

# **Complete Git & GitHub Workflow for an IoT-Based ECE Project**

**CCS342-DevOps**

**Submitted by,**

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ECE FINAL YEAR

## Repository Setup & Commit History

**Step 1.** Create a new project folder using the mkdir command, then navigate into it using cd.

**Step 2.** Generate two files—sensor.py and project\_notes.txt—using the touch command. Confirm their creation by listing the directory contents with ls.

**Step 3.** Open and edit both files using the nano editor to add initial content relevant to the IoT project.

**Step 4.** Initialize a Git repository with git init, and verify the repository status using git status.

```
MINGW64:/c/Users/subad/OneDrive/Desktop/Smart_Agri_NodeMCU
subad@SUBADEESH MINGW64 ~/OneDrive/Desktop
$ mkdir Smart_Agri_NodeMCU

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop
$ cd Smart_Agri_NodeMCU

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU
$ touch sensor.py

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU
$ touch project_notes.txt

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU
$ ls
project_notes.txt  sensor.py

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU
$ nano sensor.py

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU
$ nano project_notes.txt

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU
$ git init
Initialized empty Git repository in C:/Users/subad/OneDrive/Desktop/Smart_Agri_NodeMCU/.git/
```

**Step 5.** Configure Git with your username and email using git config. Stage the files and perform the first commit using git commit -m.

```
MINGW64:/c/Users/subad/OneDrive/Desktop/Smart_Agri_NodeMCU
subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git config --global user.name roshitha07

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git config --global user.email subadeesh2004@gmail.com

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git comit -m "Initial commit"
git: 'comit' is not a git command. See 'git --help'.

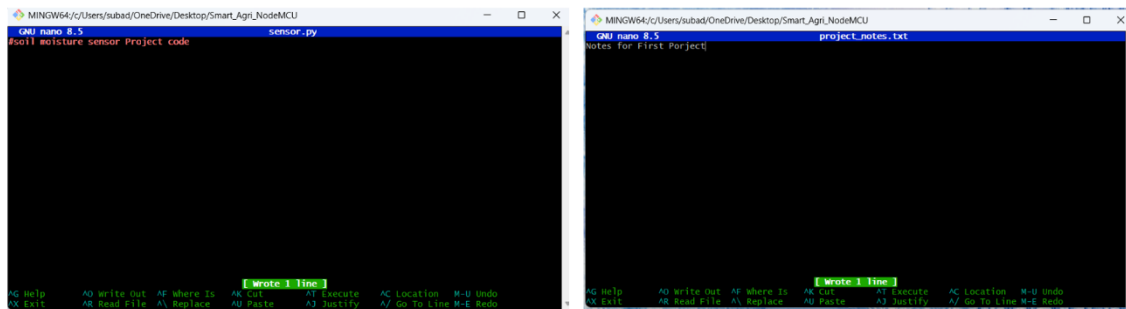
The most similar command is
    commit

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git commit -m "Initial commit"
[master (root-commit) e8653fa] Initial commit
2 files changed, 2 insertions(+)
create mode 100644 project_notes.txt
create mode 100644 sensor.py

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git commit -m "Second commit"
On branch master
nothing to commit, working tree clean
```

**Step 6.** Make edits to sensor.py, stage the changes, and execute the second commit to capture the update.

**Step 7.** Modify project\_notes.txt, add the changes to the staging area, and perform the third commit.



**Step 8.** Export a concise visual log of the commit history using git log --oneline --graph > history.txt. Use ls to confirm that history.txt has been successfully created.

```
MINGW64/c/Users/subad/OneDrive/Desktop/Smart_Agri_NodeMCU
(use "git restore <file>..." to discard changes in working directory)
modified:   project_notes.txt

no changes added to commit (use "git add" and/or "git commit -a")

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git add project_notes.txt
warning: in the working copy of 'project_notes.txt', LF will be replaced by CRLF the next time Git touches it

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git commit -m "Third Commit"
[master 6be2b06] Third Commit
1 file changed, 1 insertion(+), 1 deletion(-)

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git log --oneline --graph >history.txt
fatal: unrecognized argument: --oneline

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git log --oneline --graph >history.txt

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ ls
history.txt  project_notes.txt  sensor.py
```

## Branching, Merging & Conflict Resolution

**Step 9.** Create two new branches—`feature_sensor` and `feature_cloud`—to manage separate development tasks related to sensor data and cloud integration.

```
subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git branch origin

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git branch feature_sensor

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git branch feature_cloud
```

