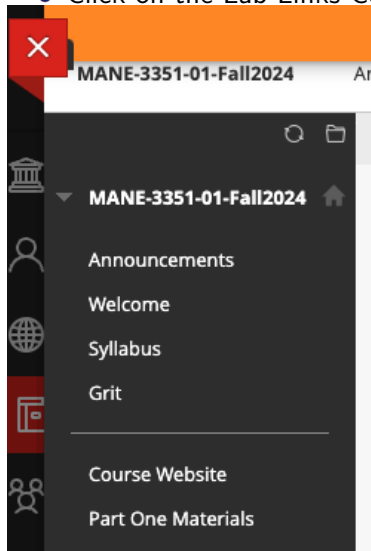
- [Lecture 3 Slides](#)
- [Lecture 3 Marked Slides](#)

Assignments

- Link personal GitHub account with GitHub Classroom

Linking GitHub Account

- Must be done once per semester
- Click on the Lab Links Content Area



Homework 0

- Click on the Homework 0 web link

The screenshot shows a web browser window. The top header is orange and contains the text 'Student' on the right. Below the header, the browser address bar shows 'MANE-3351-01-Fall2024' and 'Lab Links'. On the left, there is a dark sidebar with a navigation menu. The menu items are: 'MANE-3351-01-Fall2024' (with a home icon), 'Announcements', 'Welcome', 'Syllabus', and 'Grit'. The main content area is titled 'Lab Links' and contains a link for 'Homework 0 - Link GitHub Account'. The link is accompanied by a document icon with a chain link. Below the link, the text reads: 'Homework 0 is an ungraded assignment to link yo'.

GitHub Authorization

- Once the link is clicked, you will be asked to sign up for GitHub or verify your GitHub account if you have already logged into email on your computer (my case)
 - If you have not created a GitHub account, do so before proceeding. Notes are provided below.
 - It is recommended to use your UTRGV email but not required
 - Additional notes for creating GitHub account is provided after GitHub Classroom notes



GitHub Classroom by **GitHub** would like permission to:

 Verify your GitHub identity (mane3351f24)

 Know which resources you can access

 Act on your behalf
[Learn more](#)

GitHub Classroom

- A GitHub Classroom screen will appear allowing you to join the classroom
- Your GitHub classroom identifier is your UTRGV email account name
- Select your email address from the list
- Dr. Timmer created mane3351f24@gmail.com as his user account

GitHub Classroom

GitHub Education



Join the classroom:

MANE-3351-Fall-24





To join the GitHub Classroom for this course, please select yourself from the list below to associate your GitHub account with your school's identifier (i.e., your name, ID, or email).


Can't find your name? [Skip to the next step →](#)

Identifiers

Accept the Assignment

- A screen will appear asking you to accept the assignment
- Click on Accept this assignment

GitHub Classroom GitHub Education    

 Your account is linked to mane3351f24@gmail.com on the roster. If this is wrong, please reach out to your instructor.

MANE-3351-Fall-24

Accept the assignment —

Homework 0 - Link GitHub Account

Once you accept this assignment, you will be granted access to the `homework-0-link-github-account-mane3351f24` repository in the [utrgvqualityengineering](#) organization on GitHub.

Accept this assignment

Acceptance Confirmation

- After accepting the assignment, the following screen will appear
- Eventually, a link will be provided to the repository created using GitHub Classroom
- For Homework 0, this completes the assignment
 - In future assignments, you will have to clone the repository to your local computer and complete the assignment
 - The purpose of Homework 0 is to link your GitHub account to GitHub classroom and your UTRGV email address

