

ECPS 216: IOT SYSTEMS AND SOFTWARE

ASSIGNMENT 5 – CODE RED

-GAGAN KARTHIK KOMMA

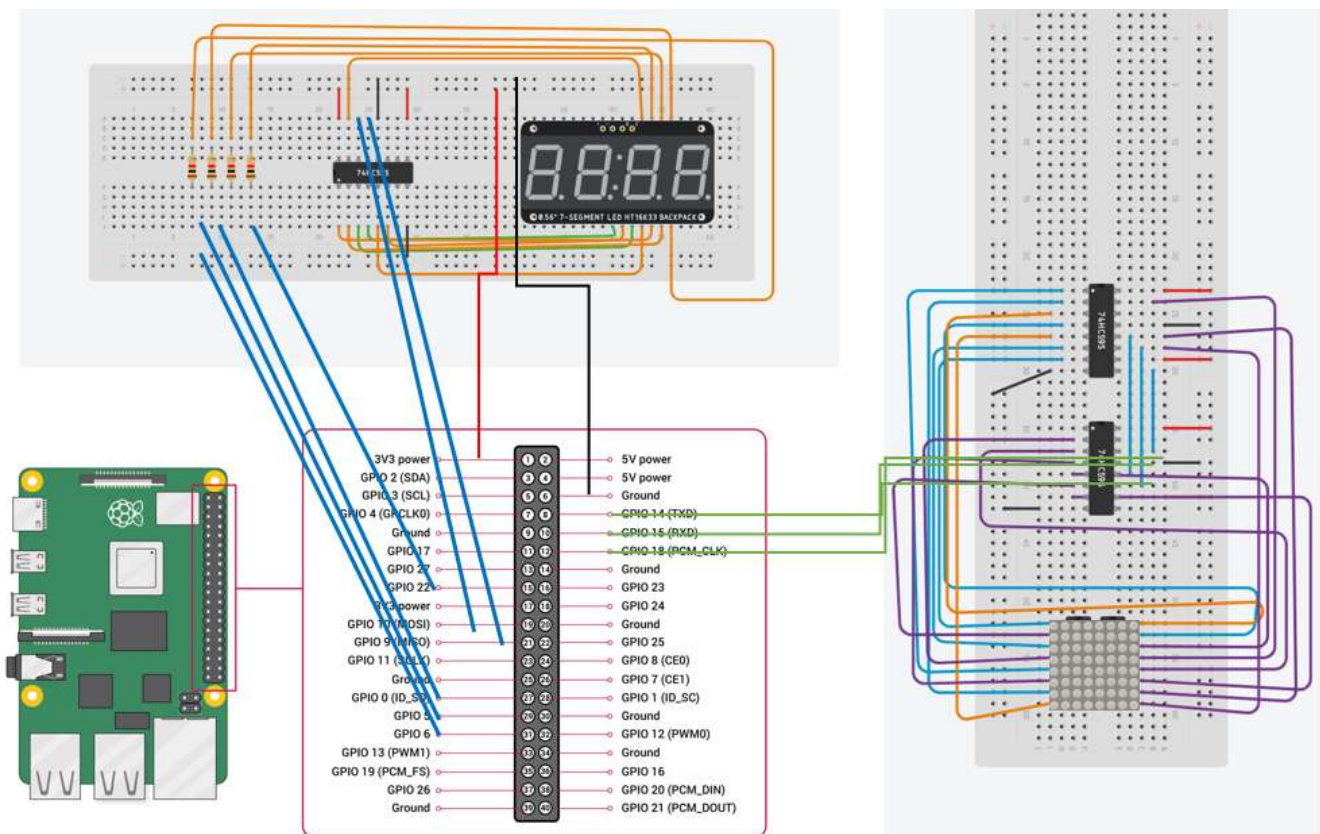
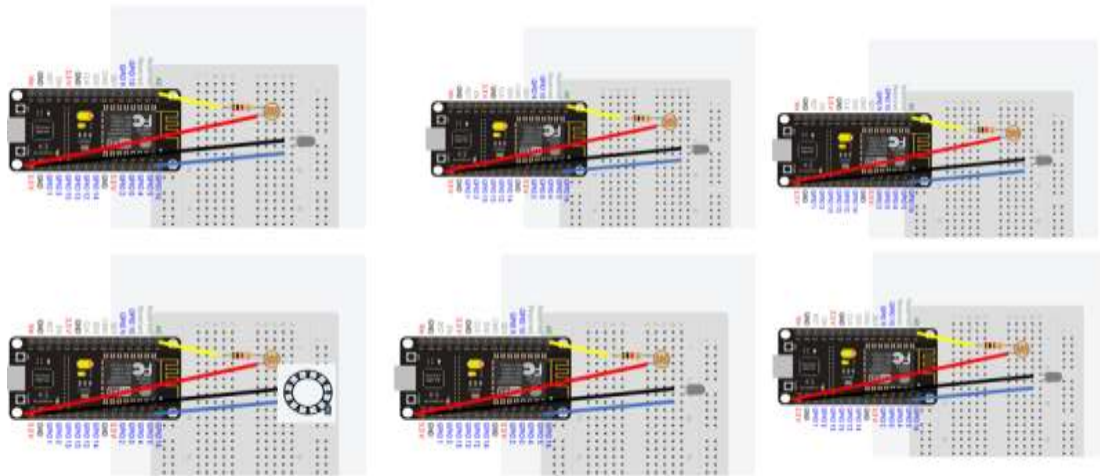
-MANISH SUDUMBREKAR

