

## Section 1

MANE 3351

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## 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

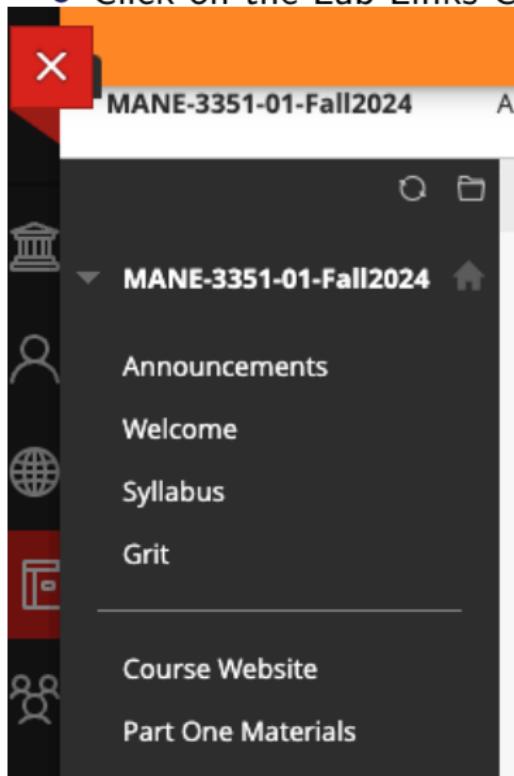
- Lecture 3 Slides
- Lecture 3 Marked Slides

# Assignments

- Link personal GitHub account with GitHub Classroom

## Linking GitHub Account

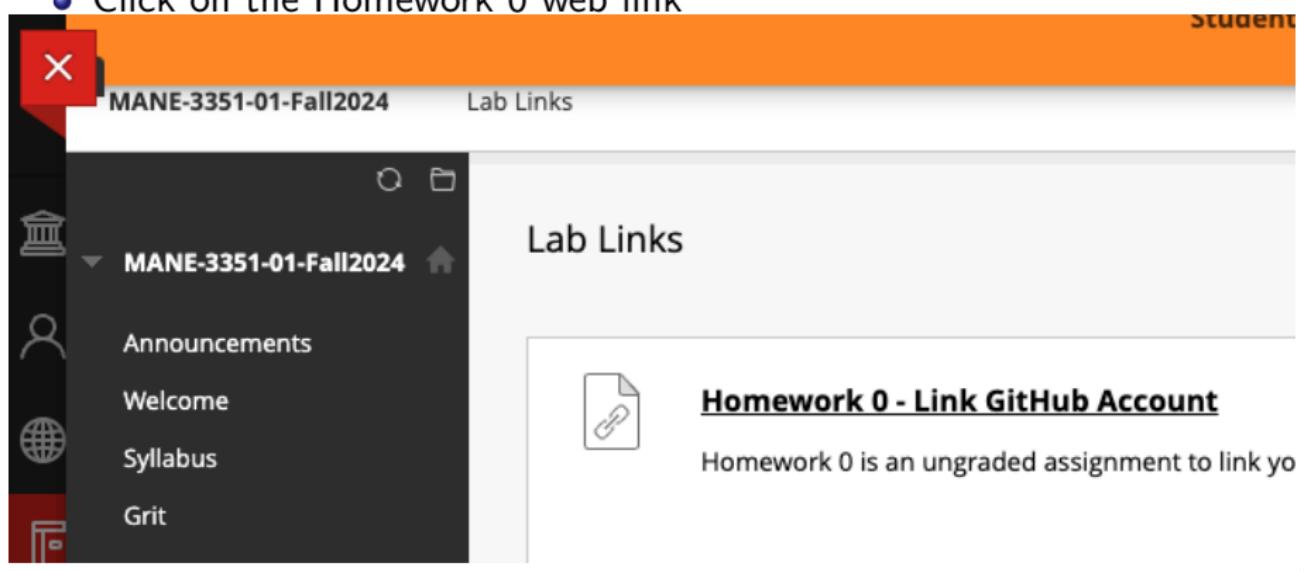
- Must be done once per semester
- Click on the Lab Links Content Area



The image is a screenshot of a learning management system (LMS) interface. At the top, there is a red header bar with the text "MANE-3351-01-Fall2024" and "Ar". Below the header is a navigation bar with several icons: a red square with a white 'X', a magnifying glass, a folder, a person, a building, and a red square with a white square icon. The main content area shows a course structure. A dropdown menu is open under the course name "MANE-3351-01-Fall2024", listing "Announcements", "Welcome", "Syllabus", and "Grit". Below this is a horizontal line, followed by "Course Website" and "Part One Materials".

