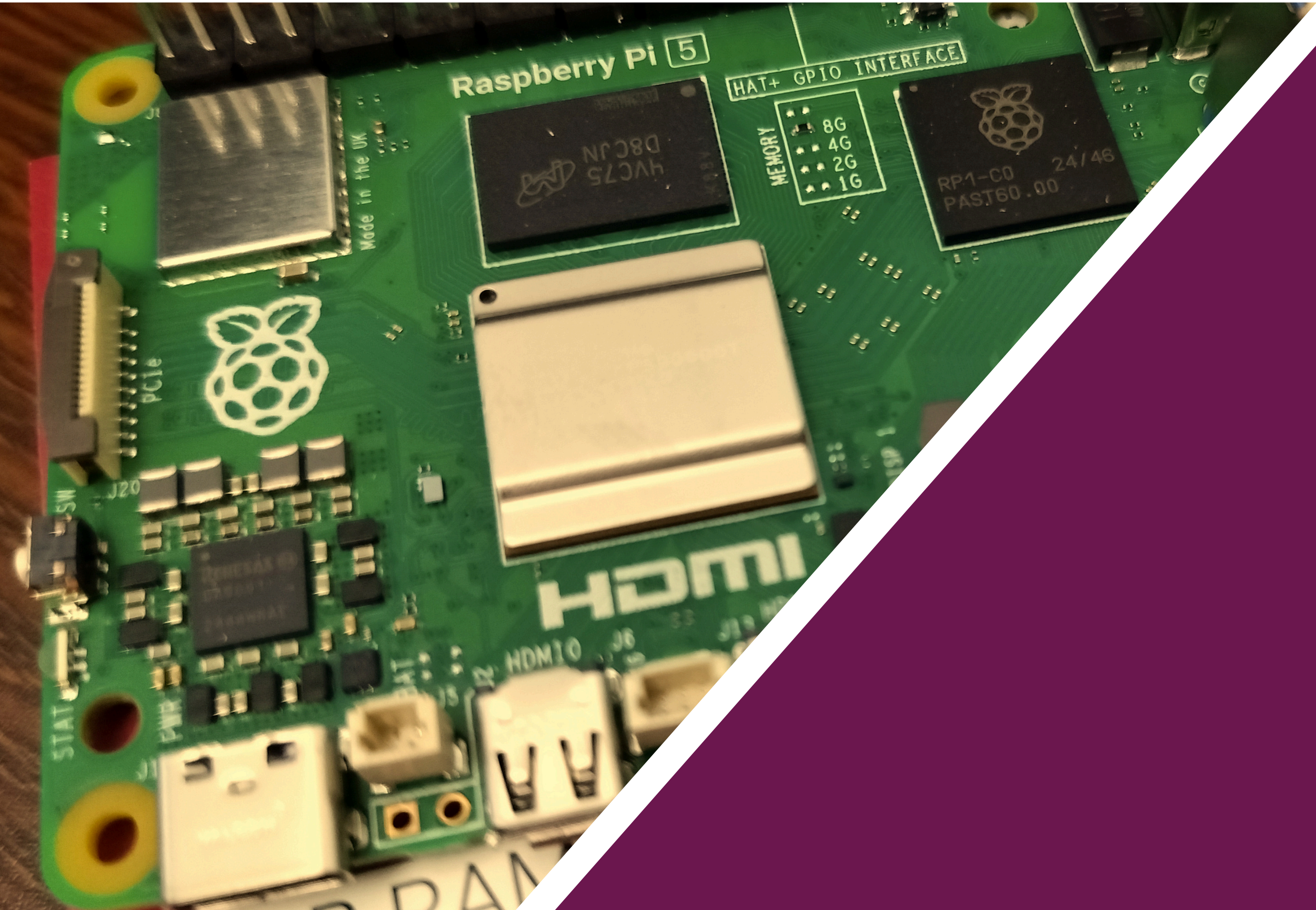




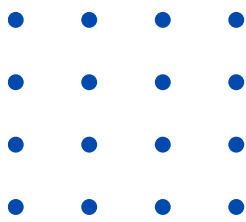
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MARA