-VISHWANATH SINGH

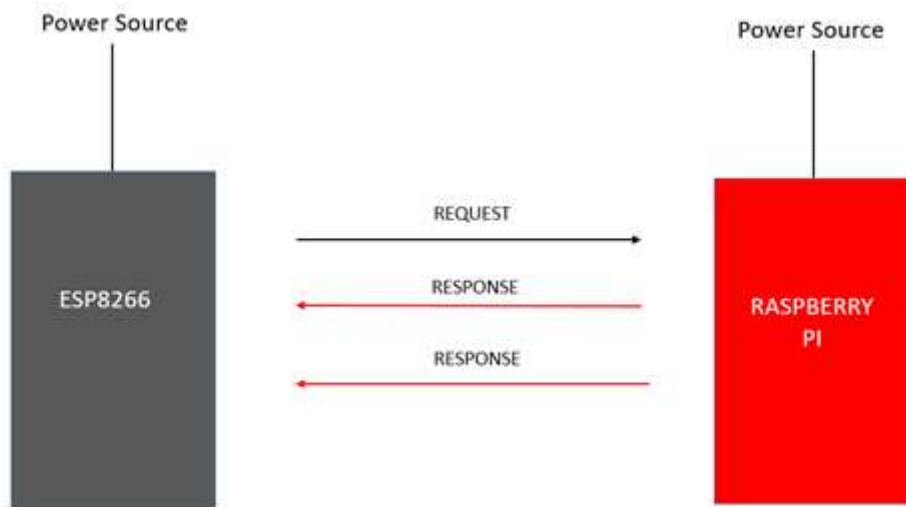
DEMONSTATION LINK:

https://drive.google.com/file/d/1_xewEXWAYQFRTCY6JA_uUItJYpxNVtu4/view?usp=sharing

WIRING DIAGRAM:

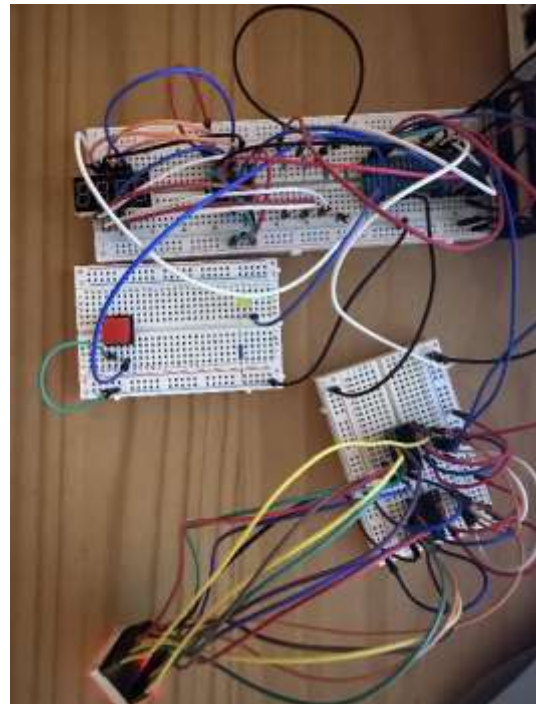
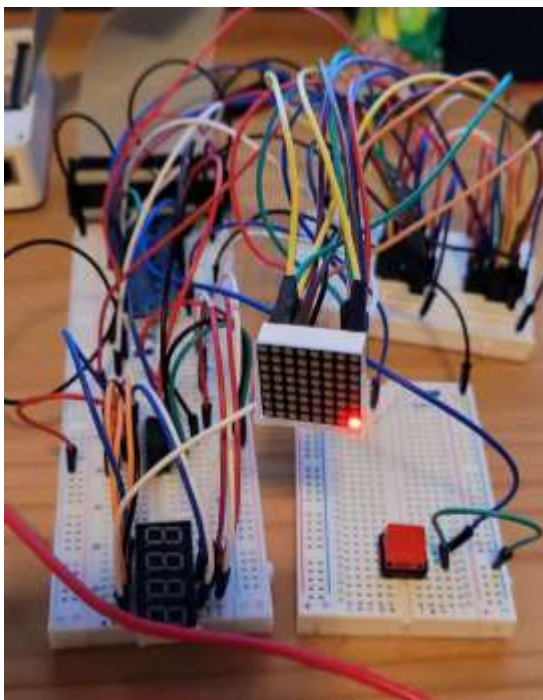
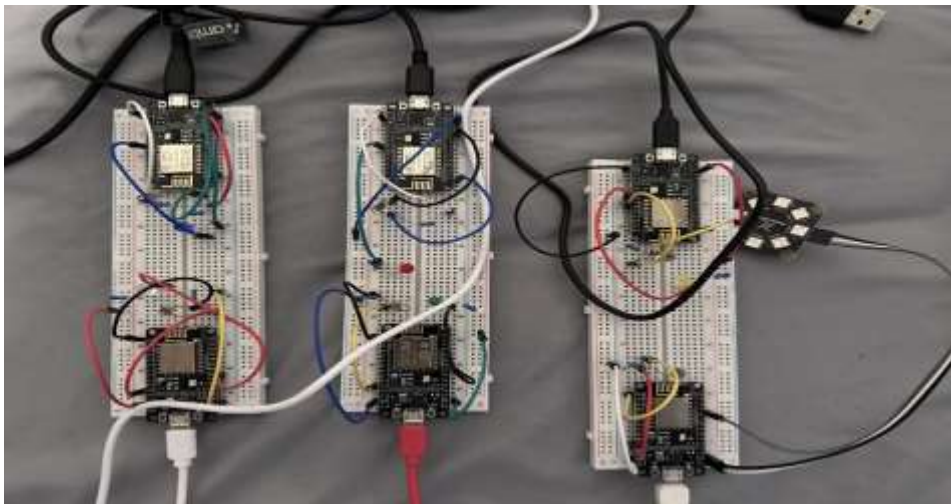


BASIC UDP COMMUNICATION:

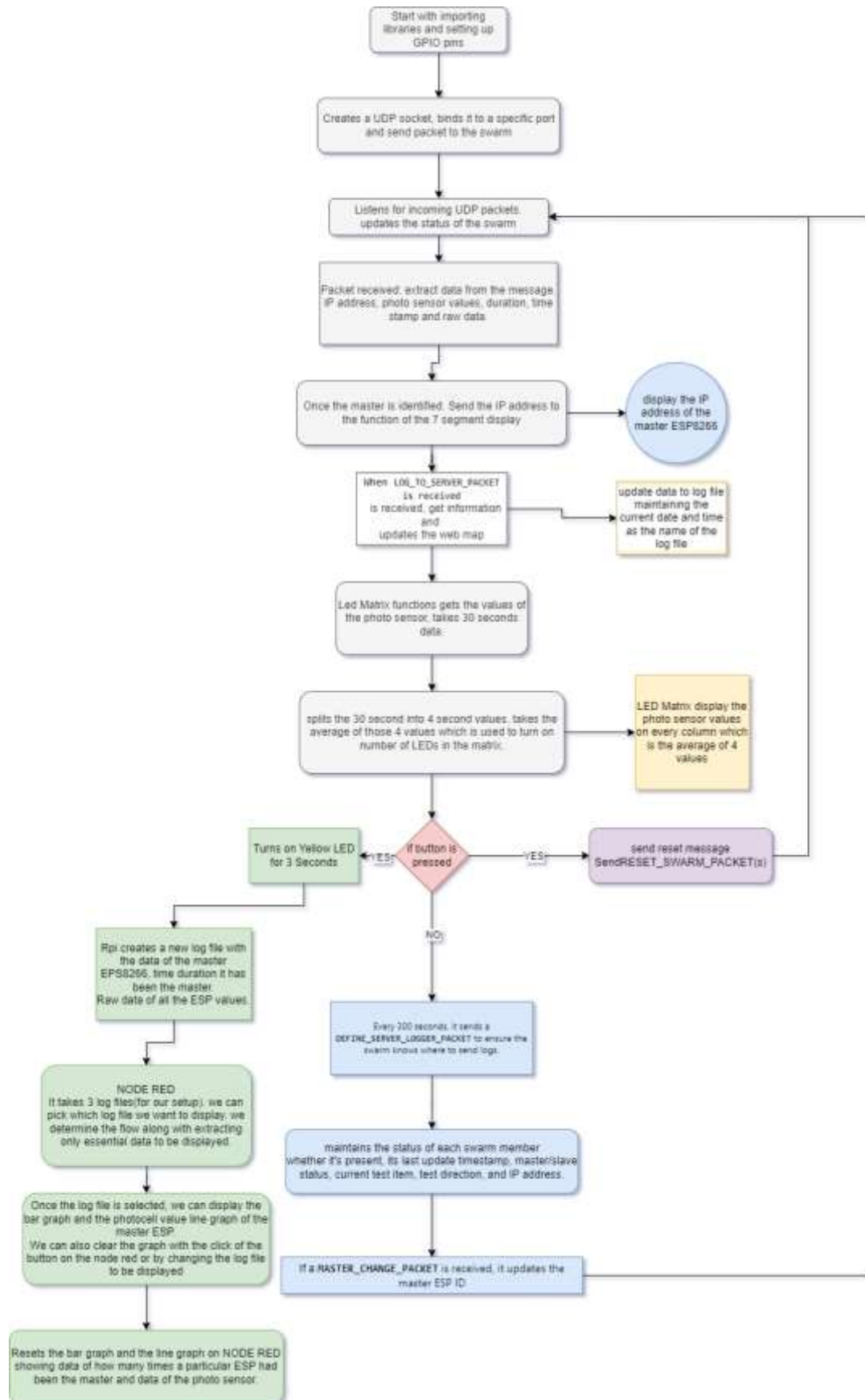


- We are using 6 ESP's and a Raspberry Pi to establish UDP communication. ESP is connected with an external LED(Red, Blue, Yellow, White, Green and a circular LED) which shows different brightness using PWM according to the values from the photo resistor. Raspberry pi has been connected with a button and a LED (Yellow). Raspberry Pi is also connected to 2 shift registers which are connected to a 7-segment display and a LED matrix.
- Each LED is assigned to an ESP and starts blinking when the master between the LEDs has been selected. The circular LED is also implemented on one of the ESP's and its 8 Led's are lit according to the brightness and intensity values of the photoresistor. The Yellow LED connected to the button on the Raspberry Pi is lit up for 3 seconds when the button is pressed to reset all the values being displayed on the graphs.
- The 7 Segment display is used to display the last 3 digits of the IP Address of the current Master and the photo-resistor values are also displayed on the LED Matrix which displays the photocell data trace over the past 30 seconds, each column of the LED Matrix represents 4 seconds.

