Weekly Journal #01

Week Overview (Sunday 10 - Sunday 17)

Planned Tasks:

- **Set up the Raspberry Pi with the camera module.**
- **Complete tactile button installation and associated scripting.**
- **Begin web server setup.**

Monday, November 11

Camera Connection and Functionality Testing

HOME:

I installed the Raspberry Pi OS on a micro SD card following these steps:

Downloaded and Installed the Raspberry Pi Imager:

- I navigated to the official Raspberry Pi website and downloaded the Raspberry Pi Imager tool.
- Using the imager, I inserted the micro SD card into my computer and selected the OS to write to the card.

SCHOOL LAB WORK:

After installing the OS, my teammate and I connected the Raspberry Pi camera module. We researched how to enable camera functionality and executed the following steps:

Setting Up and Testing the Camera Module:

We initially made an error by attaching the camera module after the Pi was powered on, potentially risking hardware damage. Thankfully, the module remained functional. So, we powered off the Raspberry Pi to restart it.

Using The Raspberry Pi website tutorial we did the following steps:

Connect the Camera Module

Ensure your Raspberry Pi is turned off.

1. Locate the Camera Module port

2. Gently pull up on the edges of the port's plastic clip
3. Insert the Camera Module ribbon cable; make sure the connectors at the bottom of the ribbon cable are facing the contacts in the port.
4. Push the plastic clip back into place
5. Turn on the Raspberry Pi
6. Reboot the Raspberry Pi

Link of the website:

https://projects.raspberrypi.org/en/projects/getting-started-with-picamera

This is an official Raspberry Pi project tutorial designed to help users set up and use the Raspberry Pi Camera Module.

Accessed the Configuration Menu:

- Opened the terminal and typed: `sudo raspi-config`
- Navigated to **Interface Options** > **Camera** and enabled it.
- Rebooted the Raspberry Pi to apply changes.

To test the camera's connectivity, I used terminal commands:

- Recorded a 10-second video: `raspivid -o video1.h264 -t 10000`

  `-o:output`

  `-t:to specifie the duration of the video in milliseconds`

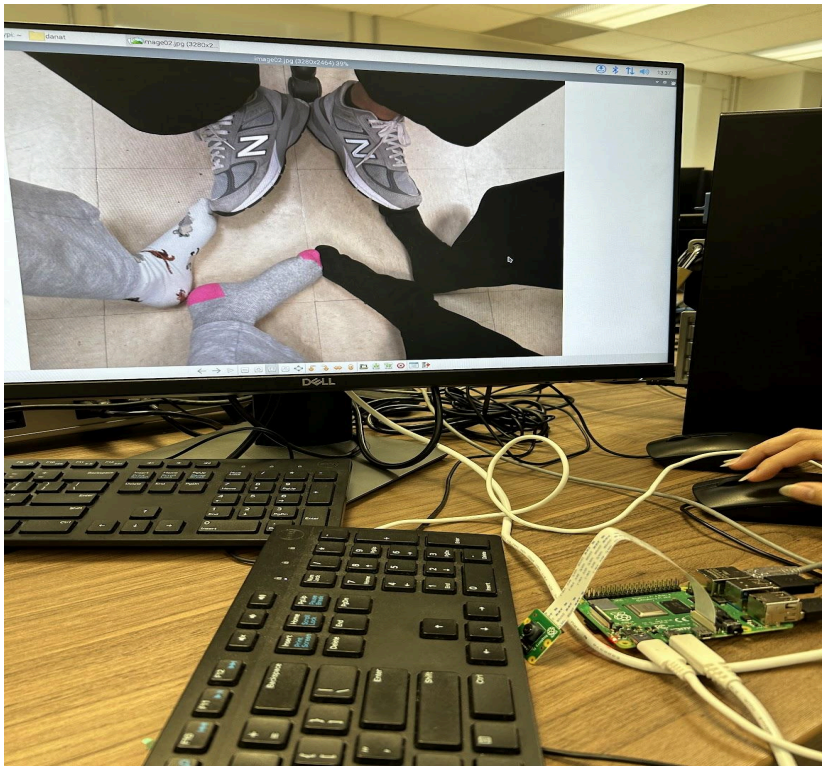
  `-10000: 10000 milliseconds = 10 second`

- Captured a still image: `raspistill -o image1.jpg`

This testing confirmed that the camera module was functioning correctly. The pictures and videos were saved to my designated directory.

Image Taken During Initial Raspberry Pi Camera Test

(8MP Sony IMX219 sensor)



Tuesday, November 12

Web Server and Gallery Software Selection

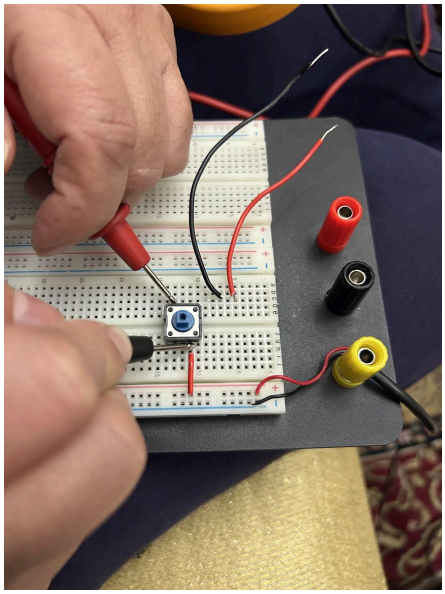
I focused on researching and beginning the process of connecting buttons (3 tactile buttons to control image capture, video recording, and device power) to the Raspberry Pi to control the camera module. My father assisted me in this step.