## Homework 0

- Click on the Homework 0 web link



The screenshot shows a learning management system interface. At the top, there is a red header bar with the text "MANE 3351" and "Resources". Below this is an orange navigation bar with the text "MANE-3351-01-Fall2024" and "Lab Links". The main content area has a dark grey sidebar on the left with icons for announcements, syllabus, and grit. The main content area displays a "Lab Links" section with a sub-section for "MANE-3351-01-Fall2024". This section includes a "Homework 0 - Link GitHub Account" link with a clipboard icon, and a note that it is an ungraded assignment to link to GitHub.

MANE-3351-01-Fall2024

Lab Links

MANE-3351-01-Fall2024

Announcements

Welcome

Syllabus

Grit

Lab Links

[Homework 0 - Link GitHub Account](#)

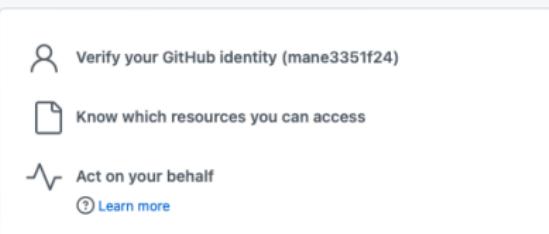
Homework 0 is an ungraded assignment to link yo

## 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:



## 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



Join the classroom:  
**MANE-3351-Fall-24**

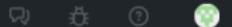
To join the GitHub Classroom for this course, please select yourself from the list below to associate your GitHub account with your school's identifier (i.e., your name, ID, or email).

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.

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[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**

