IEEE Project Competition

Week 7: Git/Github Workshop

Attendance

IEEE UCF

UCF | College of Engineering and Computer Science

Overview

- November 30th, BOM’s are due.
- Keep researching topics, and find components that might be useful.
- Next slide will show reference and a template BOM, feel free to edit.
- Eriks Sumobot Example Project - > Git theory - > Commands - > Git/Github Installation - > Practice

Dos and Don’ts of BOM

DONT

- Neglect Power and Size Requirements
- Fail to Check for Alternatives
- Buy Overkill Components
- a
- Select Based on Price Alone
- Overlook Small yet Still Important Components

DO

- Prioritize Compatibility
- Research multiple viable options
- Choose Parts Based on What is actually Required
- Review Parts to Ensure Reliability
- Remember to Include Components Like Wires, Please

Example BOM

IEEE INTERNAL PROJECT COMPETITION BUDGET FORM TEMPLATE

IEEE PAID ITEMS : $25 limit for Beginner / $50 for Advanced

Purchased?	Item	Description	Unit Price	Shipping	Tax	Quantity	Cost	Link
FALSE	2Pack ESP-WROOM-32 ESP32 Development Board	Microcontroller	$ 12.99			1	$12.99	https://www.amazon.com/Mosyond-Development-Bluetooth-Microcontroller-Compatible/dp/B09XDMV9
FALSE	L298N H Bridge Stepper Motor Driver Module DC	Motor Drivers	$ 7.99			1	$7.99	https://www.amazon.com/JTAREA-Stepper-Driver-H-Bridge-Mega2560/dp/B0D2RJV2VX?pd_rd_w=9qTeY
FALSE	4pcs Geared Motor DC3V-12V DC for Four-Wheel D	Motors + Wheels	$ 9.99			1	$9.99	https://www.amazon.com/Gebildet-DC3V-12V-Four-Wheel-Robotic-Aircraft/dp/B08D39MFN1?crid=1VM
FALSE	OVONIC 3s Lipo Battery 50C 1400mAh 11.1V Lipo	Motor Battery	$ 15.29			1	$15.29	https://www.amazon.com/Connector-Airplane-Helicopter-Quadcopter-Multi-Motor/dp/B07L6BNTDV?c
FALSE							$0.00	
FALSE							$0.00	
FALSE							$0.00	
FALSE							$0.00	
FALSE							$0.00	
FALSE							$0.00	
FALSE							$0.00	
FALSE							$0.00	
FALSE							$0.00	
FALSE							$0.00	
FALSE							$0.00	
FALSE							$0.00	
FALSE							$0.00	
FALSE							$0.00	
	Total						$46.26	

Personal Paid Items - Not required but I would prefer you organized it here aswell.

Purchased?	Item	Description	Unit Price	Shipping	Tax	Quantity	Cost	Link
FALSE	eSUN PLA+ Filament 1.75mm, 3D Printer	Printer Filament	$ 23.00	$ -	$ -	1	$23.00	https://www.amazon.com/eSUN-Filament-Dimensional-Accuracy-Printing/dp/B0BN4W6P6Q?crid=2
FALSE	ELEGOO 120pcs Multicolored Dupont Wire 40pin M	Wires	$ 6.99			1	$6.99	https://www.amazon.com/Elegoo-EL-CP-004-Multicolored-Breadboard-arduino/dp/B01EV70C78?crid=
FALSE	565 Pieces M3 Machine Screws Nuts Washers Set,	Screws	$ 9.99			1	$9.99	https://www.amazon.com/Sutemribor-Phillips-Countersunk-Assortment-Stainless/dp/B0CLM8C7M9?c
FALSE	ELEGOO 2PCS 830 Point & 2PCS 400 Point Breadbo	Breadboard	$ 4.99			1	$4.99	https://www.amazon.com/ELEGOO-Breadboard-Solderless-Breadboards-Electronics/dp/B0CXF1B6GB?c
FALSE	Energizer MAX 9V Batteries (2 Pack), 9 Volt Al	9-Volt Battery	$ 6.83			1	$6.83	https://www.amazon.com/Energizer-Alkaline-Volt-Battery-2-Count/dp/B004R16728?dib=eyJ2IjoiM9
FALSE	9V Battery Connector,10 PCS T-Type 9 Volt Buck	9-Volt Adaptor	$ 4.99			1	$4.99	https://www.amazon.com/Battery-Connector-Plastic-Experiment-Equipment/dp/B08SL9X2YC?crid=B1
FALSE	GINTOOYUN 2 PCS XT60 Power Pigtails Cable 18AW	LiPo Adaptor	$ 12.99			1	$12.99	https://www.amazon.com/GINTOOYUN-XT60-Pigtails-Balancing-Batteries/dp/B0BV5XD134?crid=8R82M
FALSE							$0.00	

