4. Experiments doing the analog output II:

Description of the Experiment:

After checking the results of the previous experiment, Team AD thought about the way to detect the hand motion regardless of the speed of the hand movement. As a result, some changes were made on the code. The experiment is conducted with the modified code to detect the right to left movement or the left to right movement.

Explanation of the Code used in the Experiment:

From the previous experiment, Team AD realized that the system must detect the hand movement regardless of the speed of the hand motion. The basic ideas of storing the first measurements as the initial value and of appending the difference between the initial value and the measured value is not changed. However, the difference between the initial value and the measured value is appending into the corresponding list that has no fixed length.
The list of each sensor has the maximum length of the list based on the time.sleep value and the value set up by Team AD as the longest time it will take for hand to move from one sensor to another. The maximum length of the list equals the maximum time value divided by the time.sleep value.
The lists of each sensor are empty initially. The difference between the initial value and the measured value of each sensor is appended to the corresponding list if the difference value is greater than the certain arbitrary number (0.5 in the code). If it is less than the chosen arbitrary number, then zero is added to the list. If the first values of both lists are zero, then both lists become empty lists. If one of the sensors detected the presence of the hand and the first value of the corresponding list is not zero, the difference between the measured value and the initial value for each sensor is appended to the list until the hand movement is detected or the length of the list exceeds the maximum length. When the length of the list exceeds the maximum length, the
The hand movement is detected based on the first value of each list and the last value of each list, which is very similar to the previous experiment. The difference between the previous experiment and this experiment is that the position of the last value that the code checks. In the previous experiment, the last value of the list is always going to be the third value of the list. However, the position/index of the last value of the list is unknown as the length of the list keeps increasing. As it was mentioned before, the left to right movement is detected when the first value of the left sensor's list and the last value of the right sensor's list are bigger than 0 while the right to left movement is detected when the first value of the right sensor's list and the last value of the left sensor's list are bigger than 0.
The setup and the procedure of the experiment are the same as the previous experiment.

Result of the experiment:

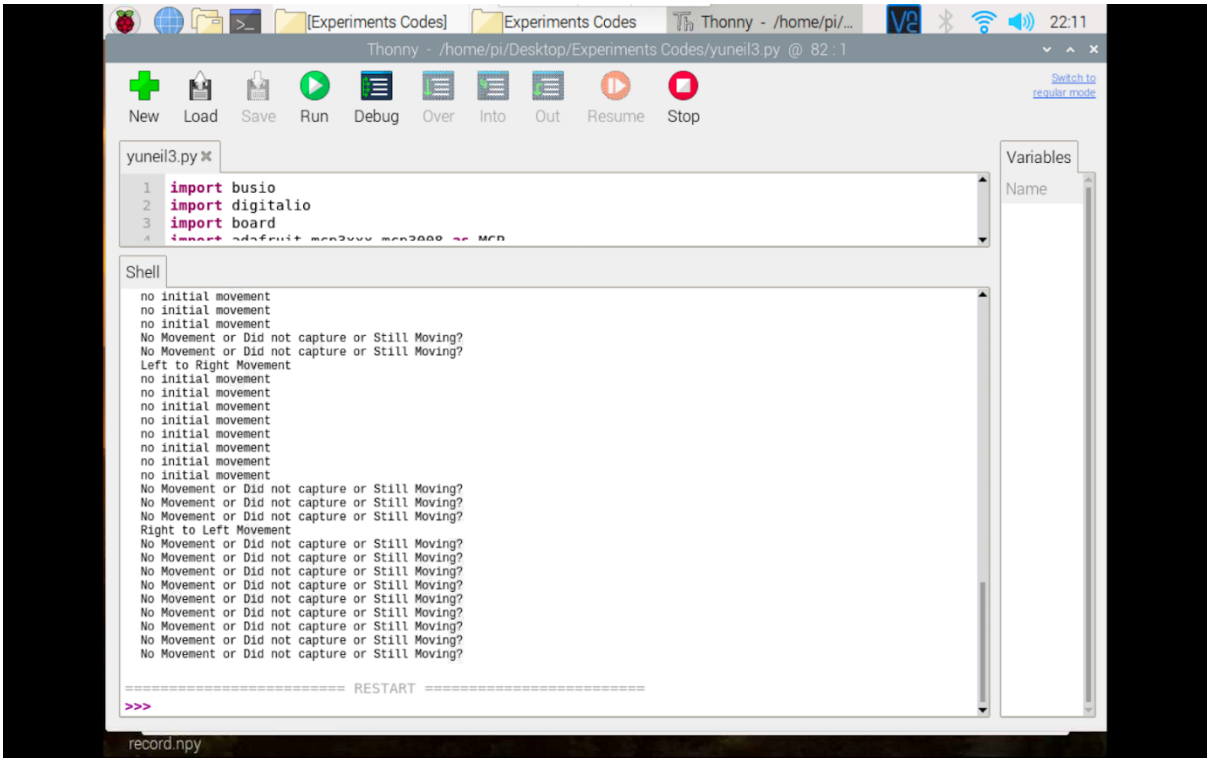

Figure: Output of the Code for Experiment 4

The output of the code shows that the system is good at detecting the hand movement. However, the speed of the hand motion still affects the success of the system on detecting the hand movement in a small magnitude. Since it is impossible to create the system perfectly detecting the hand motion in short amount of time, Team AD decided to use the code to control presentation slides and music player.