GitHub Classroom

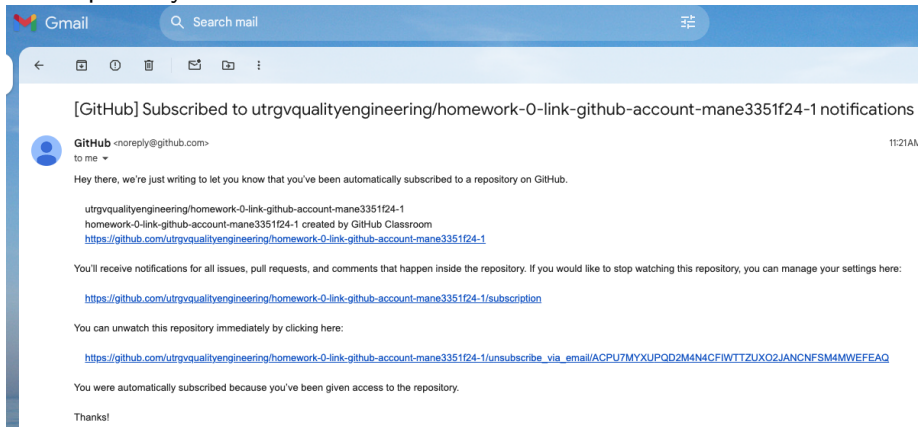
GitHub Education



You accepted the assignment, **Homework 0 - Link GitHub Account** .

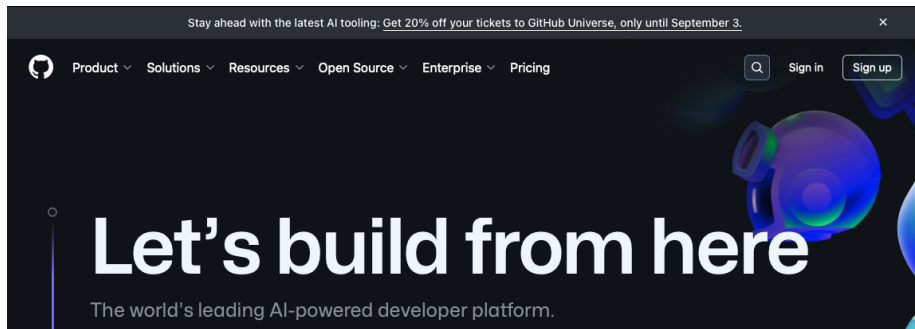
Email Confirmation

- You will receive an email confirmation that contains a link to the repository to be downloaded



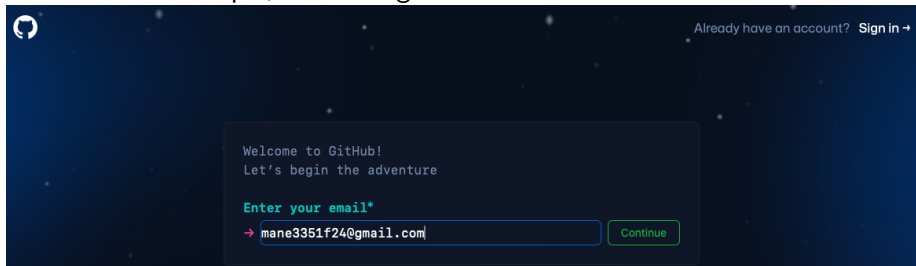
GitHub Account Creation

- Click on Sign up to create a new account



Email Entry

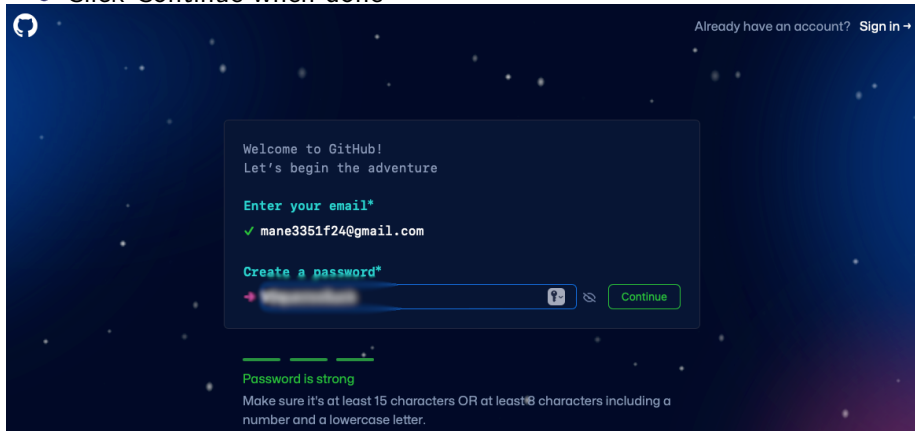
- Enter your email address (preferably UTRGV) and click continue
- For this example, I am using a Gmail account I created for the course