Connecting a Button on the Breadboard:

- I placed a button on a breadboard and used wires to connect it, ensuring it was part of a simple electrical circuit.

We verified the electrical connectivity of the button using a multimeter to check for current flow when the button was pressed. This confirmed proper functionality, laying a foundation for further integration with the camera.

Testing Button Connectivity with Wires and Breadboard Setup



My teammate explored suitable server options, concluding that Nginx was the best first based on previous research for its performance capabilities.

Web Server Decision:

- Chose Nginx to function as a reverse proxy for PiGallery2, which will serve as the gallery manager. This combination provides enhanced security and scalability, while PiGallery2, a Node.js-based app, offers robust media management features.

Wednesday, November 13

Button Integration and System Troubleshooting

I worked with my colleague to further develop the button integration for the Raspberry Pi and begin the installation of the reverse proxy and softwares. Key activities and challenges encountered:

Setting Up a New Micro SD Card:

I prepared a second micro SD card by installing the OS as described on Monday.

We needed to re-enable the camera interface on this new card:

- Opened the terminal and typed: `sudo raspi-config`
- Navigated to **Interface Options** > **Camera** (BUT the camera wasn't part of the options..)

Attempted to enable the camera in **Interface Options**, but encountered a problem where the system indicated that the camera was not detected.

Troubleshooting the Camera Detection Issue:

- Checked the physical connections of the camera ribbon cable to ensure it was properly secured.
- Rebooted the Raspberry Pi multiple times and retried enabling the camera interface.
- Running the commands: sudo apt update, sudo apt upgrade

Ran diagnostic commands in the terminal to check for device recognition, such as:

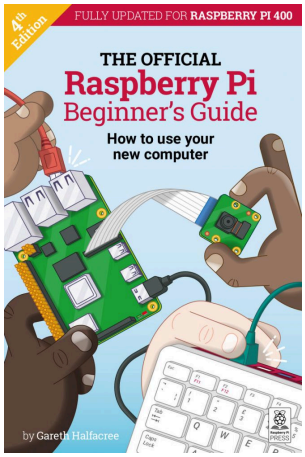
- `vcgencmd get_camera`

The output indicated that the camera was not detected (`supported=1 detected=0`), suggesting a potential hardware or connection issue.

Despite this issue, we could still capture images and videos using direct commands. This anomaly suggested that the camera connection was partially working but not recognized by the configuration utility.

Continuing Button Integration:

- We began connecting buttons on the breadboard to the Raspberry Pi GPIO pins following the steps in the Beginner's guide of the Raspberry Pi.



Due to time constraints, we were unable to complete the integration and left it for a future session.

Thursday, November 14

Research and Planning

My teammate researched on installation processes and gathered insights from external resources and AI-based assistance to streamline our approach.

TEAM MEETING:
To stay on track despite delays, we held a meeting to plan next week's tasks and complete any unfinished installations. We recognized the unexpected camera detection problem and agreed on the need to allow time for unexpected challenges.

Saturday, November 16

GitHub Repository Creation

I set up a GitHub repository for our project, allowing us to collaborate efficiently. I completed the initial setup, including creating and structuring the README file and adding the MIT License to define our project's usage terms.

Sunday, November 17

GitHub Repository

My teammate contributed by updating the README file to include additional details about the project.

Week 1 Summary (Sunday, November 10 - Saturday, November 17):

- Connected the camera module to the Raspberry Pi.
- Initiated the web server setup.
- Integrated the necessary connectors on the breadboard and prepared the tactile buttons for future installation.
- Created the GitHub repository

Online Video Resources and Learnings:

- Camera module with Raspberry Pi 4

  https://www.youtube.com/watch?v=0hrF8Wq8SSQ&t=552s

  Description: This video provides a step-by-step tutorial on setting up and configuring the camera module with a Raspberry Pi 4. It covers connecting the hardware, enabling the camera interface, capturing images, and using basic commands to work with the camera.

How it helps us: This resource is valuable for understanding how to correctly connect and enable our camera module, which aligns with our project's need to capture high-quality images and videos while minimizing the risk of hardware damage.

- Raspberry Pi 3 - Push Button Video Camera with Code

  https://www.youtube.com/watch?v=Ysp18CeqJmg&t=14s

  Description: This video demonstrates how to build a push-button camera system using a Raspberry Pi 3, which captures videos at the press of a button. It includes hardware assembly, button integration, and the code necessary to operate the system.

  How it helps us: While the example uses a Raspberry Pi 3, the push-button integration concepts and related code examples are directly applicable to our project, helping us implement tactile button functionality for image and video capture.

- Getting started with the Camera Module

  https://projects.raspberrypi.org/en/projects/getting-started-with-picamera

  Description: This guide offers a comprehensive introduction to using the Raspberry Pi camera module. It covers hardware setup, software configuration, capturing images and videos, and using Python scripts to control the camera.

  How it helps us: This resource is useful for both basic and advanced operations with the camera module, allowing us to develop scripts to automate picture and video capture. It also reinforces our understanding of using the Raspberry Pi's camera tools effectively.

- Raspberry Pi Beginner's Guide

  Description: This guide provides an overview of the Raspberry Pi, covering basic setup, installation of the operating system, connecting peripherals, and using GPIO pins for hardware interaction.

  How it helps us: It serves as a foundational reference to ensure we fully understand the core operations of the Raspberry Pi. This is especially beneficial when configuring our hardware components (e.g., buttons and camera) and for troubleshooting issues that arise during the project.

Project Repository on GitHub:
https://github.com/ayakharchafi/Unix-Project24