**Step 10.** Switch to the `feature_sensor` branch and update the `sensor.py` file by adding a print statement for reading soil moisture sensor data. Stage the modified file for commit.

```
subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git checkout feature_sensor
Switched to branch 'feature_sensor'

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (feature_sensor)
$ nano sensor.py

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (feature_sensor)
$ git add sensor.py
warning: in the working copy of 'sensor.py', LF will be replaced by CRLF the next time Git touches it

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (feature_sensor)
$ git commit -m "Added Moisture Reading"
[feature_sensor 80bde6f] Added Moisture Reading
1 file changed, 1 insertion(+)
```

**Step 11.** Switch to the `feature_cloud` branch and modify the `sensor.py` file to include a print statement for sending data to the cloud server. Stage the updated file for commit.

```
subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (feature_sensor)
$ git checkout feature_cloud
Switched to branch 'feature_cloud'

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (feature_cloud)
$ nano sensor.py

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (feature_cloud)
$ nano sensor.py

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (feature_cloud)
$ git add sensor.py
```

**Step 12.** Merge both branches into the main branch. During the merge process, a conflict arises in `sensor.py`, which is manually resolved by retaining both print statements. The resolved file is committed to finalize the merge.

```
subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git merge feature_cloud
Auto-merging sensor.py
CONFLICT (content): Merge conflict in sensor.py
Automatic merge failed; fix conflicts and then commit the result.

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master|MERGING)
$ nano sensor.py
```

```
MINGW64:/c/Users/subad/OneDrive/Desktop/Smart_Agri_NodeMCU
GNU nano 8.5 sensor.py
#soil moisture sensor Project code
print('Reading soil moisture sensor data')
print('Sending data to cloud server')
```

**Step 13.** Review the final commit history using a visual log to confirm that changes from both branches have been successfully integrated into the main branch.

```
MINGW64:/c/Users/subad/OneDrive/Desktop/Smart_Agri_NodeMCU
1 file changed, 1 insertion(+)

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git merge feature_cloud
Auto-merging sensor.py
CONFLICT (content): Merge conflict in sensor.py
Automatic merge failed; fix conflicts and then commit the result.

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master|MERGING)
$ nano sensor.py

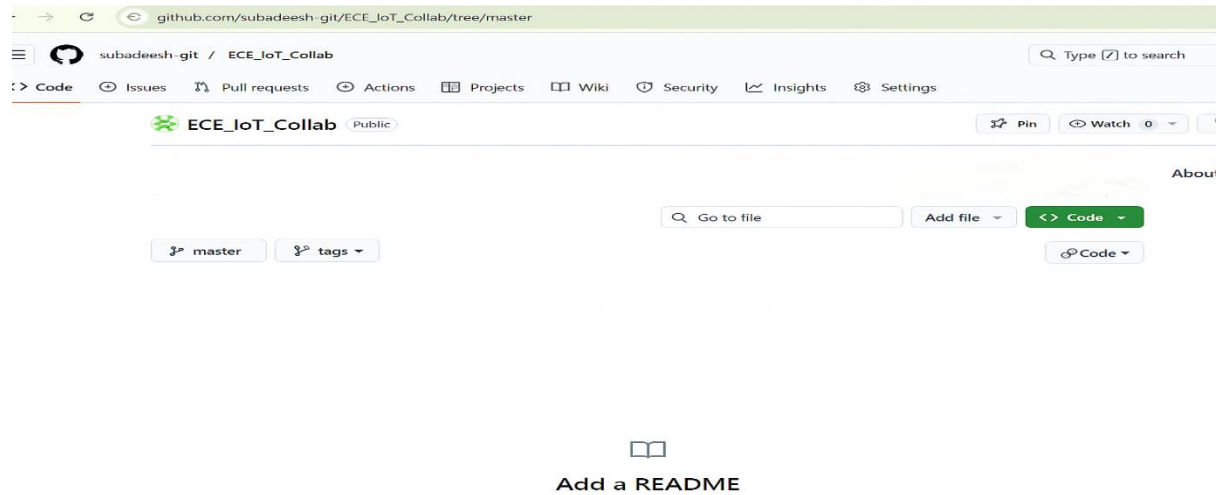
subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master|MERGING)
$ git add sensor.py

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master|MERGING)
$ git commit -m "Resolved the conflict and merged"
[master c6eeald] Resolved the conflict and merged

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git log --oneline --graph
*   c6eeald (HEAD -> master) Resolved the conflict and merged
|
| * 10c95b2 (feature_cloud) Print Statement
| * 80bde6f (feature_sensor) Added Moisture Reading
|/
* 6be2b06 (origin) Third Commit
* 92faa31 Second Commit
* e8653fa Initial commit
```

## GitHub Remote & Collaboration

**Step 14.** A new remote repository named ECE\_IoT\_Collab was created on GitHub to host the local project and enable team collaboration.