The screenshot shows the GitHub login interface. In the top right corner, there is a link that says "Already have an account? Sign in →". The main content area has a dark blue background with a white GitHub logo in the top left. Centered on the screen is a dark gray box containing the text "Welcome to GitHub!" and "Let's begin the adventure". Below this, it says "Enter your email*" in green. There is a text input field with a blue border containing the email address "mane3351f24@gmail.com" and a green arrow icon to its left. To the right of the input field is a green button with the text "Continue".

GitHub Account Password

- You will be asked to create a strong password
- Click Continue when done



The screenshot shows the GitHub account creation interface. At the top left is the GitHub logo. At the top right, it says "Already have an account? Sign in →". The main content area has a dark blue background with a starry pattern. A central white box contains the following text: "Welcome to GitHub! Let's begin the adventure". Below this, it says "Enter your email*" followed by "✓ mane3351f24@gmail.com". Then it says "Create a password*" followed by a password input field with a red arrow icon on the left and a visibility icon on the right. To the right of the input field is a green "Continue" button. Below the input field, there are three green bars of increasing length, followed by the text "Password is strong". At the bottom, it says "Make sure it's at least 15 characters OR at least 8 characters including a number and a lowercase letter."

Welcome to GitHub!
Let's begin the adventure

Enter your email*
✓ mane3351f24@gmail.com

Create a password*

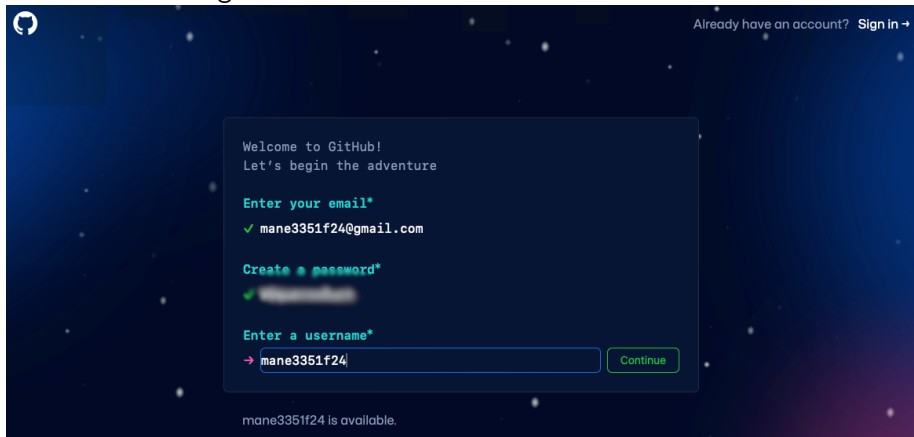
Continue

Password is strong

Make sure it's at least 15 characters OR at least 8 characters including a number and a lowercase letter.

GitHub Username

- Create a username that is available
- Your username will be incorporated into the repository name along with the assignment name



The screenshot shows the GitHub account creation interface. At the top right, there is a link "Already have an account? Sign in →". The main content area has a dark blue background with a starry pattern. A central white box contains the following text and form elements:

- "Welcome to GitHub!"
- "Let's begin the adventure"
- "Enter your email*" followed by a green checkmark and the email "mane3351f24@gmail.com".
- "Create a password*" followed by a green checkmark and a blurred password field.
- "Enter a username*" followed by a red arrow icon, a text input field containing "mane3351f24", and a green "Continue" button.