https://docs.google.com/spreadsheets/d/1MzQs9egSNgwi3-KXXFkbnIGUh0TODJRdJ_6OjmiipWM/edit?usp=sharing

Itinerary

- What is Version Control?
- What is Git?
- What is Github?
- Practice!

What is Version Control?

Workflow!

DevOps!

Branching!

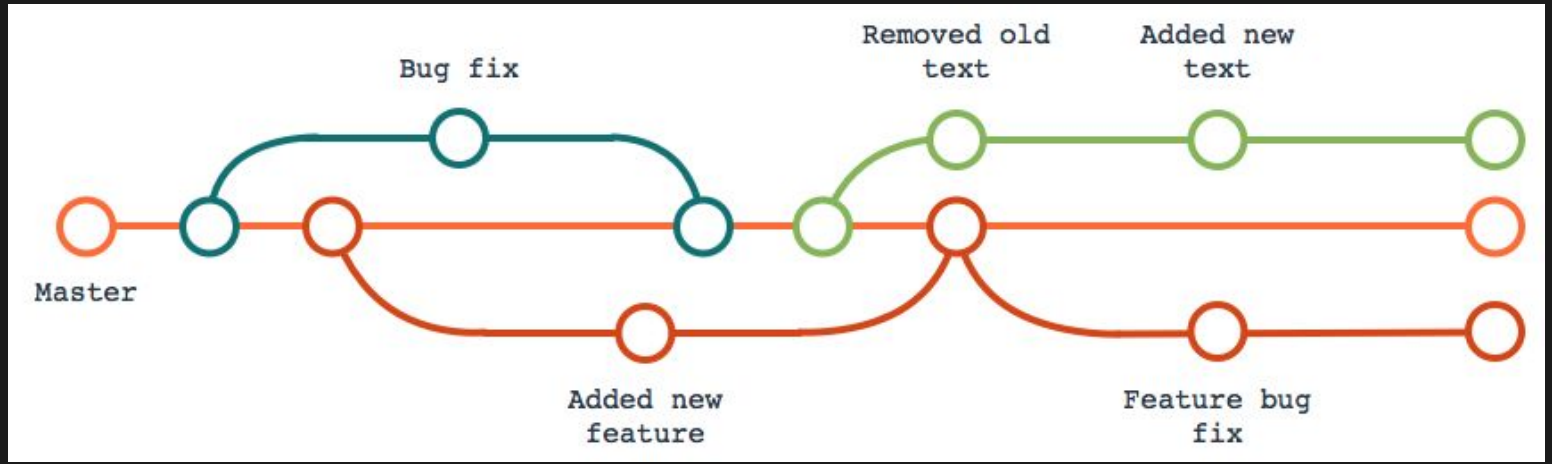
Traceability!

Documentation!

Definitions and more concrete benefits:

- Version Control
  - the practice of tracking and managing changes to software code. Version control systems are software tools that help software teams manage changes to source code over time.
- Workflow
  - the sequence of industrial, administrative, or other processes through which a piece of work passes from initiation to completion.
- Branching
  - The ability to work on the same source in a separate ‘branch’ allows for many other benefits
- Traceability/Documentation
  - Version Control gives the ability to trace changes all the way to there roots through natural documentation and version tracking

Branching


Bug fix
Removed old text
Added new text
Master
Added new feature
Feature bug fix

What is Git?

Background of Git

Created by Linus Torvalds, creator of Linux, in 2005

- Came out of Linux development community
- Designed to do version control on Linux kernel

Goals of Git:

- Speed
- Support for non-linear development (thousands of parallel branches)
- Fully distributed
- Able to handle large projects efficiently

(A "git" is a cranky old man. Linus meant himself.)