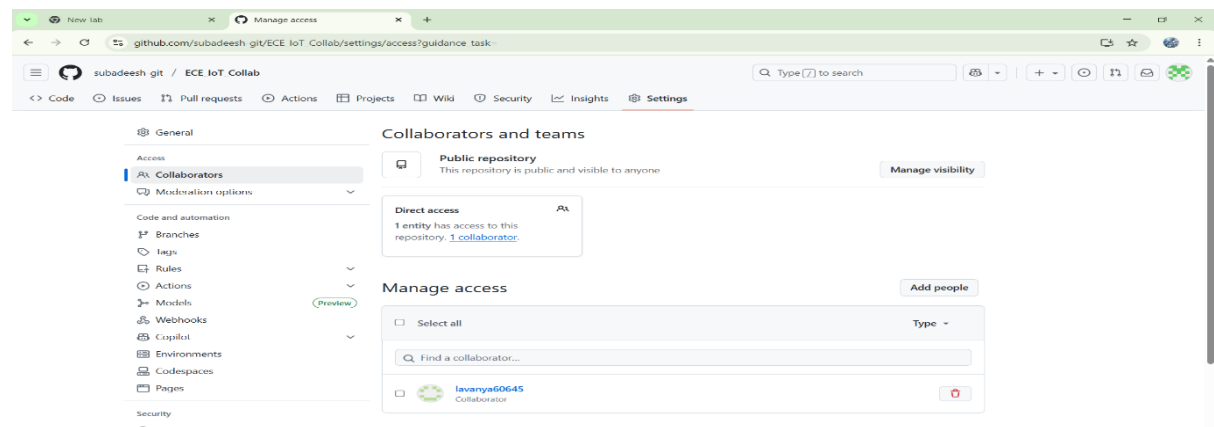


**Step 15.** The local Git repository was successfully linked to the remote GitHub repository, and all project files were pushed to the remote using Git.

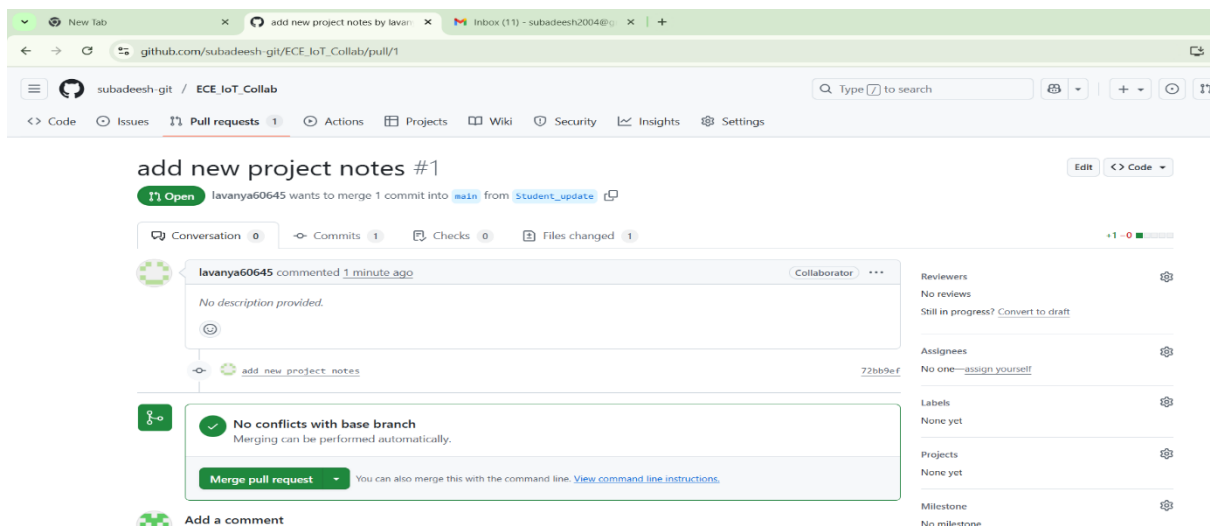
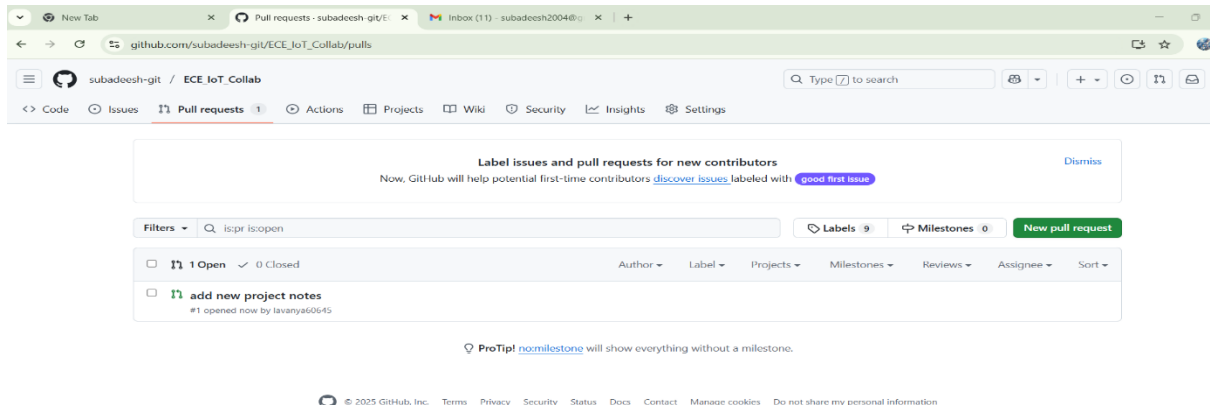
```
subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git remote add origin https://github.com/subadeesh-git/ECE_IoT_Collab.git

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git push origin master
info: please complete authentication in your browser...
Enumerating objects: 19, done.
Counting objects: 100% (19/19), done.
Delta compression using up to 16 threads
Compressing objects: 100% (15/15), done.
Writing objects: 100% (19/19), 1.70 KiB | 347.00 KiB/s, done.
Total 19 (delta 3), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (3/3), done.
remote:
remote: Create a pull request for 'master' on GitHub by visiting:
remote:   https://github.com/subadeesh-git/ECE_IoT_Collab/pull/new/master
remote:
To https://github.com/subadeesh-git/ECE_IoT_Collab.git
 * [new branch]      master -> master
```

