TEXAS A&M UNIVERSITY

ROBOTICS TEAM & LEADERSHIP EXPERIENCE

Introduction

TURTLE Hatchling

What is Hatchling?

An introduction to foundational technical, soft, and engineering skills that culminates in an internal competition project

Historic Success

Hatchling formed in Fall 2015.

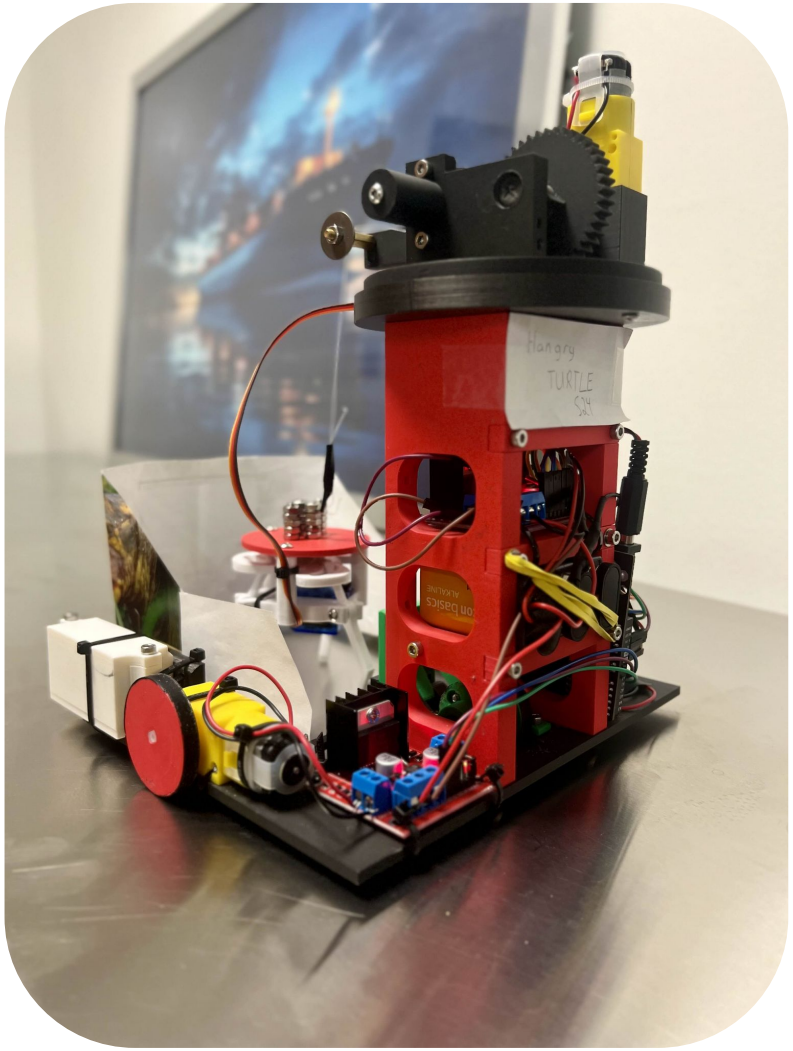
Over the past two years, participant roles currently include:

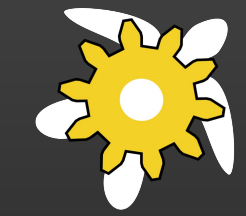
- Engineering student org officers
- Project team leads
- Project sub-team leads
- Solidworks certified (CSWA and CSWP)
- Research and Internship positions

All within two semesters of completing Hatchling!!

It is an OPPORTUNITY to …

- Learn about engineering
- Get hands-on experience
- Showcase Abilities
- Develop…
  - Technical Skills
  - Critical Thinking
  - Problem Solving
  - Friendships





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Organizations

TURTLE

Texas A&M University Robotics Team and Leadership Experience

The oldest active robotics org at TAMU

Founded in 2013

300+ Active members

21 Student Led Projects

Mission:

To develop the next generation of leaders through hands on robotics projects, competitions, and community service opportunities.