Installing/Learning Git

Git website: http://git-scm.com/

- Free online book: http://git-scm.com/book
- Reference page for Git: http://gitref.org/index.html
- Git tutorial: http://schacon.github.com/git/gittutorial.html
- My preferred Git tutorial: https://www.atlassian.com/git

At command line (where verb = config, add, commit, etc.):

- git help verb

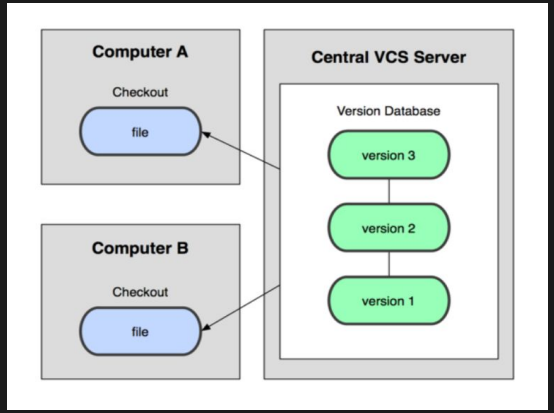
Centralized VCS

In Subversion, CVS, Perforce, etc. A central server repository (repo) holds the "official copy" of the code

- the server maintains the sole version history of the repo
- You make "checkouts" of it to your local copy
- You make local modifications
- Your changes are not versioned

When you're done, you "check in" back to the server

- Your checkin increments the repo's version



DVCS (Git)

In git, mercurial, etc., you don't "checkout" from a central repo

- You "clone" it and "pull" changes from it

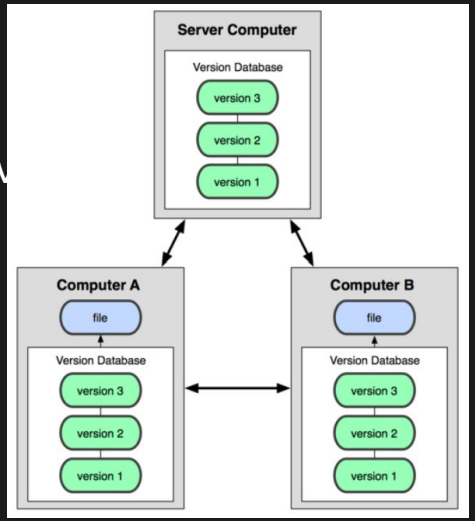
Your local repo is a complete copy of everything on the remote serv

- Yours is "just as good" as theirs

Many operations are local:

- check in/out from local repo
- commit changes to local repo
- local repo keeps version history

When you're ready, you can "push" changes back to server



Local Git Areas

In your local copy on git, files can be:

In your local repo

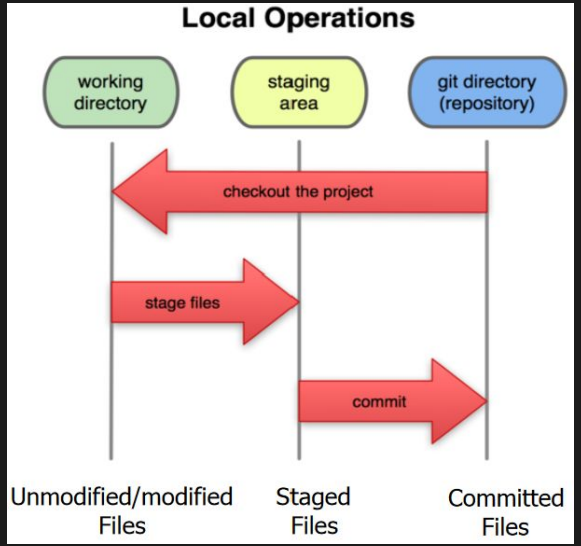
- (committed)

Checked out and modified but not yet committed

- (working copy)

Or, in-between, in a "staging" area

- Staged files are ready to be committed.
- A commit saves a snapshot of all staged state.



Creating a Git Repo

Two common scenarios: (only do one of these)

To create a new local Git repo in your current directory:

- git init
  - This will create a .git directory in your current directory

Then you can commit files in that directory into the repo.

