Project report on

Energy Consumption Monitor

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Chapter 1: Introduction

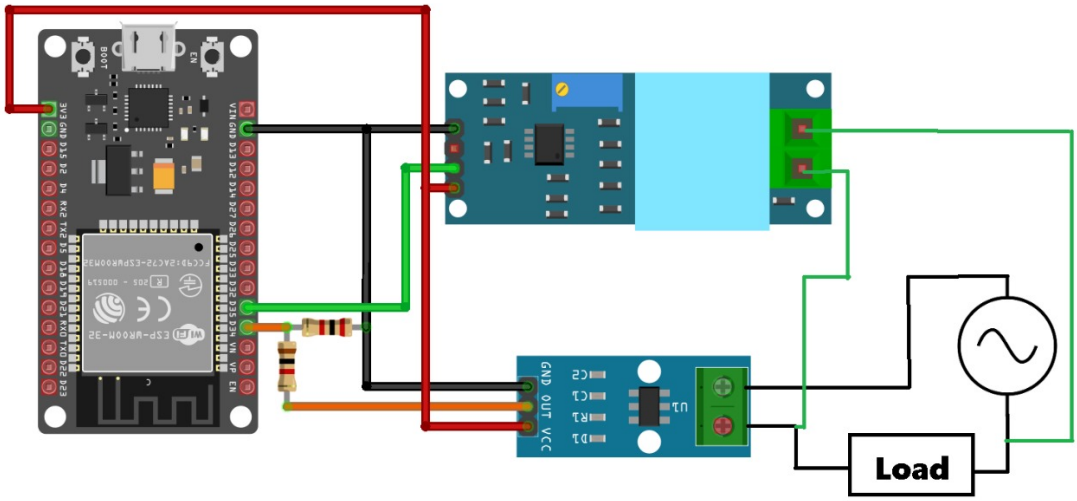
In an age where environmental sustainability and resource efficiency are paramount, the development of an advanced Energy Consumption Monitor is not only timely but essential. Our project, titled "Smart Energy Insight," is poised to meet this critical need by introducing an innovative solution that empowers individuals and organizations to gain comprehensive insights into their energy usage.

At its core, "Smart Energy Insight" leverages cutting-edge technology and sophisticated data analytics to provide users with real-time information and historical data regarding their energy consumption patterns. This empowers users to make informed decisions, leading to responsible energy management, cost reduction, and a decreased carbon footprint.

With an ever-increasing focus on energy conservation and eco-friendliness, this project will play a pivotal role in enabling consumers to take control of their energy usage like never before. Join us on this transformative journey as we revolutionize the way energy is monitored and managed, contributing to a more sustainable and energy-efficient future for all.

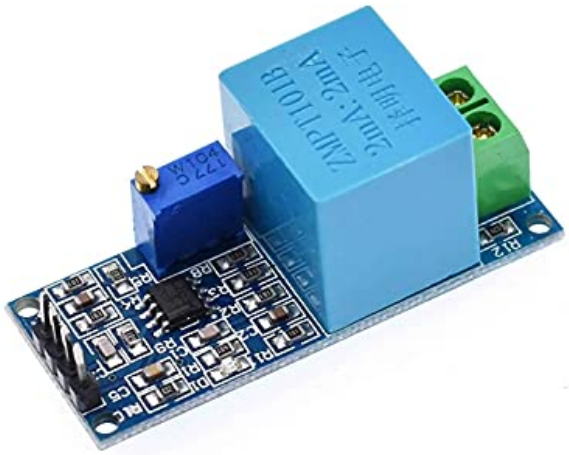
[1]