Learning Objectives

- **SolidWorks (CAD) Competency :**
  - Design custom parts and modify assemblies
  - Reading and designing around manufacturing constraints
- **Electronics**
  - Evaluating hardware specifications and datasheets
  - Circuit design and implementation
- **Programming**
  - Utilize Git/GitHub
  - Control hardware via a microcontroller
  - Python and C++
- **Manufacturing**
  - Soldering and crimping
  - Additive manufacturing
- **Problem Solving and Critical Thinking**
  - Teams go through the design process from concept creation to testing

Schedule

Week 1: Introduction
Week 2: SolidWorks (CAD) Foundation
Week 3: SolidWorks 3D
Week 4: Tools, Project, and Process
Week 5: Design Review and C++
Week 6: SolidWorks Assembly
Week 7: Programming and Git/GitHub
Week 8: Electronics and Soldering
Week 9: Prototype Week
Week 10: Build Week

3 meetings a week

- Wednesday: 6 - 8 PM
- Thursday: 6 - 8 PM
- Friday: 4 - 6 PM

Attend at least one meeting a week. If there is a conflict, let an officer know.

Information will be the same across meetings, however, feel free to attend more than one. Slides are posted on the website.

Note: Weeks with project milestones are in orange

Doing some math

Hatchling Directors are volunteers. What we get out of this is the ability to meet y'all and help you become the most knowledgeable version of yourself. Unfortunately **time** is the limiting factor.

Meeting hours = 10 weeks * 2 hours = 20 hours

Tip: To get the most out of this opportunity, dedicate an extra 1-2 hours a week to learn more about the topic.

Ohh and listen to the old phrase “Ask questions”

Another Note: TURTLE

- Our capacity for Hatchling is 120 people
  - Priority goes to new members
  - Do **NOT** expect spots to be available for repeating members next semester

- <u>Advanced Projects are not guaranteed for Hatchling graduates</u>
  - Every Advanced Project lead determines their own team
    - Selection is based on the needs of the project
  - Most will look for the Hatchling project on your resume
    - Do NOT lie about Hatchling
    - A lot will check if you finished a Hatchling robot
  - If you are interested in a certain project, contact the project lead and learn more about what skills they are looking for

General Lab Rules

- An officer must be present in the lab at all times while the lab is in use.
- Any behavior deemed disrespectful or inappropriate can result in disciplinary action or a request to vacate
- During a project's reserved lab time, the project lead may ask anyone to leave the lab for any reason.
- Project tasks always have priority over personal or school projects when it comes to lab tools and space.
- **Misuse or unsafe lab practice will result in the revoking of privilege**s.
- If you need training or supervision for a tool and cannot receive it from those present, send an @Officer in the
- If at any time, common sense would defy any of the rules detailed in this document, ask an officer for help.

Note: Refer to your organization's rules

General Lab Rules

While in the lab, your safety is first and foremost your own responsibility. You are surrounded by resources and experienced people who can help you use them. If you are at any point unsure of what you are doing, ask. If you feel unsafe with a tool, stop what you are doing immediately and do not resume work until you have received clarification.

Tools Requiring Training:

- Angle Grinder
- Dremel
- Drill Press
- Hand Drill
- Impact Driver
- Jig Saw
- Power Supply
- Printer (3D)
- Soldering Iron

Tools that require Supervision:

- Angle Grinder
- Dremel

Safety Gear

- PPE is required for all tools listed in the training section excluding the 3D printers. Proper PPE includes: closed toe shoes, bottoms that cover to the lower leg, a sleeved shirt, and safety glasses. All loose items and hair must also be properly secured up and out of the way.

Trainings

- Any individual may be trained by an officer. This training is tool specific and is not all encompassing.

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Officer Introductions

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Icebreakers!