OUR SETUP:

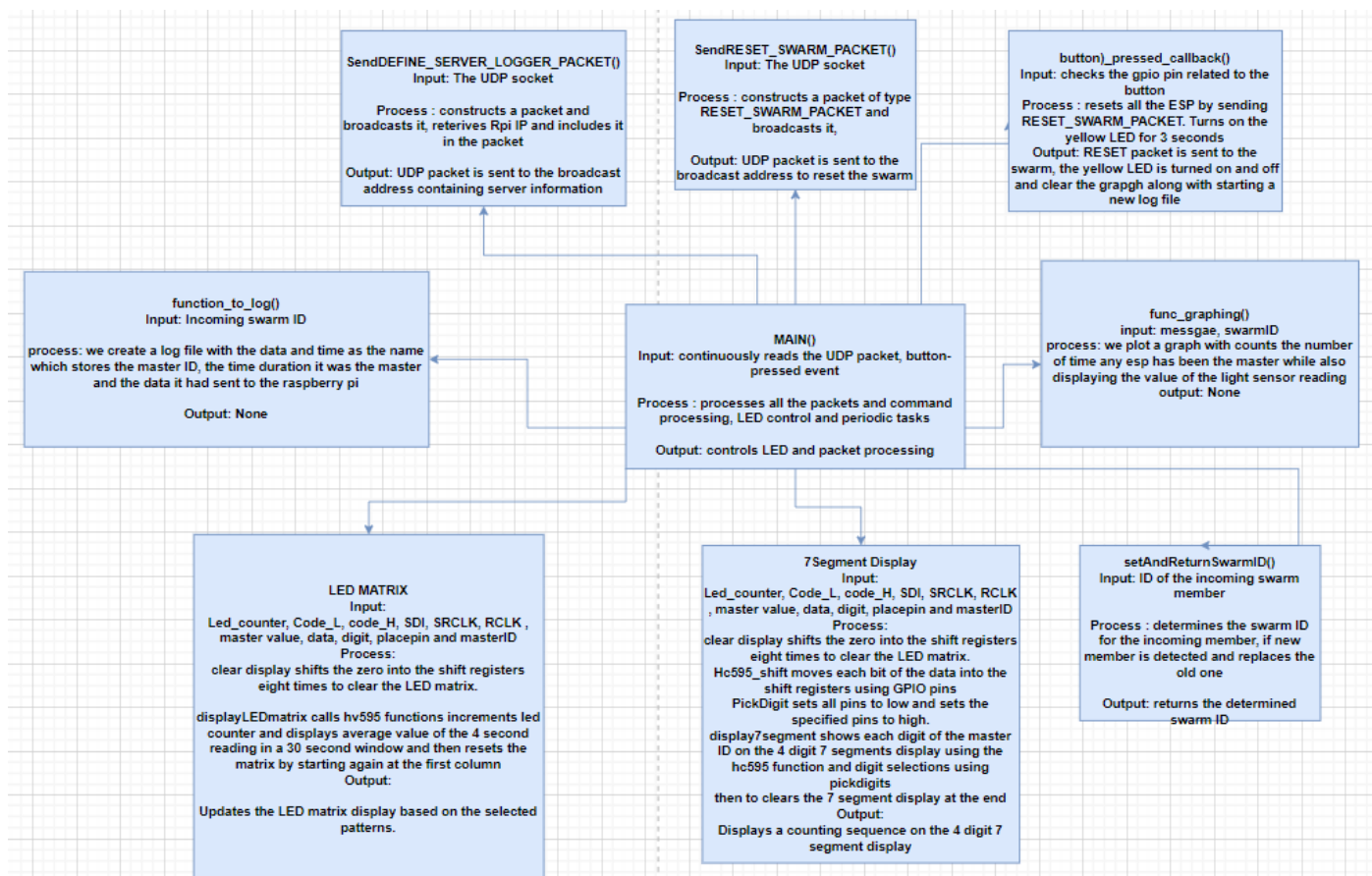


FLOW CHART OF RASPBERRY PI:

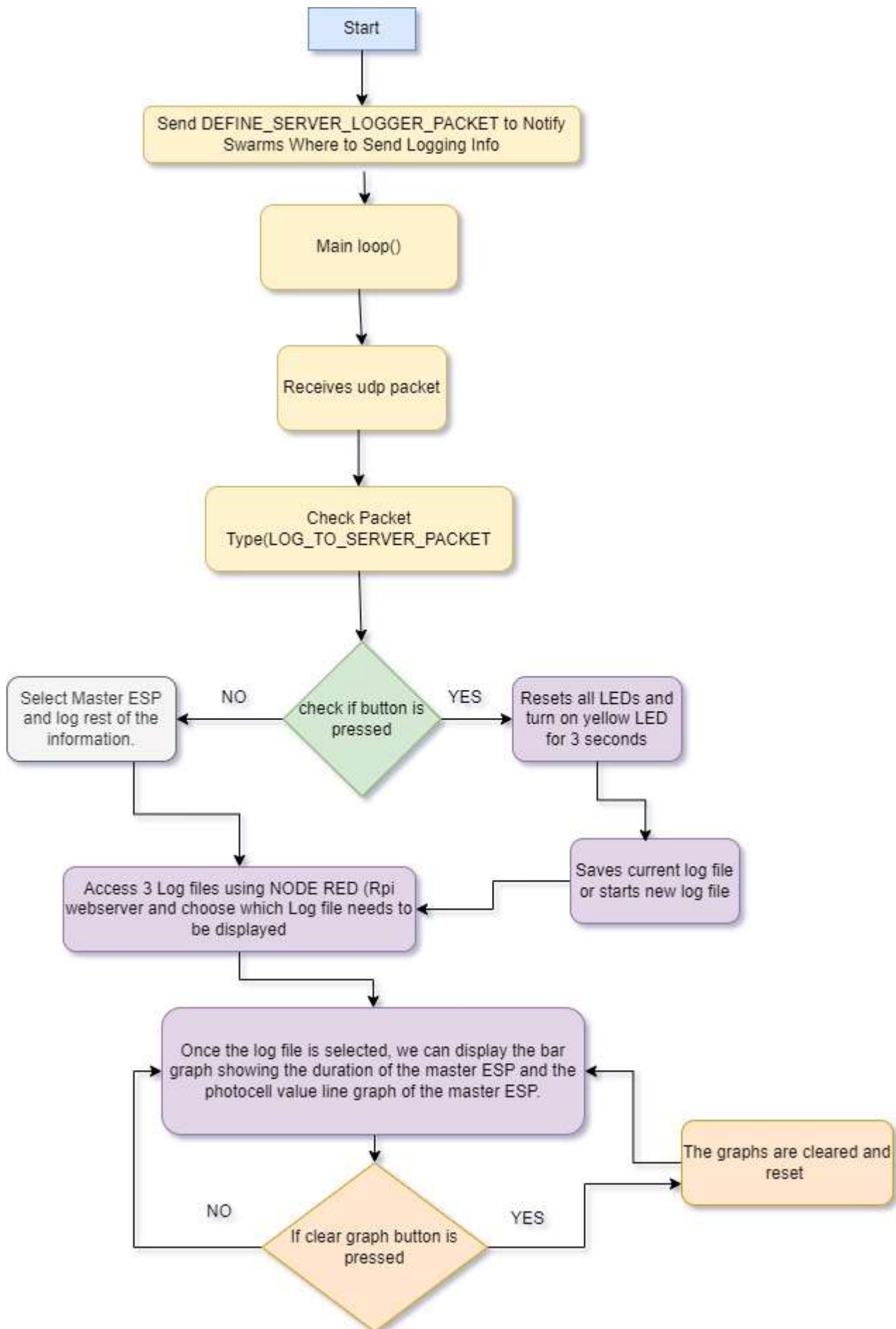


- Initially, after UDP communication has been established between ESP and Raspberry Pi, the Pi starts receiving photo resistor values from ESP and LEDs are flashed accordingly to the master status of the ESP swarm.
- The values being received are stored into a log file which includes the Master status, swarm ID, the software version number, the photo resistor value, the packet status, the IP address of the ESP along with current date and time.
- This information is used to create 2 graphs in NODE RED (RPI Webserver).
- One Line graph where data is traced on the NODE RED display over the past 30 seconds from the chosen Log file in the web server.
- Another bar graph chart is displayed showing master devices (Identified by the IP) and how long they have been a master.
- When the button attached to the Pi is pressed a new log is created or saves the current log file with the current date and time as part of the filename.
- The last three digits of the IP address of the current master ESP is displayed on the 7-segment display.
- The photocell trace value is displayed in the led matrix. Each column in the led matrix depicts the trace value over a period of 4 seconds and the data of 30 seconds is displayed in the led matrix.

FUNCTIONALITY OF RASPBERRY PI CODE:



FLOW CHART OF RASPBERRY PI LOGGING:



- The raspberry pi receives the data from the ESP which are connected to the same network . The data received about the master ESP is stored in a log file by the raspberry pi. The data includes the version number , the status of each ESP, the photoresistor value, and the is packet status.
- A button is connected to the raspberry pi and when it is pressed, Yellow LED is turned on for a period of 3 seconds and a new log is created by naming it as the current date and time .