Fig. 1: ESP - 32



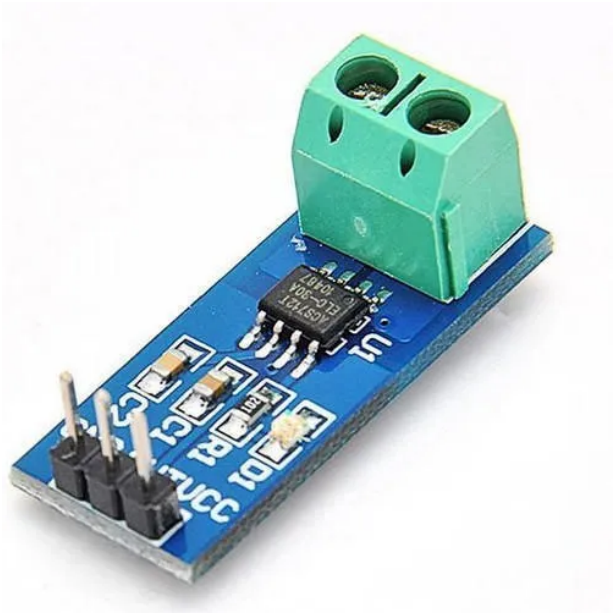
[2]

Fig. 2: Block Diagram of the circuit



[3]

Fig. 3: ZMPT 101B



[4]