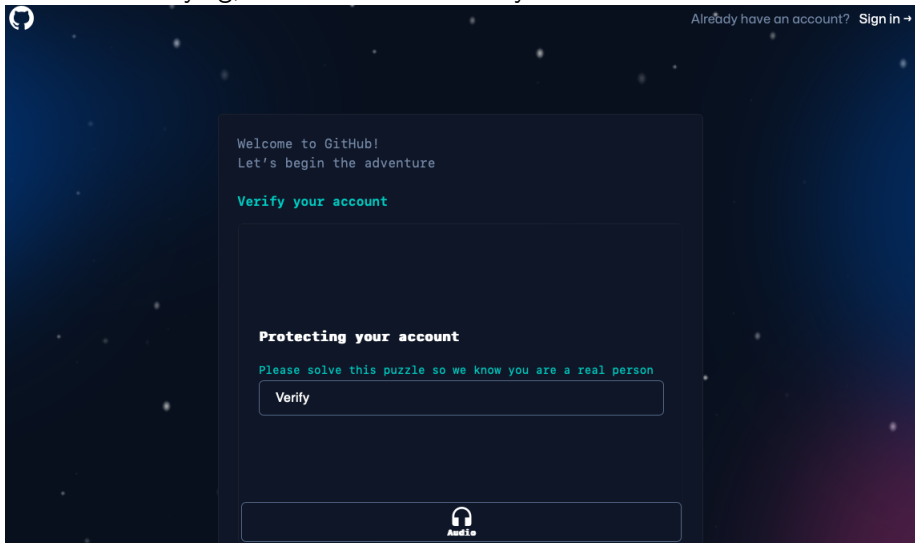
At the bottom of the white box, it says "mane3351f24 is available."

GitHub Email Preferences

- you will be provided an opportunity to sign-up to receive occasional product updates and announcement.
- Signing up for email updates is optional
- No screen capture is provided of this step

GitHub Verify Account

- You will be prompted to verify your account by solving a puzzle
- After verifying, a code will be sent to your email account that is needed



What is a Circuit?

- A circuit is a loop through which current can flow
- A power source, such as a battery, provides the energy for the circuit to work
- Electrons flow from the negative side of the power source, through the circuit and back to the positive side of the power source
- Once the electrons return to the power source, the circuit is complete
- View example at web site

Source

Components of a Circuit

Circuits consist of three parts:

- **Voltage Source:** this provides the electrons that flow through the circuit in order to power it. Common voltage sources are batteries and electrical connections such as outlets,
- **Load:** this consumes the power created by the voltage source. Loads are what make a circuit light up, make noise, run a program and more. In simple circuits, the load may be a single light bulb, but in more complex circuits, the load may be made up of a combination of resistors, capacitors, light bulbs, buzzers and more,
- **Conductive Path:** this is the route the current follows through the circuit. It must be made of conductive materials in order to allow electricity to flow. The path starts at the voltage source, travels through the load and returns to the voltage source. In order to create a closed circuit, this path must form a loop

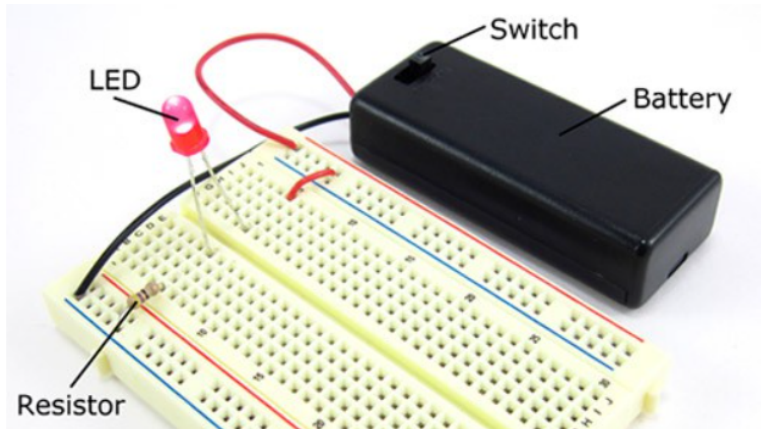
An open circuit is one in which there is an interruption in the loop. The