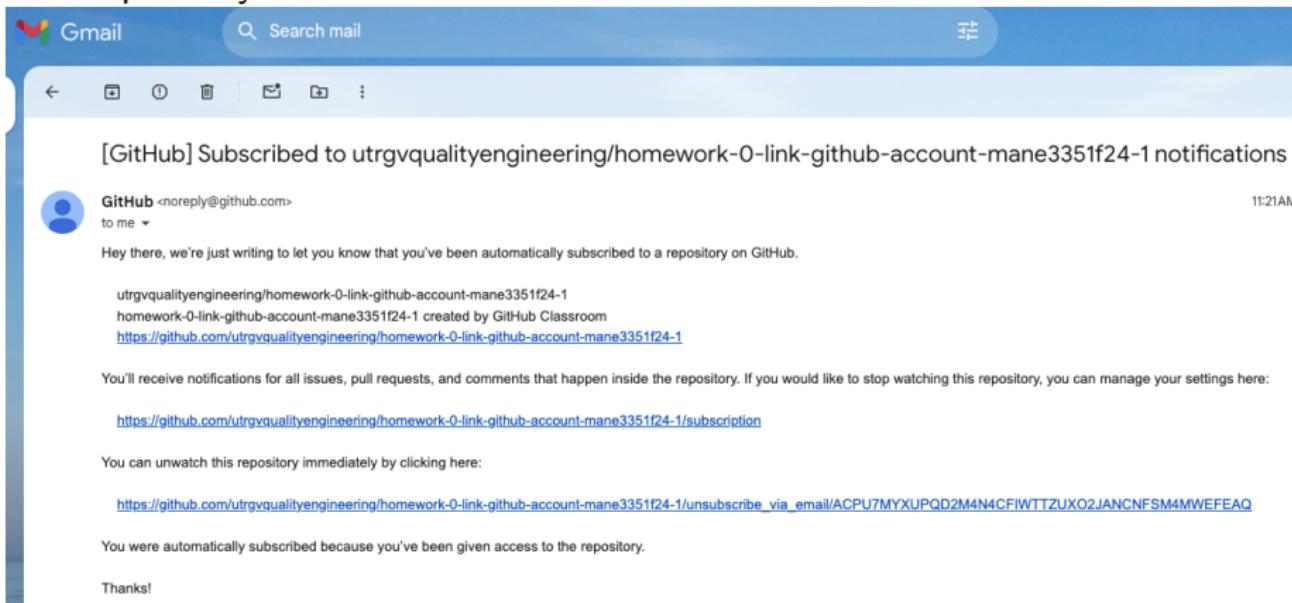
GitHub Education



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



The screenshot shows a Gmail inbox with a single email from GitHub. The email subject is "[GitHub] Subscribed to utrvqqualityengineering/homework-0-link-github-account-mane3351f24-1 notifications". The email body contains a message from GitHub, a link to the repository, and instructions for managing notifications and unsubscribing.

[GitHub] Subscribed to utrvqqualityengineering/homework-0-link-github-account-mane3351f24-1 notifications

GitHub <noreply@github.com>  
to me ▾ 11:21AM

Hey there, we're just writing to let you know that you've been automatically subscribed to a repository on GitHub.

utrvqqualityengineering/homework-0-link-github-account-mane3351f24-1  
homework-0-link-github-account-mane3351f24-1 created by GitHub Classroom  
<https://github.com/utrvqqualityengineering/homework-0-link-github-account-mane3351f24-1>

You'll receive notifications for all issues, pull requests, and comments that happen inside the repository. If you would like to stop watching this repository, you can manage your settings here:  
<https://github.com/utrvqqualityengineering/homework-0-link-github-account-mane3351f24-1/subscription>

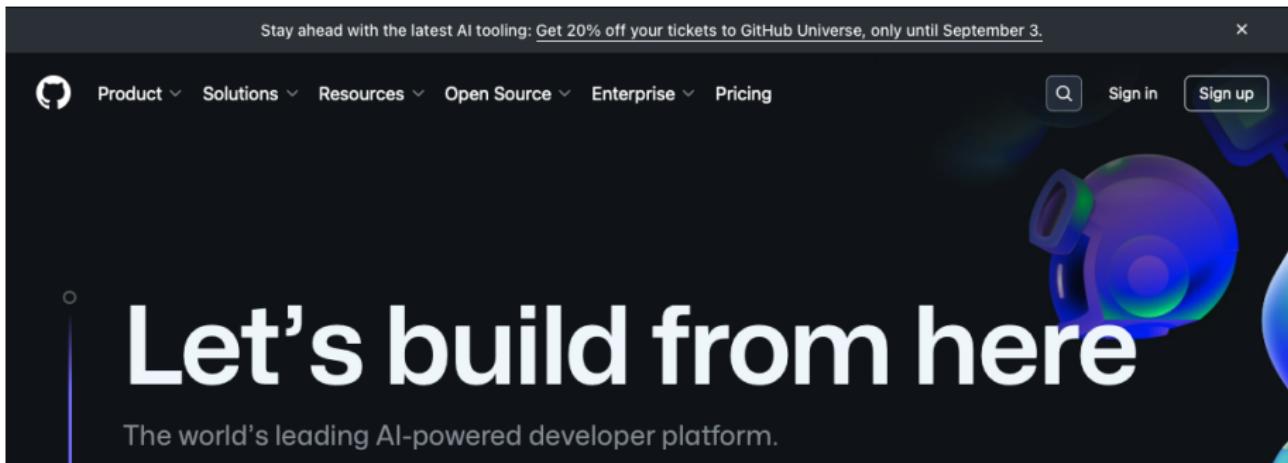
You can unwatch this repository immediately by clicking here:  
[https://github.com/utrvqqualityengineering/homework-0-link-github-account-mane3351f24-1/unsubscribe\\_via\\_email/ACPU7MYXUPQD2M4N4CFIWTZUXO2JANCNFSM4MWEFEAQ](https://github.com/utrvqqualityengineering/homework-0-link-github-account-mane3351f24-1/unsubscribe_via_email/ACPU7MYXUPQD2M4N4CFIWTZUXO2JANCNFSM4MWEFEAQ)

You were automatically subscribed because you've been given access to the repository.