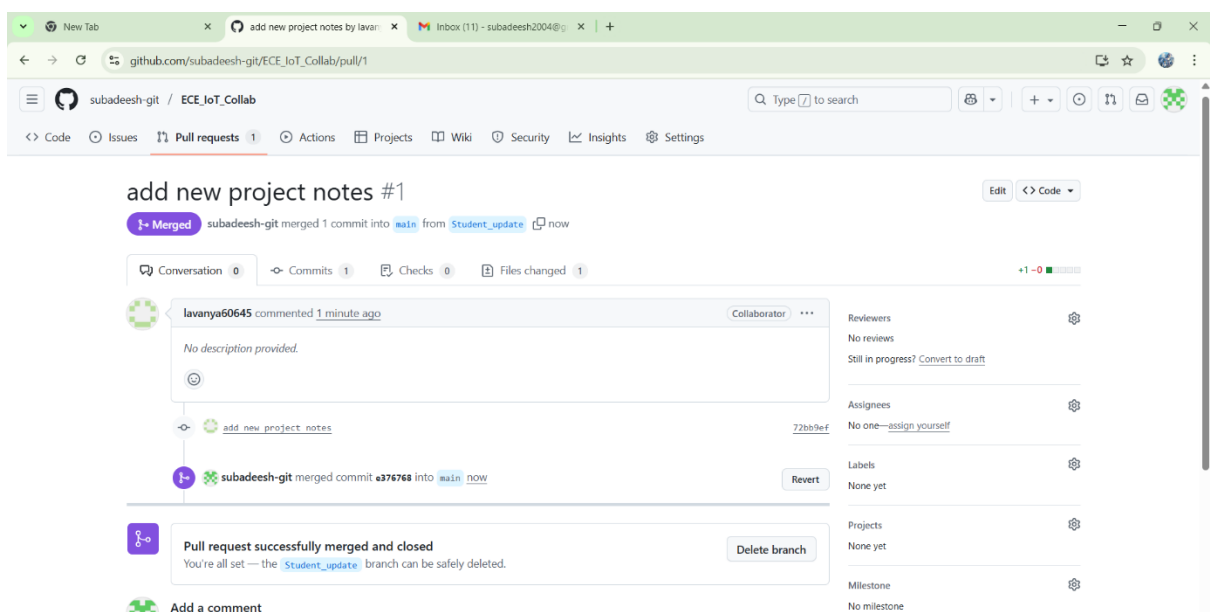
**Step 16.** A collaborator was added to the GitHub repository to contribute to the project through a dedicated feature branch.



