# Installation and execution instructions

We have submitted the C and Python files as we have executed the project in both languages.

The problem with the C execution is that it requires various n numbers of other installations and small changes which were made along the way. We have jotted down the most necessary installations which we remember are needed for the execution of this file, but in case we might have forgotten to include them in the instructions list we have provided a working demo of the project and also a Python file which might help to give an idea of the execution of the project in C.

We have used multi-threading along with mutex implementation for the distance variable as it is shared by various threads and functions in various places, for example, thread 1 uses an ultrasonic sensor and the distance measurement function to calculate the distance of the object and set it. Threads 3 and 4 execute LEDs and buzzers that use the distance variable to check if the object is near 30 cm and glow up the red LED and buzz the buzzer or if the object is farther than 30 cm then glow up the green LED and stop the buzzer.

You can just directly run the Python file by using the python3 objectDetectionSystem.py

OR

To execute using a C file you follow the following steps.

Requirements needed to run the C file:

- We have run the code on a Linux image.
- You need to the PRU software development kit and set the variables PRU_CGT to the path of PRU compiler tools.
- You can download the PRUSDK from the Texas Instruments website and extract them into your system.
- Set the environment variables and ensure the PRU compiler is installed using CLPRU –version.

- We also ran the following codes from the following GitHub repository to make sure that the code was running https://github.com/luigif/hcsr04
- We can download the package using the following code
  wget --no-check-certificate https://github.com/luigif/hcsr04/archive/master.tar.gz -O - | tar xz
- You will also need to run the following code to make sure PASM is installed.
  sudo apt-get install parallax-propeller-elf
- After it is downloaded unzip it using the following code
  gunzip propeller-toolchain-ubuntu-linux-64-bit.gz
- To build the packet downloaded from GitHub run the following commands
  cd hcsr04-master
  make
  make install
  It will copy the device tree driver to /lib/firmware and add it to the cape manager.

Compile the file using the normal gcc compiler using the code

gcc objectDetectionSystem.c -o objectDetectionSystem.out -lpthread

The above PRU header files are necessary because they contain the configuration needed for working the ultrasonic sensor. We needed the PRU to generate and measure ultrasonic sensors, this requires high-precision distance calculation in real-time.