Thanks!

# GitHub Account Creation

- Click on Sign up to create a new account



Stay ahead with the latest AI tooling: [Get 20% off your tickets to GitHub Universe, only until September 3.](#) X

[!\[\]\(2dd3b6633bbbee43053b4f98ac51508a\_img.jpg\) Product](#) [!\[\]\(e7f815ea6376abce63d24a8d1dac9634\_img.jpg\) Solutions](#) [!\[\]\(fb7549290c822c52c0013b95db06ac7b\_img.jpg\) Resources](#) [!\[\]\(1c76d5d40303018e38b7231548f6aa6b\_img.jpg\) Open Source](#) [!\[\]\(6e5e88e1a7189eecabc9c98767c3cf06\_img.jpg\) Enterprise](#) [Pricing](#)

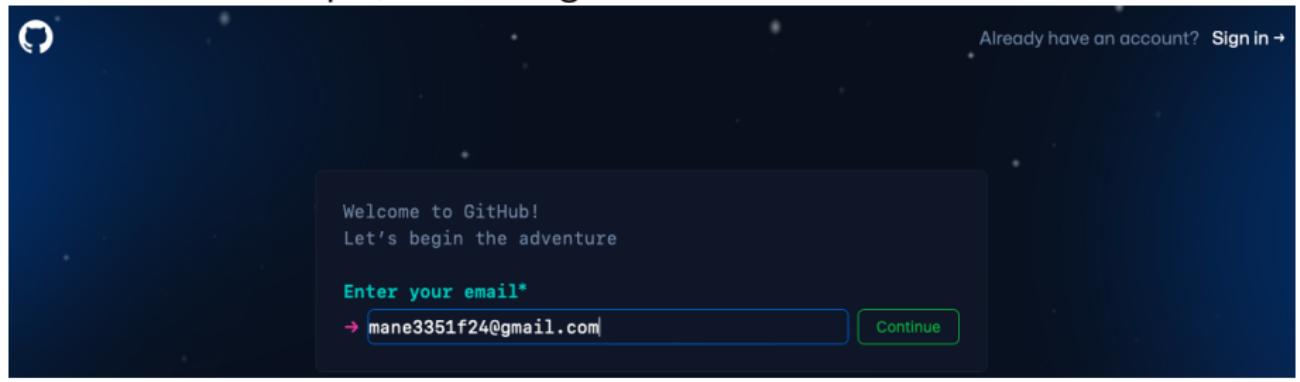
[!\[\]\(f201517cf5de5569b27ea603c4776741\_img.jpg\) Sign in](#) [!\[\]\(4af18d6512e016e1bd64336b23a8f83c\_img.jpg\) Sign up](#)

# Let's build from here

The world's leading AI-powered developer platform.