- git add filename
- git commit –m "commit message"

To clone a remote repo to your current directory:

- git clone url localDirectoryName

This will create the given local directory, containing a working copy of the files from the repo and a .git directory (used to hold the staging area and your actual local repo

Git Commands

command	description
`git clone` ***`url [dir]`***	copy a Git repository so you can add to it
`git add` ***`file`***	adds file contents to the staging area
`git commit`	records a snapshot of the staging area
`git status`	view the status of your files in the working directory and staging area
`git diff`	shows diff of what is staged and what is modified but unstaged
`git help` ***`[command]`***	get help info about a particular command
`git pull`	fetch from a remote repo and try to merge into the current branch
`git push`	push your new branches and data to a remote repository
others: `init, reset, branch, checkout, merge, log, tag`	

Branching and Merging

Git uses branching heavily to switch between multiple tasks.

To create a new local branch:

- git branch name

To list all local branches: (* = current branch)

- git branch

To switch to a given local branch:

- git checkout branchname

To merge changes from a branch into the local master:

- git checkout master

Interaction w/ remote repo

Push your local changes to the remote repo.

Pull from remote repo to get most recent changes.

- (fix conflicts if necessary, add/commit them to your local repo)

To fetch the most recent updates from the remote repo into your local repo, and put them into your working directory:

- git pull origin master

To put your changes from your local repo in the remote repo:

- git push origin master

Practice

1. Create a new subdirectory
2. Create a new git repository in that location
3. Create new file in that repo
4. Add it
5. Commit it!

What is GitHub?


Issue
Open
Moisture data sharing
What if farmers could share moisture data?!
Comment

Using Git and GitHub Together

- A GitHub Repository is a remote repository that multiple developers can contribute to (push to) and download and edit source code from (pull from).
- Pull Requests
  - Allows other team members to review changes before being merged to main branch
- Easy Collaboration with other developers
  - Task boards (Issues)
  - Online access to code
  - Contribution tracking
- https://github.com/ucfai/knightros-gambit

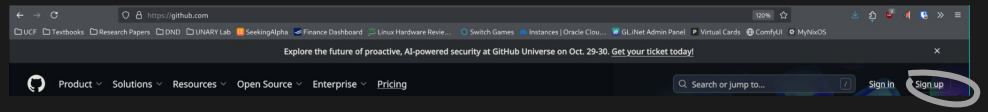
Other uses for GitHub

- Easy way to document and display a project online
- Can be used as a social media (sorta)
  - https://github.com/nashirj
- Easy ePortfolio!
- Tons of public repos from random people, github hosts some huge projects!
  - https://github.com/replicate/scribble-diffusion
  - https://github.com/ytdl-org/youtube-dl
  - https://github.com/topydo/topydo

If you are curious…

- Tortoisegit
- Atlassian Git Tutorial
- GitLab
- VSCode Git Extensions
    - Git History
    - Git Graph
    - GitLens (I use)

But how to GitHub?

1. Go to https://github.com
2. 

3. Do what it says

How to download Git?

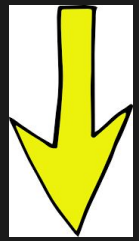
Windows:

- Open Command Prompt
- Type the following: “winget install Git.Git”
  - Choose ‘Y’ when it asks, and let it do it’s thing.

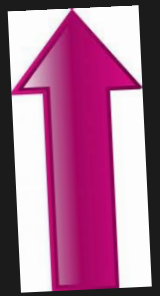
Mac/Linux:

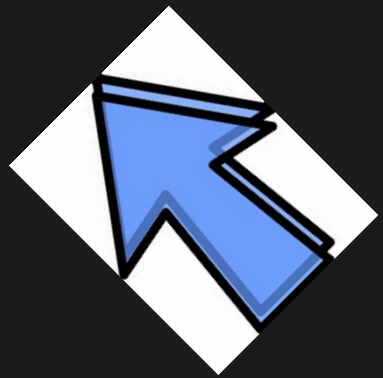
- You are cool so you don’t have to install it (It’s already installed)

GitHub Tutorial



https://docs.github.com/en/get-started/quickstart/hello-world





Workshop Time!