Short Circuits

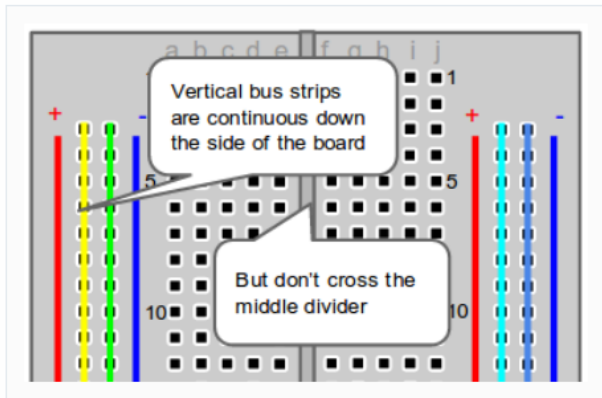
- When the conductive path of a circuit connects directly from one end of the voltage source to the other without first powering a load, the result is a short circuit
- Current flows everywhere it can, and if it can find a shorter path, it will take it. This is why conductive wires are coated in an insulator - to prevent accidental short-circuiting through wires touching.
- Short circuits can be very dangerous and cause wires to burn up, damage the power supply, drain the battery, start a fire and more. Most of the time your power supply will have some sort of safety mechanism built into it to limit the maximum current in the event of a short circuit, but not always. This is the reason all homes and buildings have circuit breakers, to prevent fires from starting in the event of a short circuit somewhere in the wiring. If you notice a part of your circuit suddenly becoming hot or a part suddenly burns out, immediately turn off the power and look for possible short circuits
- It is important to note that current does not limit itself to choosing

Breadboard

- A breadboard is a rectangular plastic board with a bunch of tiny holes in it
- These holes let you easily insert electronic components to **prototype**
- See illustration below



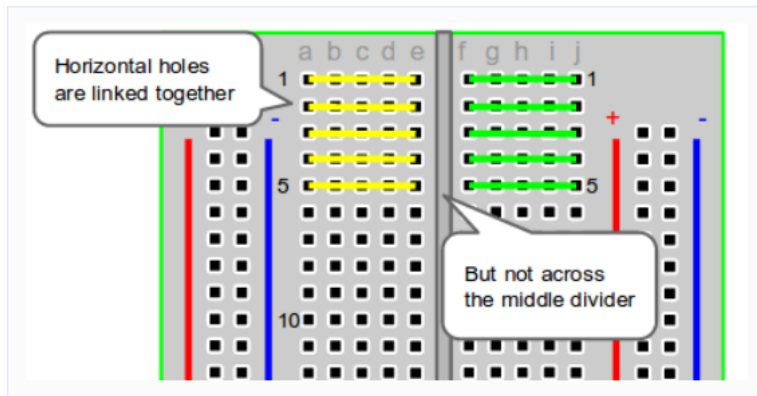
Breadboard Columns



Vertical columns on the side of the breadboard are for power and ground.

Figure 2: Columns

Breadboard Rows



You can see that the horizontal rows are connected on the inside.

Source

Breadboard Demonstration

- Simple circuit: LED

Ohm's Law

Defines the relationship between three quantities: voltage (V), current (I) and resistance (R)

$$V = IR$$

$$I = \frac{V}{R}$$

$$R = \frac{V}{I}$$

Units

- Voltage measured in volts
- Resistance is measured in ohms
- Current is measured in amperage