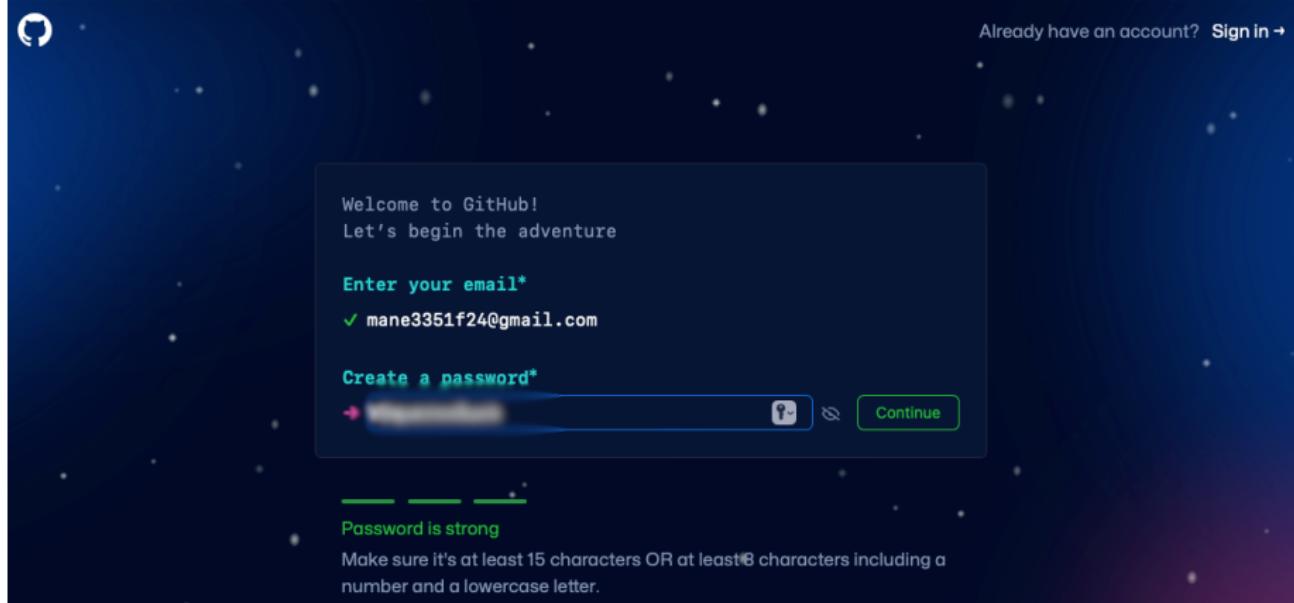
## Email Entry

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



## GitHub Account Password

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



The screenshot shows the GitHub account creation process. A modal window is open, prompting the user to enter their email and create a password. The email field is filled with "mane3351f24@gmail.com". The password field is partially obscured by a red redaction box. Below the password field are three green progress bars. A green success message states "Password is strong". At the bottom of the modal, a note says "Make sure it's at least 15 characters OR at least 8 characters including a number and a lowercase letter." The background of the modal is white, while the rest of the screen is dark blue.