- Selection of log file in the node red, will show two graphs in the node red UI. A line graph showing photocell trace data and a bar graph showing the duration for each ESP has become master.
- There is also an option to clear the displays for both the graphs and the values are reset.

EXAMPLE OF EXPECTED LOG FILE:

2023-12-08 05:12:26,530 - Master Device: 2 | Duration: 1 seconds

2023-12-08 05:12:26,531 - Raw Data: [' 0,1,28,62,PR,234 ', ' 1,0,28,12,PR,147 ', ' 2,0,28,1,PR,47 ', ' 3,0,28,5,PR,155 ', ' 4,1,28,50,PR,139 ', ' 5,0,28,4,PR,159 ']

2023-12-08 05:12:26,858 - Master Device: 1 | Duration: 1 seconds

2023-12-08 05:12:26,858 - Raw Data: [' 0,1,28,67,PR,147 ', ' 1,0,28,2,PR,47 ', ' 2,0,28,28,PR,234 ', ' 3,0,28,5,PR,155 ', ' 4,1,28,50,PR,139 ', ' 5,0,28,4,PR,159 ']

2023-12-08 05:12:26,861 - Master Device: 2 | Duration: 1 seconds

2023-12-08 05:12:26,861 - Raw Data: [' 0,1,28,151,PR,234 ', ' 1,0,28,12,PR,147 ', ' 2,0,28,2,PR,47 ', ' 3,0,28,5,PR,155 ', ' 4,1,28,50,PR,139 ', ' 5,0,28,4,PR,159 ']

2023-12-08 05:12:27,207 - Master Device: 2 | Duration: 2 seconds

2023-12-08 05:12:27,207 - Raw Data: [' 0,1,28,97,PR,234 ', ' 1,0,28,12,PR,147 ', ' 2,0,28,1,PR,47 ', ' 3,0,28,5,PR,155 ', ' 4,1,28,50,PR,139 ', ' 5,0,28,4,PR,159 ']

2023-12-08 05:12:27,522 - Master Device: 2 | Duration: 3 seconds

2023-12-08 05:12:27,523 - Raw Data: [' 0,1,28,69,PR,234 ', ' 1,0,28,12,PR,147 ', ' 2,0,28,1,PR,47 ', ' 3,0,28,6,PR,155 ', ' 4,1,28,50,PR,139 ', ' 5,0,28,4,PR,159 ']

2023-12-08 05:12:27,856 - Master Device: 2 | Duration: 4 seconds

2023-12-08 05:12:27,857 - Raw Data: [' 0,1,28,77,PR,234 ', ' 1,0,28,12,PR,147 ', ' 2,0,28,8,PR,47 ', ' 3,0,28,6,PR,155 ', ' 4,1,28,50,PR,139 ', ' 5,0,28,4,PR,159 ']