Name and Fact

Talker: Say your name and one fun fact about yourself
Everybody: Raise your hand if the fact applies to you

After everyone has finished, form groups of 3-4 people.
Label yourself 1 through 3 or 4

30 Second Sales Pitch

In your group, sell your item in 30 seconds

#1 Spork

#2 Candle Lamp

#3 Dehydrated Water

#4 Pen

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Program Installation yay!

*Always recommend bringing a mouse

SolidWorks

Two options

Texas A&M students have free access to SolidWorks Student Premium through the Software Center. **Recommended**

https://software.tamu.edu/

DO NOT INSTALL IN ONEDRIVE

DO NOT INSTALL IN ONEDRIVE

The software can also be accessed through the Virtual Open Access Lab (VOAL) which can be used without downloading SolidWorks.

For Mac users [Omissa Horizon Clients]

and

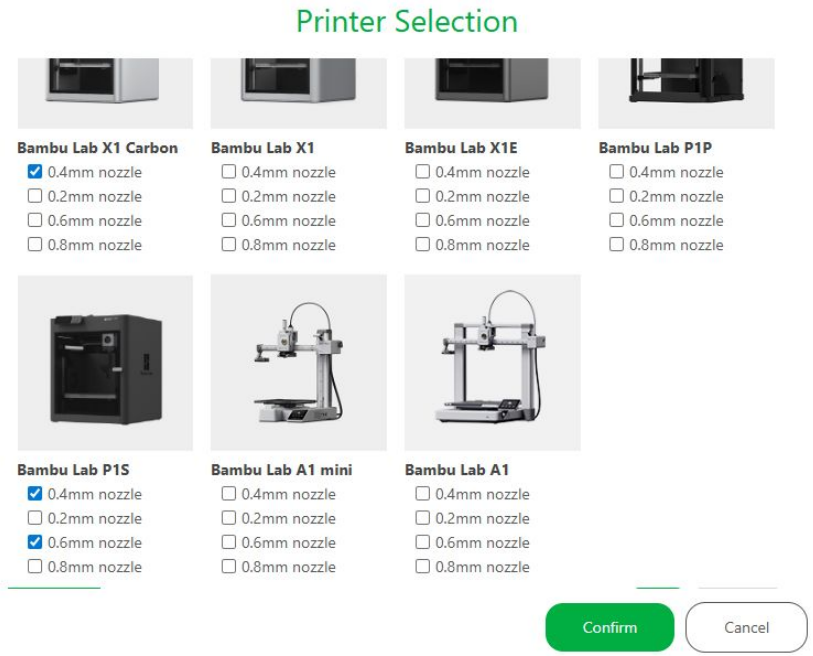
People who are currently installing SolidWorks

https://voal.tamu.edu/

Note: SolidWorks is the recommended software for TURTLE Advanced Projects. Please try to utilize SolidWorks, however, other CAD platforms may be accommodated.

Bambu Labs Slicer

Slicer programs for 3D-Printing all function very similarly (Most are forks of Slic3r, Cura, or Simplify3D). This setup will depend on the brand, type of printers, and filaments available



Most common filaments are:

1. PLA - Polylactic acid
2. PETG - Polyethylene terephthalate glycol

https://bambulab.com/en-us/download/studio

VS Code

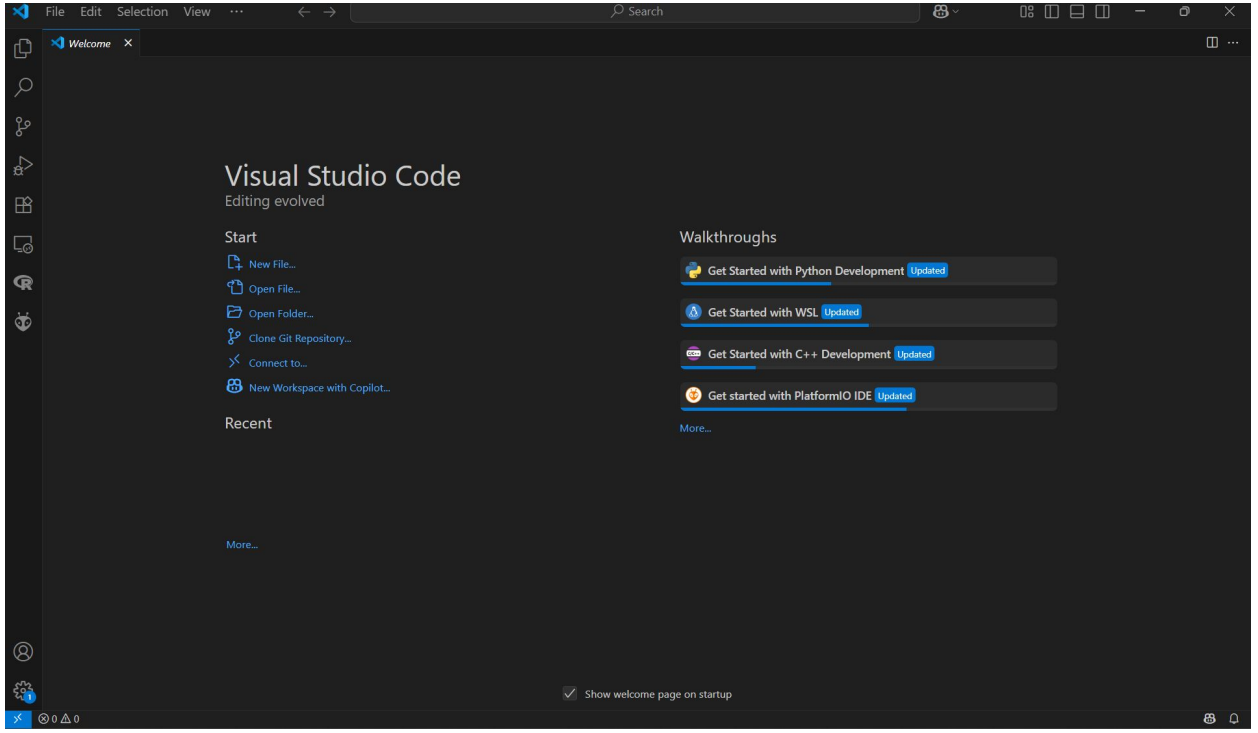
Integrated Development Environment (IDE)