Already have an account? [Sign in](#) →

Welcome to GitHub!  
Let's begin the adventure

Enter your email\*

✓ mane3351f24@gmail.com

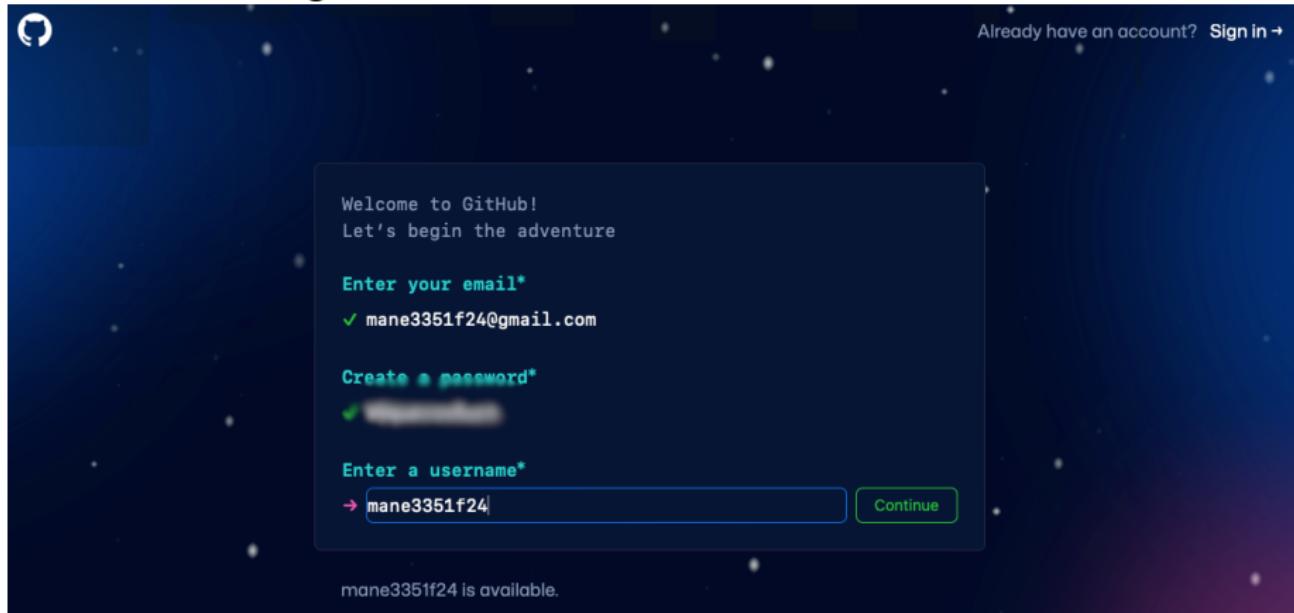
Create a password\*

>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



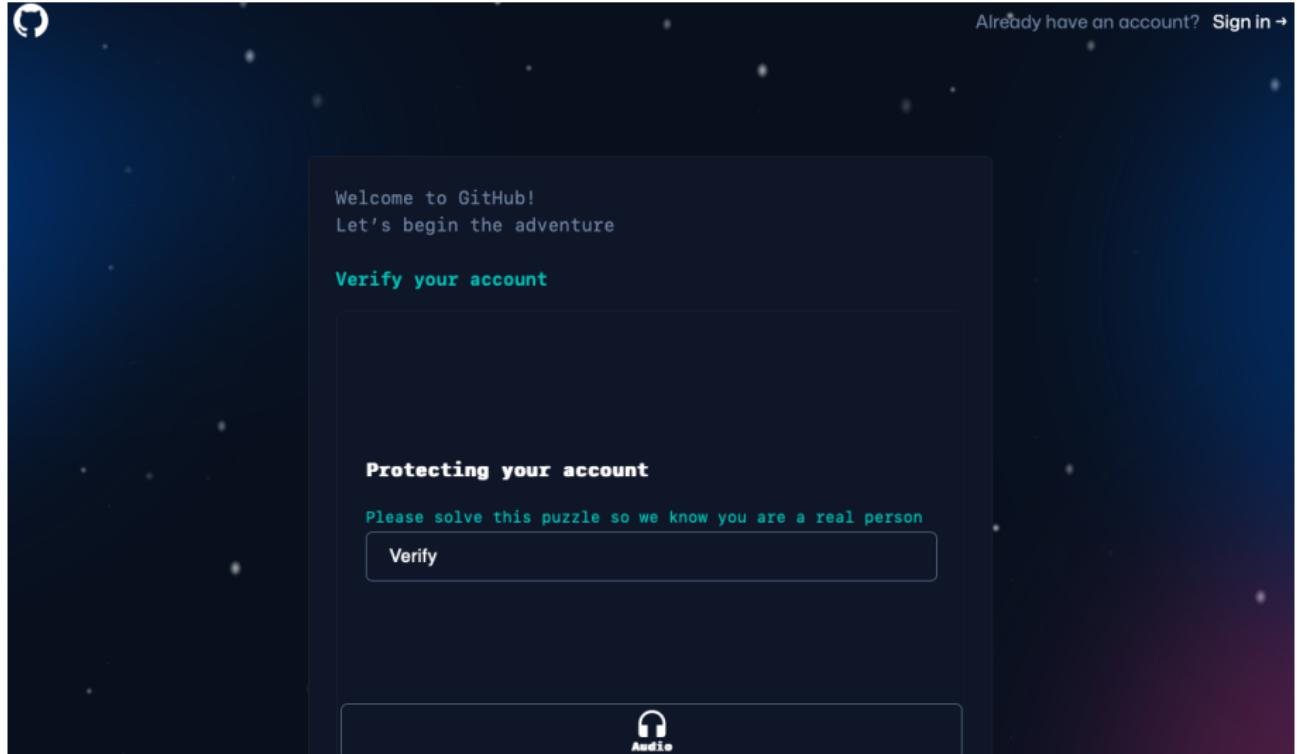
The screenshot shows the GitHub sign-up interface. At the top right, there is a "Sign in" link. The main area displays a "Welcome to GitHub!" message and a "Let's begin the adventure" call-to-action. Below this, there are fields for "Enter your email\*" with a green checkmark and the value "mane3351f24@gmail.com". There is also a "Create a password\*" field with a blurred value. The final field is "Enter a username\*", which contains the value "mane3351f24". To the right of this input field is a "Continue" button. Below the input fields, a message states "mane3351f24 is available." The entire process is set against a dark blue background with a GitHub logo icon on the left.