Fig. 4: ACS712

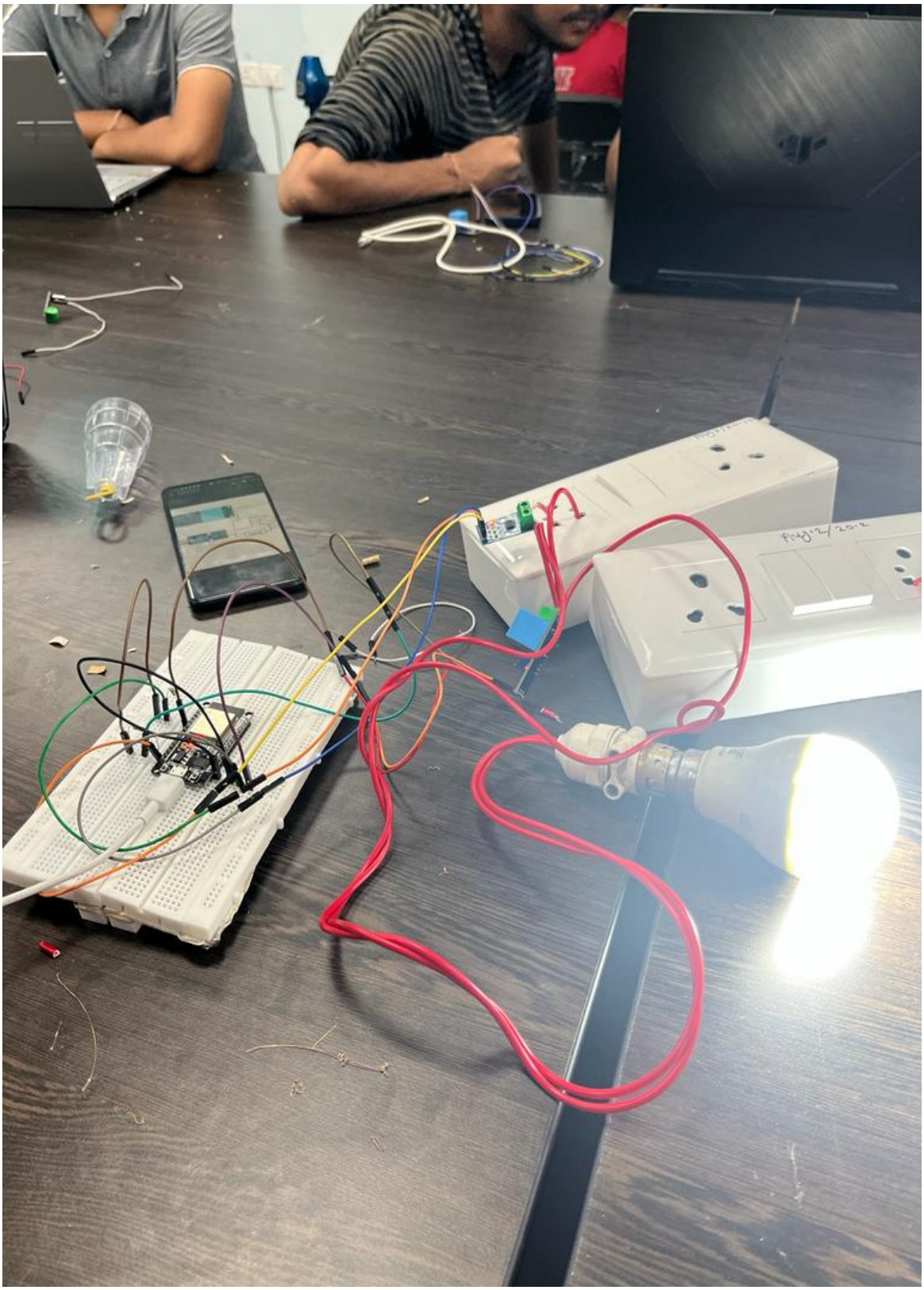


Fig. 5: Picture of the circuit made

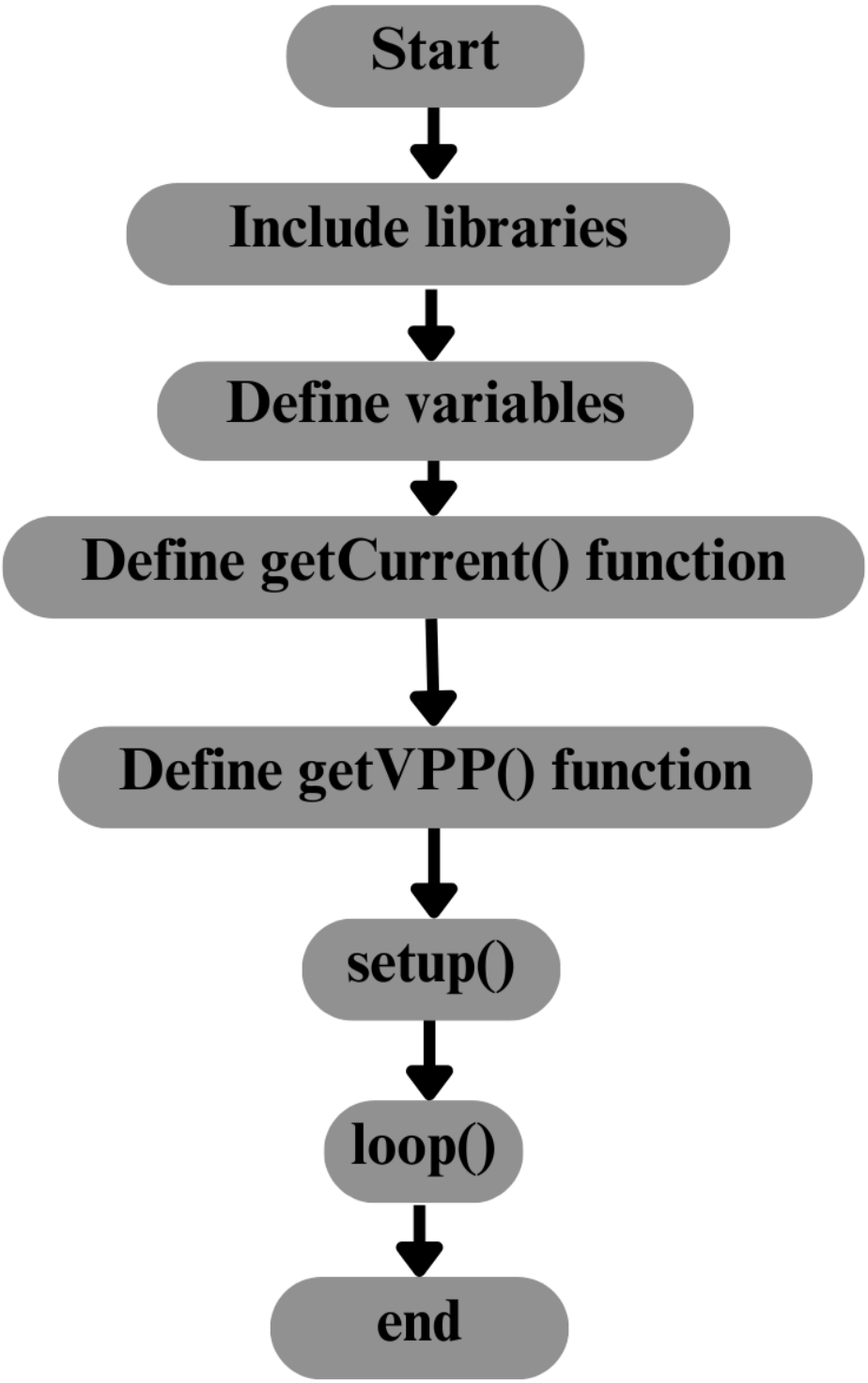
Chapter 3: Code

```
#include "EmonLib.h"     // Include the Emon library
#include <EEPROM.h>

EnergyMonitor emon;       // Create an instance of the EnergyMonitor
class
#define vCalibration 83.3 // Voltage calibration factor
const int sensorIn = 34;  // Analog input pin for current sensor
int mVperAmp = 185;       // Millivolts per ampere
int Watt = 0;             // Power in watts
double Voltage = 0;       // Voltage value
double VRMS = 0;          // Root Mean Square Voltage
double AmpsRMS = 0;       // Root Mean Square Amperage

// Function to calculate and print current and power values
float getCurrent() {
  Voltage = getVPP();                       // Get the voltage peak-to-peak
value
  VRMS = (Voltage / 2.0) * 0.707;               // Calculate VRMS
  AmpsRMS = ((VRMS * 1000) / mVperAmp);         // Calculate Amps
RMS
  Serial.print(AmpsRMS);
  Serial.print(" Amps RMS  --- ");
  Watt = (AmpsRMS * 240 / 1.2);               // Calculate power in watts
  Serial.print(Watt);
  Serial.println(" Watts");
  return AmpsRMS;
}

// Function to get Voltage Peak-to-Peak
float getVPP() {
  float result;
  int readValue;
  int maxValue = 0;
  int minValue = 4096;

  uint32_t start_time = millis();

  // Read values for 1 second to find max and min
  while ((millis() - start_time) < 1000) {
```

```
    readValue = analogRead(sensorIn);
    if (readValue > maxValue) {
      maxValue = readValue;
    }
    if (readValue < minValue) {
      minValue = readValue;
    }
  }

  result = ((maxValue - minValue) * 3.3) / 4096.0; // Calculate VPP
  return result;
}

void setup() {
  Serial.begin(115200);        // Initialize the serial communication
  emon.voltage(35, vCalibration, 0); // Initialize the voltage sensor
  Serial.print("IoT Energy");
  Serial.println("Meter");
  delay(3000); // Delay for 3 seconds
}

void loop() {
  Serial.print(emon.Vrms);
  Serial.print(" ");           // Print VRMS
  Serial.print(getVPP());
  Serial.print(" ");           // Print VPP
  Serial.println(getCurrent()); // Print current and power values
}
```