EESEE 2025

10TH ELECTRICAL ELECTRONICS SYSTEMS
ENGINEERING EXHIBITION 2025
VOLUME 1



FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
JOHOR BRANCH
PASIR GUDANG CAMPUS



Authors

Noor Hafizah Khairul Anuar, Fazlinashatul Suhaidah binti Zahid, Nor Diyana Binti Md Sin, Zakariah Yusuf, Siti Musliha Ajmal Binti Mokhtar, Hanunah Binti Othman, Khairul Kamarudin Hasan, Masmaria Binti Abdul Majid, Siti Aminah Binti Nordin, Muhammad Asraf Bin Hairuddin, Muhammad Zairil Bin Mohd Nor, Nor Affida Binti M.Zin, Nur Asfahani Binti Ismail, Zahari Abu Bakar, Kamaru Adzha Bin Kadiran, Ezril Hisham Bin Mat Saat, Muhammad Rajaei Dzulkifli, Nur Amalina binti Muhamad, Norbaiti binti Sidik, Rozi Bin Rifin, Zatul Iffah Binti Abd Latiff, Sufian bin Mohamad, Norhalida Binti Othman, Nurul Nadia Binti Mohamad, Norlee Husnafa Binti Ahmad, Fatimah Khairiah Abdul Hamid, Wan Suhaifiza Binti W. Ibrahim, Fadila Binti Mohd Atan, Siti Aliyah Binti Mohd Saleh, Mastura Omar, Rijalul Fahmi Bin Mustapa, Atiqah Hamizah Binti Mohd Nordin, Muhammad Zairil Bin Muhammad Nor, Shakira Azeehan Binti Azli, Siti Hazurah Binti Indera Putra, Suhaili Binti Beeran Kutty.

Editors

Sufian bin Mohamad
Kamaru Adzha Bin Kadiran

Book Graphic Designer

Kamaru Adzha Bin Kadiran



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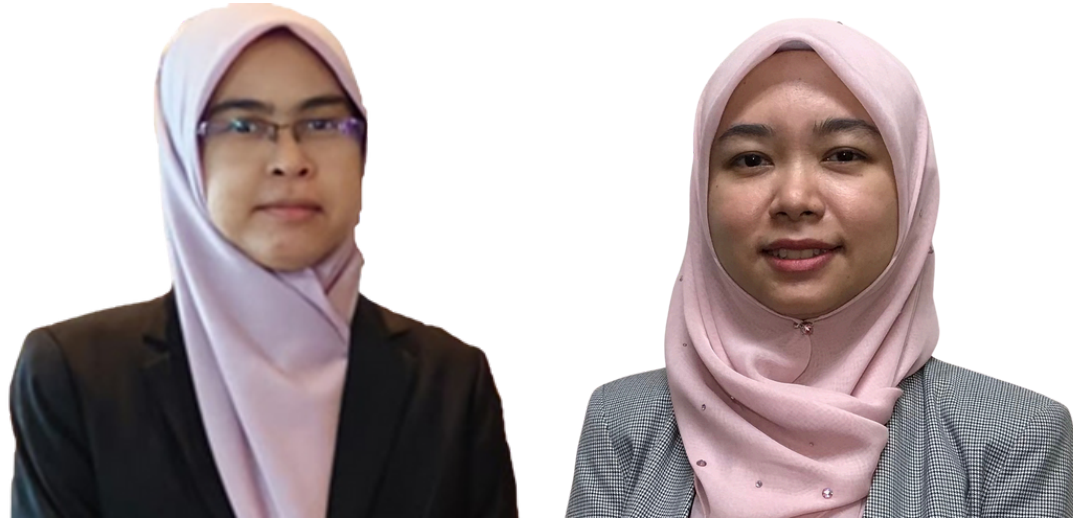
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FOREWORD BY THE PROGRAM CHAIR



Greetings from the Electrical, Electronics, and Systems Engineering Exhibition 2025 (EESEE 2025).

As the Program Chairs, it is our great pleasure to present this compilation of extended abstracts, showcasing the remarkable projects developed by our final-semester students from the Diploma in Electrical Engineering (Power) and Diploma in Electrical Engineering (Electronics) programs at Universiti Teknologi MARA, Cawangan Johor, Pasir Gudang Campus.