## 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



The screenshot shows the GitHub Verify Account page. At the top, there is a navigation bar with the GitHub logo, a search bar, and links for "Create a new repository" and "Sign in". Below the navigation bar, there is a "Welcome to GitHub!" message and a "Let's begin the adventure" button. A large, prominent "Verify your account" button is centered on the page. Below this button, there is a "Protecting your account" section with a "Please solve this puzzle so we know you are a real person" message and a "Verify" button. At the bottom of the page, there is an "Audio" button with a headphones icon.

Welcome to GitHub!  
Let's begin the adventure

**Verify your account**

**Protecting your account**

Please solve this puzzle so we know you are a real person

Verify

Audio

# 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

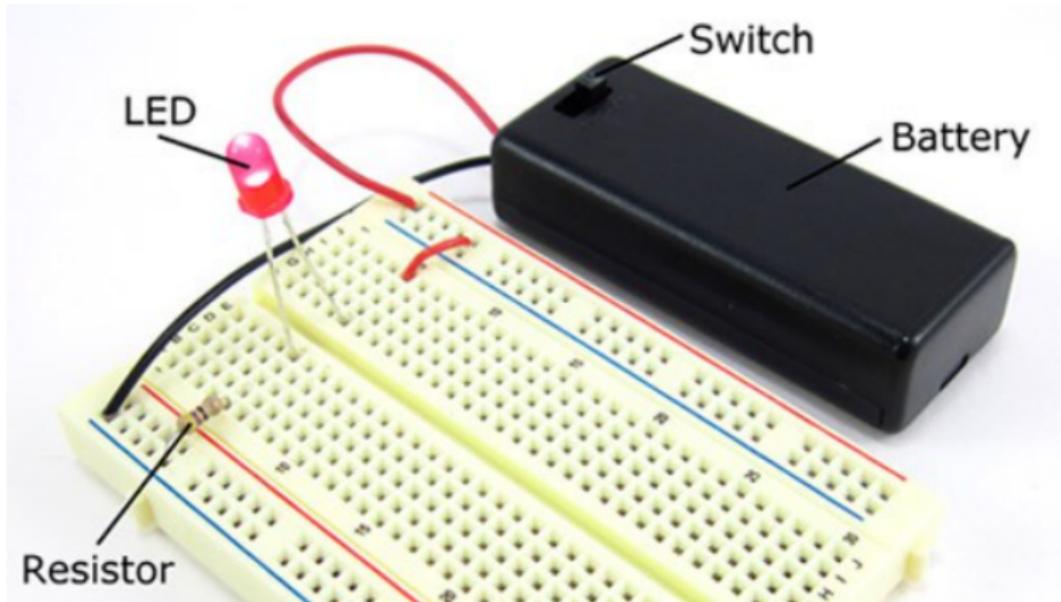
An open circuit is one in which there is an interruption in the loop. The

# Short Circuits

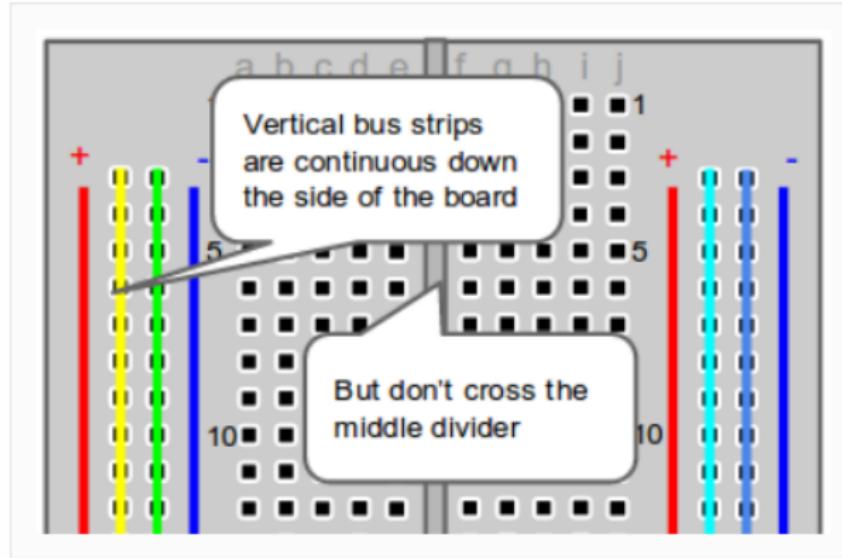
- When the conductive path of a circuit connects directly from one end of the voltage source to the other without first powering a load, the result is a short circuit
- Current flows everywhere it can, and if it can find a shorter path, it will take it. This is why conductive wires are coated in an insulator - 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