Powerful, popular, and customizable

Git and GitHub integration

Versatile across languages and types of project

Microsoft Store or
https://code.visualstudio.com/

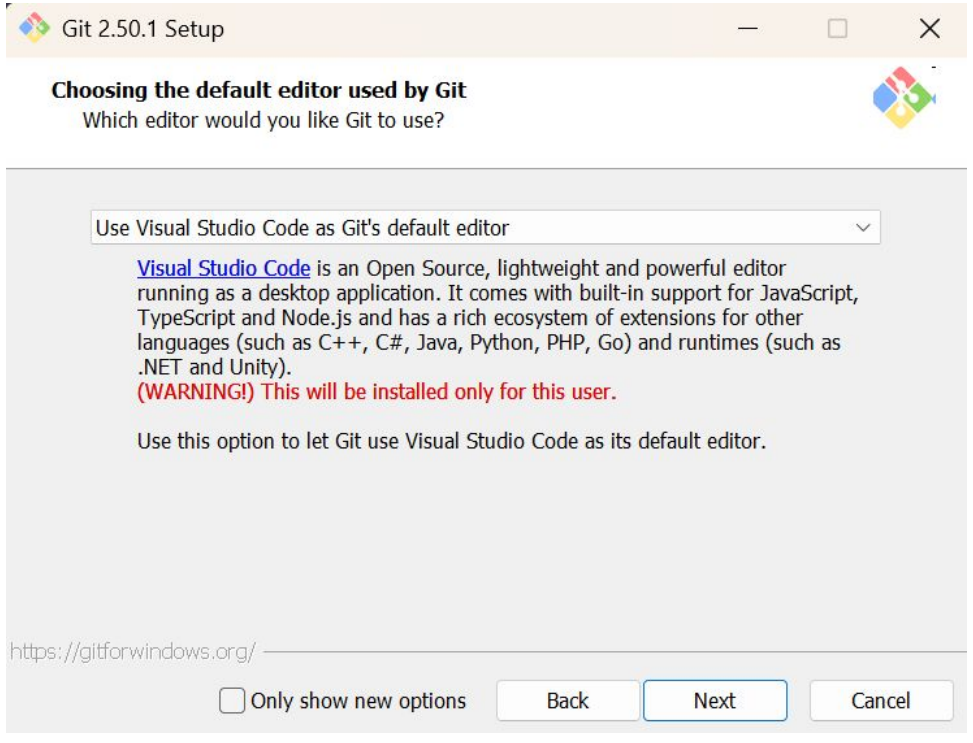


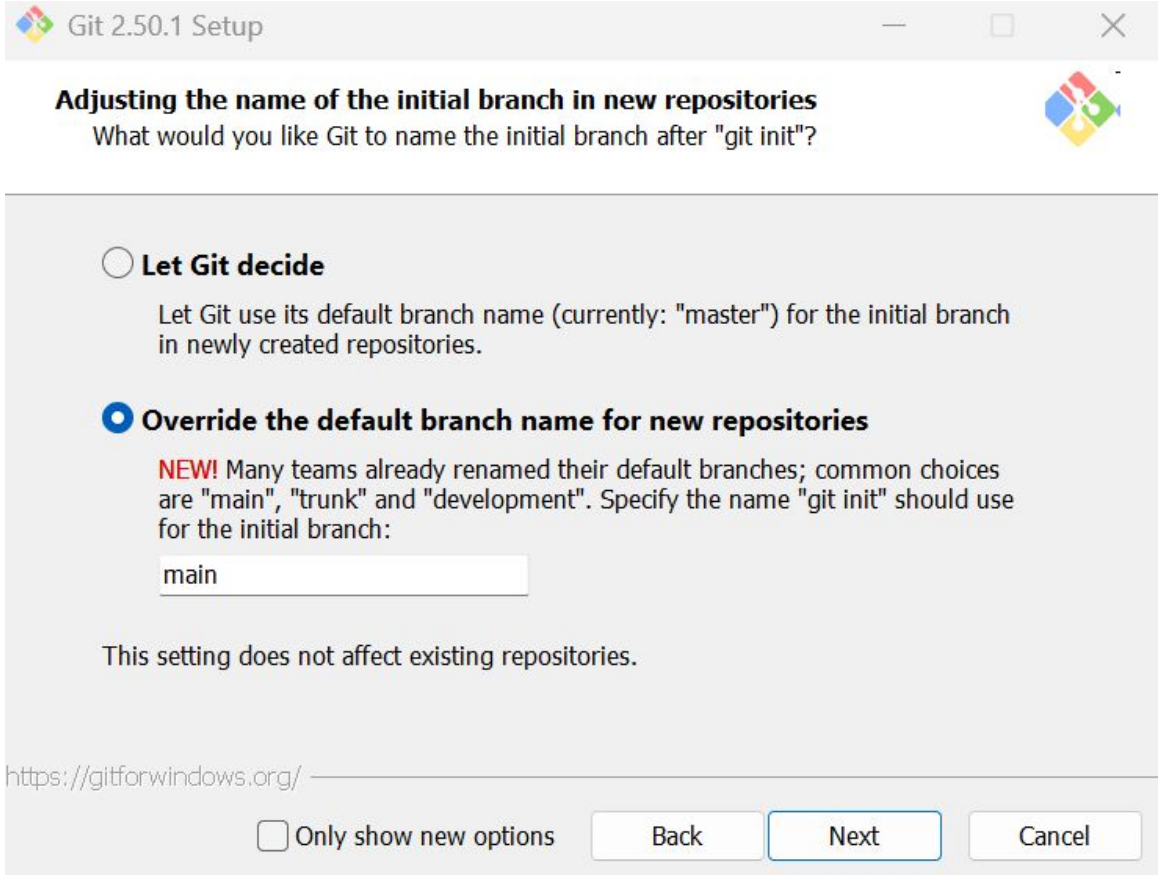
Extensions to add

- C/C++ Extension Pack by Microsoft
  - Adds syntax highlighting
- PlatformIO IDE
  - Allows interfacing with ESP32
- Prettier (Personal preference)
  - Code formatter that makes code more legible
- GitHub CoPilot (Be careful to avoid using this for class)
  - AI chat and coding assist that scans files and autocompletes

Installing Git

- Go to this website to install Git:
  - https://git-scm.com/downloads
