**Installation Guidelines**

Arduino IDE software was downloaded from Arduino official website. Necessary drivers for serial communication were installed in the same binary executable file. See *Figure* 1 as reference to download the file.

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Figure 1. Downloading Arduino IDE

Arduino IDE was launched after successful setup. *Figure* 2 shows program sketch area.

void setup()

{

//this function configures and initializes required hardware

}

void loop()

{

//this function runs the code within this block infinite times

}

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Figure 2. Arduino IDE Program Canvas

Required libraries for sensor were installed using library manager in:

Tools > Manage Libraries (Ctrl + Shift + I)

See figure below on how to search and install a library.

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Figure 3. Installing Libraries

See *Figure* 4 to add development board (MCU). New window for adding development board can be opened from:

File > Preferences (Ctrl + Comma)

Refer to following URL to add ESP32 board:

<https://github.com/espressif/arduino-esp32/releases/download/1.0.6/esp32-1.0.6.zip>

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Figure 4. Adding ESP32 Board

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Figure 5. Selecting Communication Port

*Figure* 5 shows selection of the communication port after ESP32 board was connected to PC via USB cable.

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Figure 6. Selecting Development Board

*Figure* 6 shows selection of the correct development board and version for Arduino to recognize chipset used on the boards and load the drivers accordingly.

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Figure 7. Uploading Program Sketch

*Figure* 7 shows program compilation of program sketch. Program was compiled by clicking the right arrowhead (marked in yellow) as shown in top left of the image.

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Figure 8. Flashing Program To MCU

After successful compilation of the code, the program was flashed to the memory unit of ESP7 MCU. This was achieved by pressing and holding boot button on ESP32 board for five seconds. On doing so, Arduino automatically flashes the compiled binary code to the microcontroller program memory unit and starts executing the program.

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Figure 9. Opening Serial Monitor

After the program was flashed, serial monitor was opened to see the list of running processes and concurrent executions. This was achieved by opening serial monitor by doing the following:

Tools > Serial Monitor (Ctrl + Shift + M)

In serial monitor, IP address of ESP32 was noted. This IP address was then used to access the Smart Home dashboard.