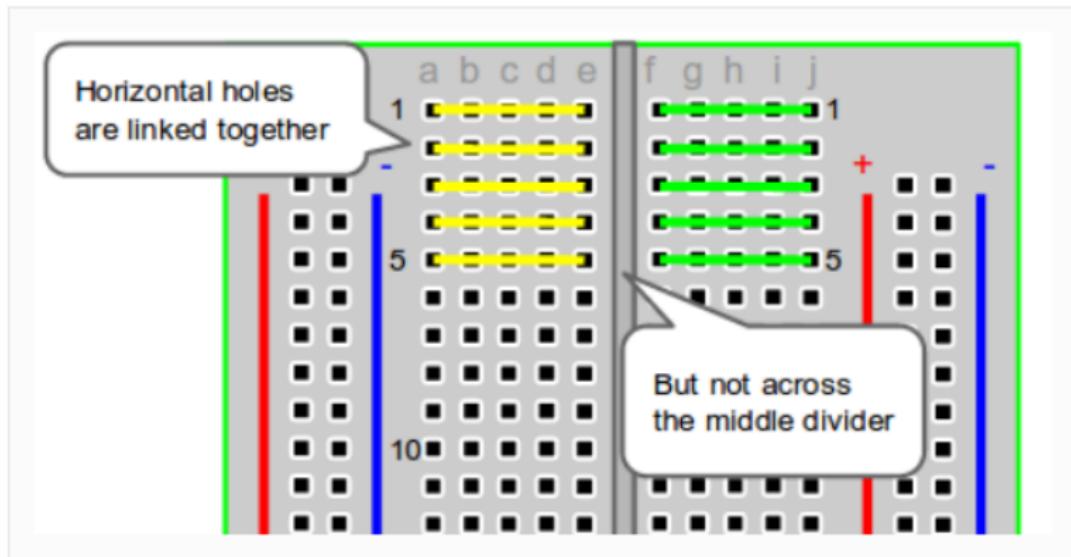
# Breadboard Columns



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	$\times 1\Omega$	
Brown		1	1	$\times 10\Omega$	$\pm 1\%$
Red		2	2	$\times 100\Omega$	$\pm 2\%$
Orange		3	3	$\times 1k\Omega$	
Yellow		4	4	$\times 10k\Omega$	
Green		5	5	$\times 100k\Omega$	$\pm 0.5\%$
Blue		6	6	$\times 1M\Omega$	$\pm 0.25\%$
Violet		7	7	$\times 10M\Omega$	$\pm 0.10\%$
Grey		8	8	$\times 100M\Omega$	$\pm 0.05\%$
White		9	9	$\times 1G\Omega$	
Gold				$\times 0.1\Omega$	$\pm 5\%$
Sil				$\times 0.01\Omega$	$\pm 10\%$

# 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.

**CanaKit™**

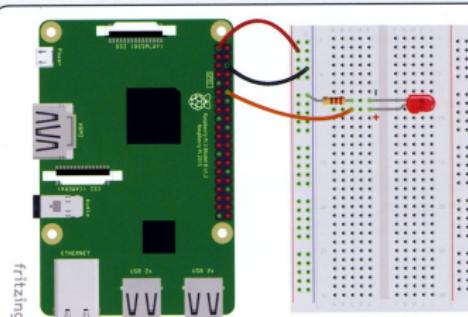


# Blinking an LED Demonstration

## 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.