- Use the defaults on every step except the name of the “master” branch. Change the name to “main”





Github Account and Git Setup

Note: Hatchling uses phrases in angled brackets <> as placeholders. I.e. someone named John Doe would put “John Doe” instead of “<name>”

1. Create a GitHub account

https://github.com/

2. Configure Git:

Open a terminal (or command prompt)

Set your username: git config --global user.name "<First Last Name>"

Set your email address: git config --global user.email "<your@email.com>"

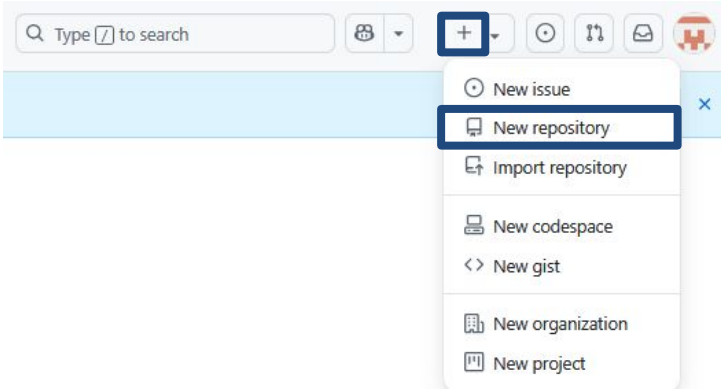
3. Create a Repository on GitHub:

Click the "+" icon in the top right corner and select "New repository"