2023-12-08 05:12:28,189 - Master Device: 2 | Duration: 5 seconds

2023-12-08 05:12:28,189 - Raw Data: [' 0,1,28,102,PR,234 ', ' 1,0,28,12,PR,147 ', ' 2,0,28,34,PR,47 ', ' 3,0,28,6,PR,155 ', ' 4,1,28,50,PR,139 ', ' 5,0,28,4,PR,159 ']

2023-12-08 05:12:28,517 - Master Device: 2 | Duration: 6 seconds

2023-12-08 05:12:28,517 - Raw Data: [' 0,1,28,288,PR,234 ', ' 1,0,28,12,PR,147 ', ' 2,0,28,34,PR,47 ', ' 3,0,28,21,PR,155 ', ' 4,1,28,50,PR,139 ', ' 5,0,28,4,PR,159 ']

2023-12-08 05:12:28,540 - Master Device: 3 | Duration: 1 seconds

2023-12-08 05:12:28,540 - Raw Data: [' 0,1,28,104,PR,47 ', ' 1,0,28,22,PR,147 ', ' 2,0,28,27,PR,234 ', ' 3,0,28,21,PR,155 ', ' 4,1,28,51,PR,139 ', ' 5,0,28,5,PR,159 ']

2023-12-08 05:12:28,770 - Master Device: 3 | Duration: 2 seconds

2023-12-08 05:12:28,770 - Raw Data: [' 0,1,28,341,PR,47 ', ' 1,0,28,22,PR,147 ', ' 2,0,28,27,PR,234 ', ' 3,0,28,9,PR,155 ', ' 4,1,28,51,PR,139 ', ' 5,0,28,5,PR,159 ']

2023-12-08 05:12:28,853 - Master Device: 2 | Duration: 1 seconds

2023-12-08 05:12:28,853 - Raw Data: [' 0,1,28,182,PR,234 ', ' 1,0,28,12,PR,147 ', ' 2,0,28,7,PR,47 ', ' 3,0,28,21,PR,155 ', ' 4,1,28,50,PR,139 ', ' 5,0,28,4,PR,159 ']

2023-12-08 05:12:29,107 - Master Device: 3 | Duration: 1 seconds

2023-12-08 05:12:29,107 - Raw Data: [' 0,1,28,488,PR,47 ', ' 1,0,28,22,PR,147 ', ' 2,0,28,27,PR,234 ', ' 3,0,28,9,PR,155 ', ' 4,1,28,46,PR,139 ', ' 5,0,28,5,PR,159 ']

2023-12-08 05:12:29,199 - Master Device: 2 | Duration: 1 seconds

2023-12-08 05:12:29,199 - Raw Data: [' 0,1,28,218,PR,234 ', ' 1,0,28,12,PR,147 ', ' 2,0,28,7,PR,47 ', ' 3,0,28,21,PR,155 ', ' 4,1,28,46,PR,139 ', ' 5,0,28,4,PR,159 ']

2023-12-08 05:12:29,439 - Master Device: 3 | Duration: 1 seconds

2023-12-08 05:12:29,440 - Raw Data: [' 0,1,28,477,PR,47 ', ' 1,0,28,28,PR,147 ', ' 2,0,28,27,PR,234 ', ' 3,0,28,9,PR,155 ', ' 4,1,28,46,PR,139 ', ' 5,0,28,5,PR,159 ']

2023-12-08 05:12:29,521 - Master Device: 2 | Duration: 1 seconds

2023-12-08 05:12:29,521 - Raw Data: [' 0,1,28,169,PR,234 ', ' 1,0,28,12,PR,147 ', ' 2,0,28,7,PR,47 ', ' 3,0,28,21,PR,155 ', ' 4,1,28,46,PR,139 ', ' 5,0,28,4,PR,159 ']

2023-12-08 05:12:29,773 - Master Device: 3 | Duration: 1 seconds

2023-12-08 05:12:29,773 - Raw Data: [' 0,1,28,484,PR,47 ', ' 1,0,28,28,PR,147 ', ' 2,0,28,27,PR,234 ', ' 3,0,28,9,PR,155 ', ' 4,1,28,52,PR,139 ', ' 5,0,28,5,PR,159 ']