Distance Measurement I

Week no. – 1

Date of experiment – 22/08/2023

Group name – Group 6

Group members – Binduthraya Matta (B21203), Saransh Duharia (B21021), Jasnoor Tiwana (B21194), Rawal Ram(B21219), Adarsh Santoria (B21176).

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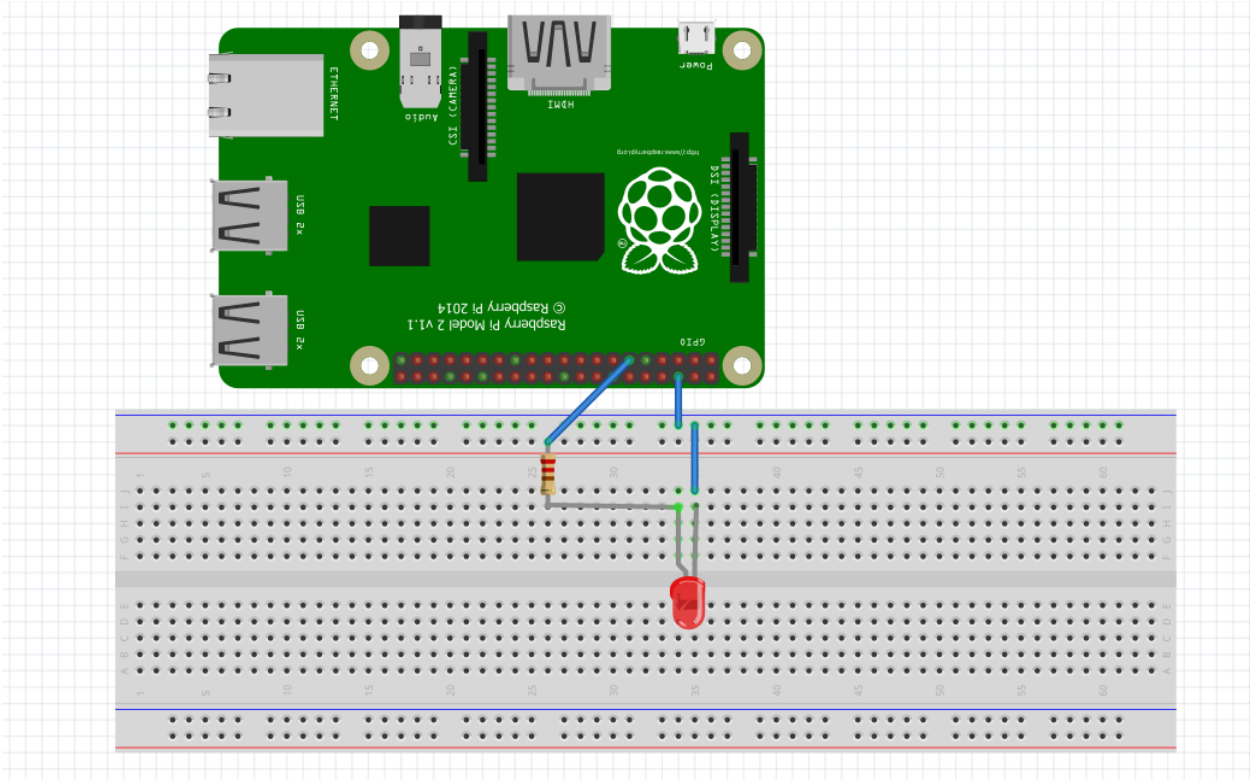
1. Experiment layout



SOFTWARE USED- Fritzig

Steps Involved:

Setup: We attached a resistor to the positive terminal of the LED, then attached the other end of the resistance to a GPIO pin on the Raspberry Pi. Later Connected the Raspberry Pi's ground (GND) pin to

the LED's other terminal.

Controlling the LED: We changed the voltage on the GPIO pin to turn the LED on or off. To control the GPIO pins on the Raspberry Pi, we used Python on THONNY software.

Blinking the LED: It can be made to blink by turning it on and off while delaying a set amount of time in between each action. This was accomplished by using loops in the code to switch between high (3.3V) and low (0V) states for the GPIO pin and the time library.

Using the Oscilloscope: We attached the positive and ground pins of the Oscilloscope to the terminals of the LED bulb to measure the output voltage. Later we adjusted the range and value/grid of X and Y, which were voltage across LED and time respectively, using knobs to get the desired output.

2. Results (in order of the indicated task completion criteria)

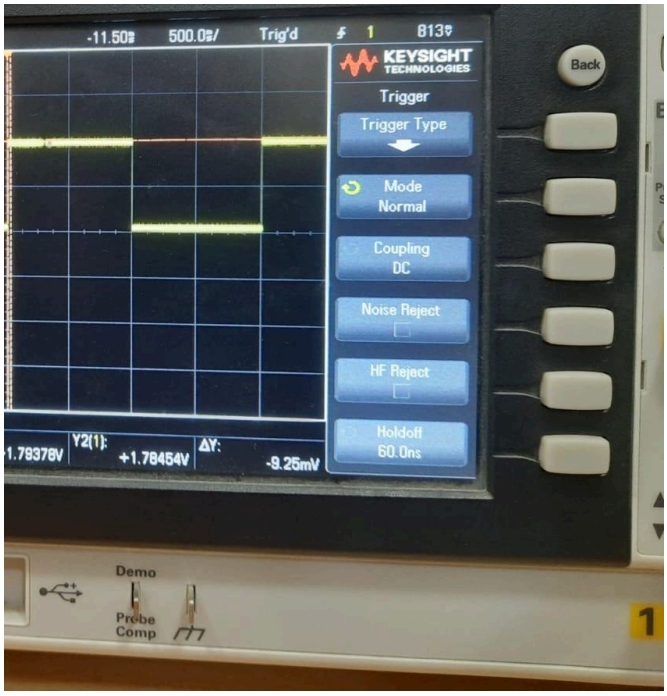
Task 1 -Switch on and off an LED

This task was successfully accomplished with LED being turned on and off according to the code's sleep time