Resistor Color Codes



Figure 1 : 470 Ohms 10% Resistor

| Color | Color | 1st Band | 2nd Band | 3rd Band Multiplier | 4th Band Tolerance |
|--------|-------|----------|----------|---------------------|--------------------|
| Black | | 0 | 0 | x1 Ω | |
| Brown | | 1 | 1 | x10 Ω | $\pm 1\%$ |
| Red | | 2 | 2 | x100 Ω | $\pm 2\%$ |
| Orange | | 3 | 3 | x1k Ω | |
| Yellow | | 4 | 4 | x10k Ω | |
| Green | | 5 | 5 | x100k Ω | $\pm 0.5\%$ |
| Blue | | 6 | 6 | x1M Ω | $\pm 0.25\%$ |
| Violet | | 7 | 7 | x10M Ω | $\pm 0.10\%$ |
| Grey | | 8 | 8 | x100M Ω | $\pm 0.05\%$ |
| White | | 9 | 9 | x1G Ω | |
| Gold | | | | x0.1 Ω | $\pm 5\%$ |
| Silver | | | | x0.01 Ω | $\pm 10\%$ |

Breadboard Demonstration 2

- What happens when we change resistors in the circuit?
- Does your observation agree with Ohm's Law?

Raspberry Pi GPIO Pins

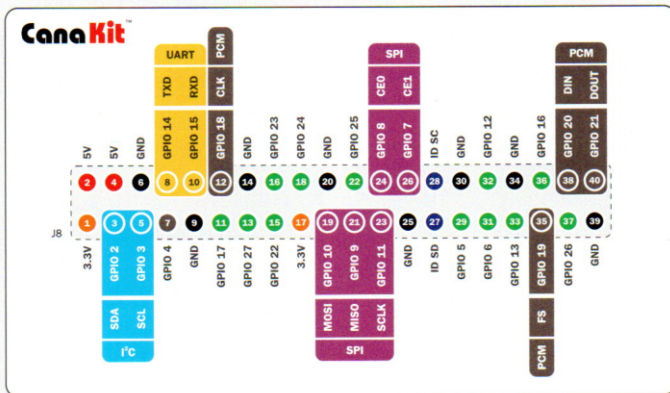
- GPIO pins are digital: on or off
- GPIO pins can receive (input) current or send (output) current
- Operating voltage of the GPIO pins is 3.3 V
- Used for low current applications, not powering motor
- GPIO pins are programmable using Python, JavaScript, non-RED, etc.
- Other types of pins will not be considered

Source

Raspberry Pi Pin Assignments

GPIO REFERENCE

Use the guide below to easily identify each of the 40-pins of the GPIO port.

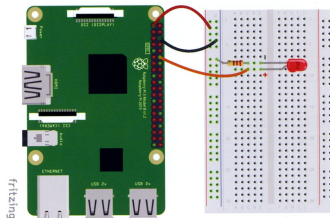


Blinking an LED Demonstration

BLINKING AN LED

To blink an LED, use three male-to-female jumper wires and a 220 Ohm resistor (red, red, brown) to connect the LED to the GPIO port as shown below.

Note that it is important for the LED to be connected with correct polarity or it will not light up and you may damage the LED. The longer leg of an LED is called the Anode (+) and the shorter leg is called the Cathode (-). In this example, the shorter leg (Cathode) is to be connected to the resistor.



```
import RPi.GPIO as GPIO
import time

GPIO.setwarnings(False)
GPIO.setmode(GPIO.BCM)
GPIO.setup(18, GPIO.OUT)

while True:
    GPIO.output(18, True)
    time.sleep(1)
    GPIO.output(18, False)
```

Blinking an LED Code

```
import RPi.GPIO as GPIO
import time

GPIO.setwarnings(False)
GPIO.setmode(GPIO.BCM)
GPIO.setup(18, GPIO.OUT)

while True:
    GPIO.output(18, True)
    time.sleep(1)
    GPIO.output(18, False)
    time.sleep(1)
```

Raspberry Pi Demonstration

- ① Circuit construction
- ② Connecting circuit to Raspberry Pi
- ③ Python programming
- ④ Blinking an LED demonstration
- ⑤ Can anyone identify the unused connector in the circuit?

Raspberry Pi demonstrations will be recorded using a HD Video Capture box typically used for recording computer games.