This exhibition marks a significant milestone in our students' academic journey, representing the culmination of years of dedication, perseverance, and learning. It also serves as an essential step toward the successful completion of their diploma studies. The projects featured this year are centered on the theme *Engineering Excellence: Bridging Technology and Life*, reflecting current trends and innovations in the engineering field.

This extended abstract book highlights not only the students' technical expertise but also their creativity, problem-solving skills, and ability to engage meaningfully with peers and industry professionals. Within these pages, you will find a diverse range of projects that embody a unique blend of knowledge, innovation, and practical application.

We warmly invite you to explore this collection, which celebrates the achievements of our aspiring engineers. Welcome once again to the Electrical, Electronics, and Systems Engineering Exhibition 2025. May the insights shared here inspire and pave the way for the next generation of innovative engineers.

Warm regards,

Dr. Fatimah Khairiah binti Abd Hamid

Dr. Atiqah Hamizah binti Mohd Nordin

Program Chairs

Electrical, Electronics, and Systems Engineering Exhibition 2025 (EESEE 2025)



Transformer Overload Protector

Muhammad Alif Najmi Bin Mohd Firdaus Ts. Muhammad Muzamil Bin Mustam

^{1,2}*Electrical Engineering Studies, College of Engineering, Universiti Teknologi MARA, Pasir Gudang, Johor.*
2022613084@isiswa.uitm.edu.my

ABSTRACT

The protection of transformers from overcurrent is pivotal to the overall reliability and stability of a power distribution system. Serious accidents, expensive repairs, or other awful events can arise as a result of such overloading. An Arduino-based monitoring system for overload protection of transformers is presented within this project. Using the ACS712 current sensor, the system automatically checks the current in real time and evaluates it against reference values for overloads. In overload conditions, a relay mechanism interrupts the transformer to prevent damage. Furthermore, the project also includes an LCD screen which indicates the status of the transformer, relay, and circuitry as useful information to the operators. For testing, empirical evidence established that the system was able to sense overload conditions and take preventive action without delay. This inexpensive and expandable design improves the security and operational performance of modern power distribution systems and will be useful in the field of electrical engineering.

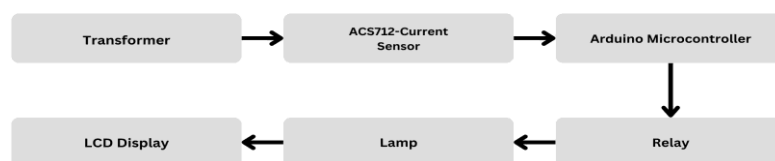
KEYWORDS: Arduino-based monitoring system, prevent damage, overload condition