Give your repository a name and an optional description

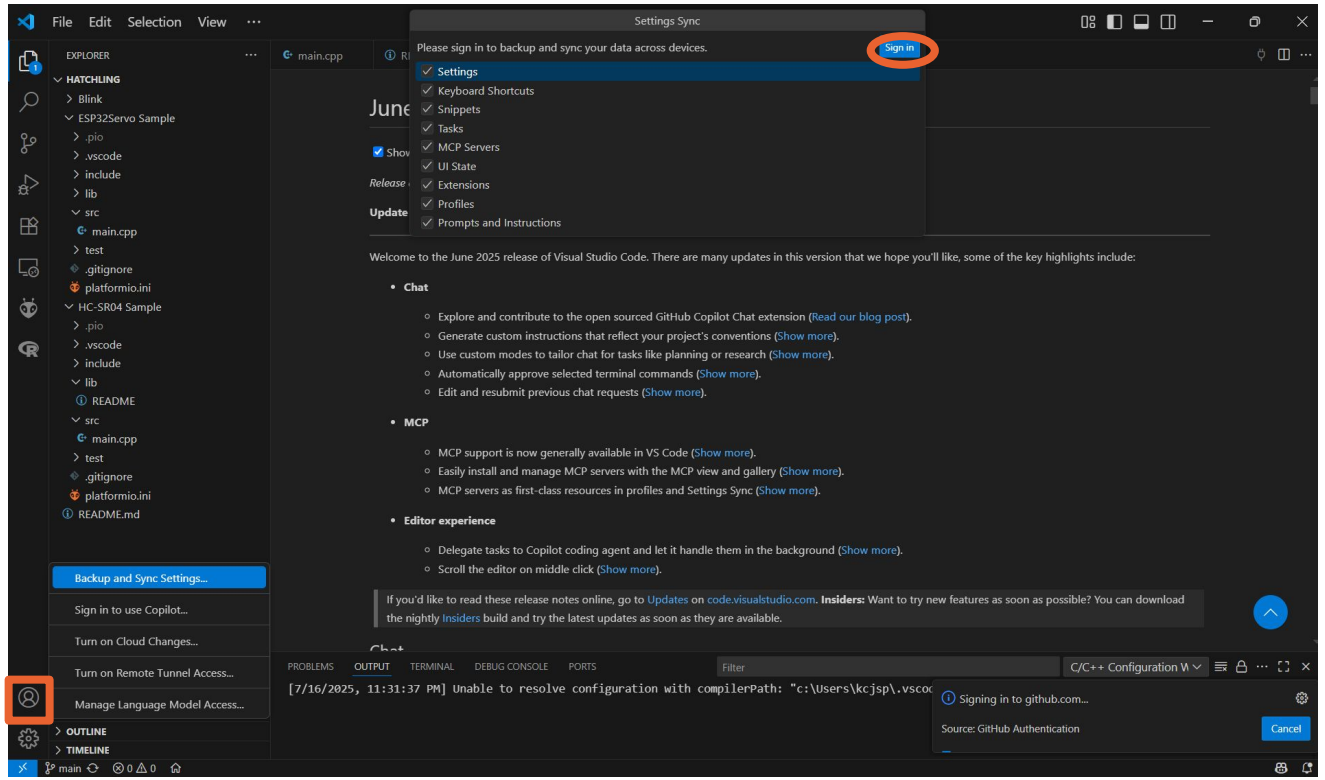
Choose a repository visibility (public or private)

Click "Create repository”



Adding GitHub to VS Code

1. Click “Accounts”
2. Click “Backup and Sync Settings”
3. Click “Sign In”
4. Click “Sign in with GitHub
5. Authorize account access
6. Confirm by clicking “Accounts”



Note: Git is required to be installed. Git commands will work in the integrated terminal

ESP32 Communication Driver

Silicon Labs CP210x USB to UART Bridge must be installed for your laptop to communicate with the ESP32

Linux: sudo adduser <username> dialout

Windows: Google “CP210x”

Most will download “CP210x Windows Drivers” and run “CP210xVCPInstaller_x64.exe”

Software Links

- SolidWorks -
https://software.tamu.edu/

- Visual Studio Code [VS Code] - (Also on Microsoft Store)
https://code.visualstudio.com/
    - Extensions: C/C++ Extension Pack by Microsoft, PlatformIO IDE

- Bambu Lab Slicer -
https://bambulab.com/en-us/download/studio
    - Printers: X1 Carbon 0.4 mm / P1S 0.4 and 0.6 mm
    - Filaments: Generic PLA, Generic PETG, Bambu PLA Basic, Bambu PETG-HF

- Git -
https://git-scm.com/downloads
    - Override default branch name from ”master” to ”main”

Software Links Continued

- Silicon Labs “CP210x Driver”

https://www.silabs.com/developer-tools/usb-to-uart-bridge-vcp-drivers?tab=downloads

- Raspberry Pi Imager -

https://www.raspberrypi.com/software/

- Google Drive for Desktop - (At the bottom of the page under Sync your desktop with Drive)

https://workspace.google.com/products/drive/#download

- LinkedIn Learning Activation - (Not software but free resource)

https://linkedinlearning.tamu.edu/

- Github Student Developer Pack - (Not software but free resource)

https://education.github.com/discount_requests/application

Dues

Pay your dues

Links should be in your orgs communication platform of choice

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SolidWorks (CAD) Foundation

Next Week
Bring a computer mouse!

“If you only do what you can do, you'll never be better than what you are. ”

Master Shifu (Kung Fu Panda 3)

Hatchling