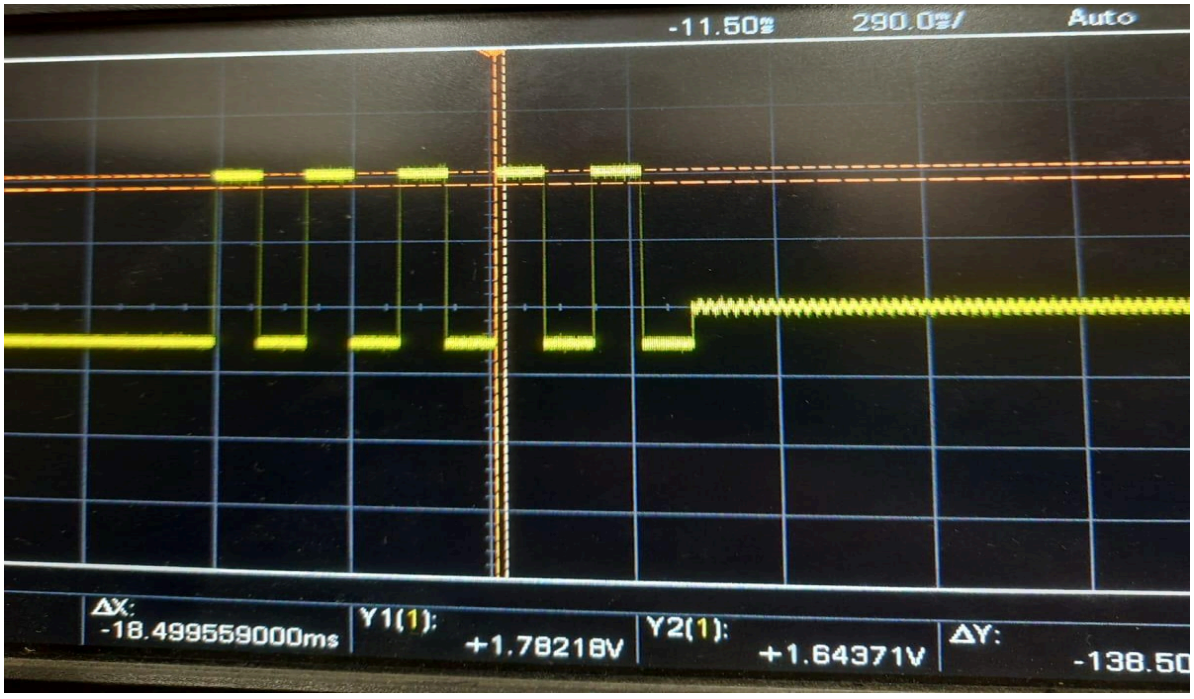
Task 2 - Pulse an LED for five times, such that is on for 0.1 second and off for 0.1 second

The LED blinked, was on for 0.1 seconds and then went off.

Task 3 - Switch an LED on once for 0.1 second and switch it off. Record the voltage across the positive leg of the LED w.r.t ground using the oscilloscope and plot the data directly from the oscilloscope as shown.



Task 4 - Switch an LED on and off for 5 times, such that it is on for 0.1 second and off for 0.1 second each time. Record the voltage across the positive leg of the LED w.r.t ground using the oscilloscope and plot the data directly from the oscilloscope as shown.



Task 5 – Repeat the Task 4 for an on/off period of 0.01 second, 0.001 second, and 0.0001

second. Explain your findings.

3. Conclusion

1. What in your opinion is the most important thing you learnt from the experiment?
The most important thing we learnt while performing the experiment was the characteristics of the GPIO pin, and how we can control what that pin does. We also learnt to control the basic external devices through the GPIO pins.

2. What was interesting about the experiment?
This was the first time many of our group members worked with the Raspberry pi. That in itself was exciting. The coding part was rather straightforward, as we had learnt that beforehand. Using the Oscilloscope to see the output voltage curves was rather interesting, as we had also never done that before, where we had to record the output curves for a certain time interval.

3. What was challenging about the experiment?
The major challenges we faced were plotting the voltage curves on the Oscilloscope. Taking care of the noise was a crucial thing.

4. Were there any drawbacks of the way the experiment was done? How would you do it better?
There weren't any major drawbacks besides the consistent heating up of our Raspberry pi. That frequently led to the system crashing. We had to disconnect the power for some time to cool it down, and then start again. Unfortunately, there was nothing we could do to fix it, except for using a different one.

5. How do you think it links with the next experiment?
We hope that we are provided with a different Raspberry Pi for the next lab, so that we can follow the experiments properly. Besides that, there were no technical issues with the experiment.

6. Contribution statement - The python code was written by Saransh and Adarsh. Rawal handled the circuit and connections. Jasnoor and Binduthraya worked on displaying the outputs on the Oscilloscope.