PRODUCT DESCRIPTION

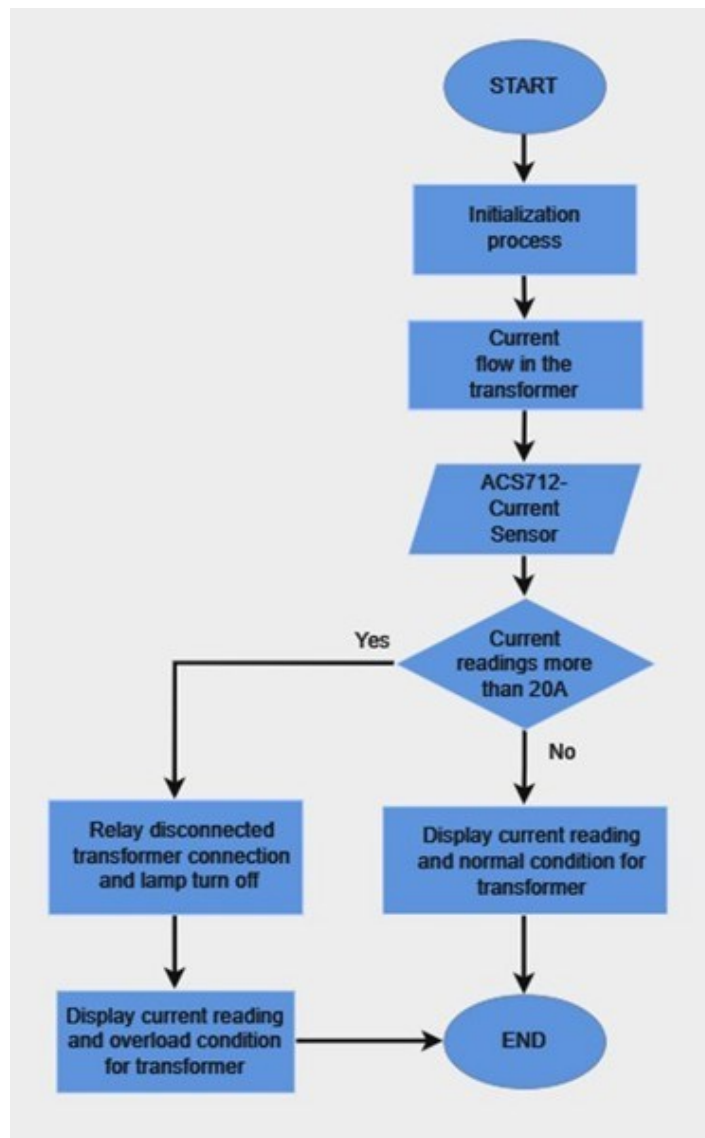
The Overload Protector of Transformer is an efficient as well as revolutionary system that is used for the protection of transformers from high load conditions. The system uses an Arduino microcontroller for the current monitoring throughout the system in real-time, processing, and controlling. The ACS712 current sensor is used to determine the current passing through the transformer and this is passed to the Arduino which compares these values with programmed values. When any overload condition is sensed, the transformer protection relay trips, thus preventing outage to the transformer. It also has an LCD display that shows real time values/status of the transformer to the operator. The system is aimed to ease the operation and flexibility of the design thus allowing a variety of use in industrial, residential, and renewable energy applications. Using efficient components and up-to-date technology, this product increases the efficiency, security and the effective life time of the transformers.