}

Code Flowchart



[5]

Conclusion:

In conclusion, "Smart Energy Insight" promises to be a catalyst for positive change in how we monitor and manage energy consumption. By harnessing advanced technology and data analytics, it empowers users to make informed choices, reduce costs, and promote environmental sustainability. Together, we can create a brighter, more energy-efficient future.

References:

[1]*https://hackster.imgix.net/uploads/attachments/1490490/image_HPKa5XuGrY.png?auto=compress%2Cformat&w=1280&h=960&fit=max*

[2] https://how2electronics.com/iot-based-electricity-energy-meter-using-esp32-blynk/

[3]*https://m.mediaamazon.com/images/I/41JXFLnKJQL._SY445_SX342_QL70_FMwebp_.jpg*

[4]*https://5.imimg.com/data5/SELLER/Default/2021/10/UI/QV/UC/53302641/current-sensor-module-acs712-30a-500x500.jpg*

[5]***https://www.canva.com/design/DAFuFKTjpyA/DdtabYak6jQzNKni83iDVQ/edit***

We also referred to articles on Github, videos on youtube and published projects on the internet. The links of which are as follows-

- Github - https://github.com/schreibfaul1/ESP32-audioI2S
- Youtube - https://www.youtube.com/watch?v=tJ1WnTRnnro
- How2electronics - https://how2electronics.com/iot-based-electricity-energy-meter-using-esp32-blynk/