**Step 17.** The collaborator created a new branch named `student_update`, made edits to the `project_notes.txt` file, and submitted a Pull Request for review.



**Step 18.** The Pull Request was reviewed and merged into the main branch on GitHub, integrating the collaborator's changes into the project.



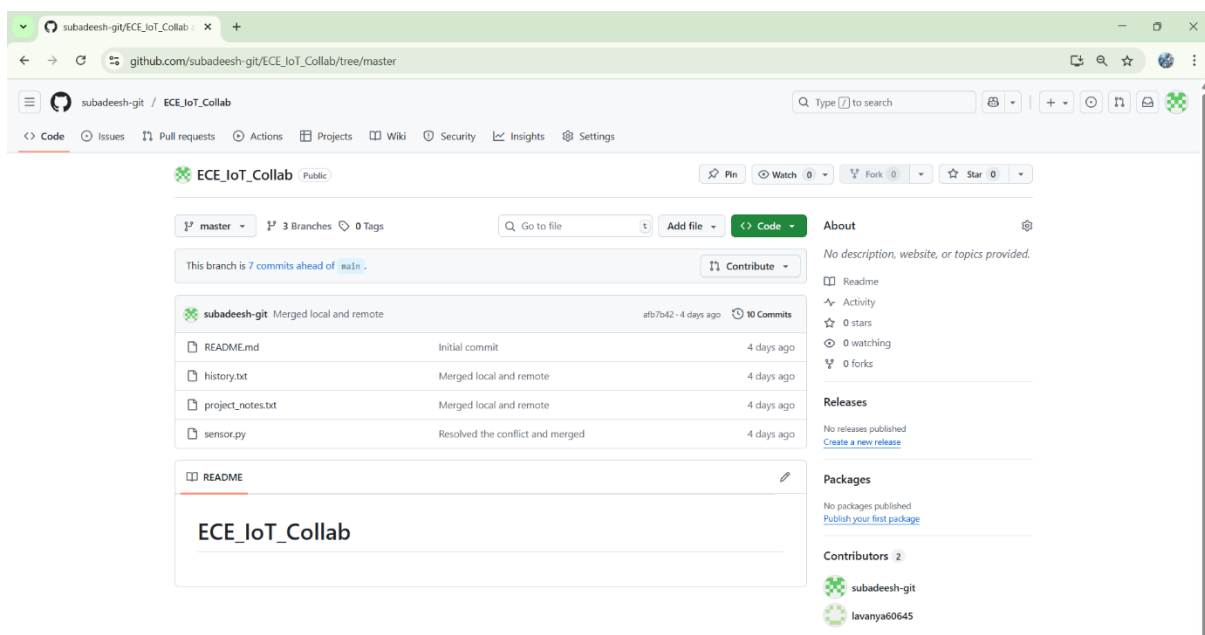
**Step 19.** The local repository was synchronized with the updated remote repository using the pull command to reflect the latest changes.

```
subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git push origin master
Enumerating objects: 8, done.
Counting objects: 100% (8/8), done.
Delta compression using up to 16 threads
Compressing objects: 100% (4/4), done.
Writing objects: 100% (4/4), 561 bytes | 561.00 KiB/s, done.
Total 4 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
To https://github.com/subadeesh-git/ECE_IoT_Collab.git
   c6eeald..afb7b42  master -> master

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git pull origin master
From https://github.com/subadeesh-git/ECE_IoT_Collab
 * branch      master      -> FETCH_HEAD
Already up to date.

subad@SUBADEESH MINGW64 ~/OneDrive/Desktop/Smart_Agri_NodeMCU (master)
$ git pull origin main
From https://github.com/subadeesh-git/ECE_IoT_Collab
 * branch      main        -> FETCH_HEAD
Already up to date.
```

## Conclusion:



This mini project has successfully demonstrated the practical application of Git-based DevOps workflows in an IoT development context. The structured approach ensures reproducibility, collaboration, and long-term maintainability of the project assets.

**Repository Access:** The complete report, along with all relevant files and documentation, has been uploaded to the project's GitHub repository. For reference and further review, the repository can be accessed via the following link:

[https://github.com/subadeesh-git/ECE\\_IoT\\_Collab.git](https://github.com/subadeesh-git/ECE_IoT_Collab.git)