PICTURES/ SCHEMATIC DIAGRAMS/ FLOW CHARTS/SCREENSHOTS/ GRAPHS AND OTHER RELATED VISUALS

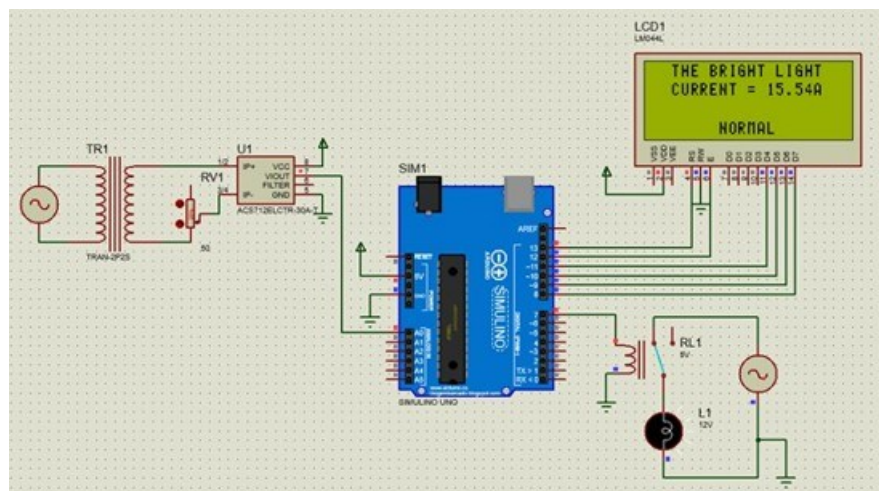
1. Block diagram



2. Flow Chart



3. Simulation Diagram



4. Coding

```

Code_Transformer_Protection_copy_20240610165822.ino
1 // include the library code:
2 #include <LiquidCrystal.h> //library for LCD
3
4 // initialize the library with the numbers of the interface pins
5 LiquidCrystal lcd(13, 12, 11, 10, 9, 8);
6
7 //Measuring Current Using ACS712
8 const int Sensor_Pin = A0; //Connect current sensor with A0 of Arduino
9 int sensitivity = 66; // use 100 for 20A Module and 66 for 30A Module
10 int offsetvoltage = 2500;
11
12 void setup()
13 {
14     pinMode(7,OUTPUT); //Relay Pin as a OUTPUT
15     lcd.begin(20, 4); // set up the LCD's number of columns and rows:
16     lcd.setCursor(0,0);
17     lcd.print(" THE BRIGHT LIGHT ");
18 }
19 void loop()
20 {
21     //***** Measure Current *****
22     unsigned int temp=0;
23     float maxpoint = 0;
24     for(int i=0;i<500;i++)
25     {
26         if(temp = analogRead(Sensor_Pin), temp>maxpoint)
27         {
28             maxpoint = temp;
29         }
30     }

```

```

31     float ADCvalue = maxpoint;
32     double Voltage = (ADCvalue / 1024.0) * 5000; // Gets you mV
33     double Current = ((Voltage - offsetvoltage) / sensitivity);
34     double AC_Current = ( Current ) / ( sqrt(2) );
35
36     lcd.setCursor(0,1);
37     lcd.print(" CURRENT = ");
38     lcd.print(AC_Current,2);
39     lcd.print("A "); //unit for the current to be measured
40
41     //***** Tranformer Overload Protection *****
42     if(AC_Current > 20) //if Tranformer Current is Greater Than 20A
43     {
44         lcd.setCursor(0,3);
45         lcd.print(" OVERLOADED ");
46         digitalWrite(7,LOW); //Shut Down Transformer
47     }
48     else
49     {
50         lcd.setCursor(0,3);
51         lcd.print(" NORMAL ");
52         digitalWrite(7,HIGH);
53     }
54 }

```

NOVELTY AND UNIQUENESS

The novelty and uniqueness from this project includes the integration of an Arduino-based system for real-time transformer overload protection, considering the affordability, scalability, and efficiency. Different from other protection methods by using fuses or simple relays, this work applies the ACS712 current sensor and relay control in overload detection precisely and automatically. Inclusion of an LCD display for real-time monitoring adds interactivity with the user and operational transparency. The novelty in the approach, besides improving safety, is a guarantee of quicker response to overload conditions; hence, this is outstanding as a modern cost-effective solution for power distribution networks.

BENEFIT TO MANKIND

It enhances the safety, reliability, and efficiency of electrical power distribution systems for the benefit of mankind. It reduces the risk of expensive repairs, power outages, and safety hazards such as electrical fires by preventing damage to the transformer through real-time monitoring and automatic disconnection in case of overload conditions. Because of its affordability and scalability, it becomes accessible for industrial and residential usage, renewable energy inclusive, to allow for better sustainably resilient energy infrastructures. This invention therefore supports the power supply uninterruptedly and helps improve the quality of life and technological progress in energy management.

COMMERCIALIZATION POTENTIAL

Transformer Overload Protector has very good commercialization potential that is cost-effective, scalable, and applicable in many different industries. The Arduino-based design integrates real-time monitoring with automatic overload detection, thus offering a modern solution to an age-old problem in power distribution systems through its user-friendly features, including an LCD display. This will make the system very attractive to industries, residential networks, and renewable energy applications that rely on the reliability of transformer protection. Besides, because of its modular and scalable architecture, easy customization to various market needs is possible; hence, it will be a feasible product for mass production and dissemination.

CONCLUSION

In conclusion, the Transformer Overload Protector is an innovative and cost-effective solution to the critical need for reliable transformer protection in modern power distribution systems. Its unique integration of Arduino-based real-time monitoring, automatic overload detection, and user-friendly features like an LCD display sets it apart from traditional protection methods. The system improves the safety and efficiency of transformers while offering a number of considerable benefits to mankind, including reduced risk of damage, costly repairs, and power outages, and improving energy sustainability. Strong commercialization potential, scalable design, and a wide variety of applications within industrial, residential, and renewable energy sectors are the reasons this product could see widespread adoption and help drive progress in energy management and infrastructure reliability.

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