M.KUMARASAMY
COLLEGE OF ENGINEERING
NAAC Accredited Autonomous Institution
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ISO 9001:2015 & ISO 14001:2015 Certified Institution
Thalavapalayam, Karur – 639 113.

A Minor Project Report

on

MCB FAILURE DETECTION AND PROTECTION

Submitted in partial fulfilment of requirements for the award of the

Degree of

BACHELOR OF ENGINEERING

in

ELECTRONICS AND COMMUNICATION ENGINEERING

Under the guidance of

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M.KUMARASAMY COLLEGE OF ENGINEERING

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KARUR – 639 113

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M.KUMARASAMY COLLEGE OF ENGINEERING, KARUR

BONAFIDE CERTIFICATE

Certified that this project report **"MCB FAILURE DETECTION AND PROTECTION "**is the bonafide work of **"ARUN KUMAR D (927621BEC014) , GOWTHAMVEL P(927621BEC054), HARIPRASAATH S (927621BEC058), KIRAN KUMAR S(22LEC007)"** who carried out the project work under my supervision in the academic year 2021-2022.

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This project report has been submitted for the **18ECP106L-Minor Project I** Viva Voce Examination held at M.Kumarasamy College of Engineering, Karur on **23.11.2022.**

Vision and Mission of the Institute and Department

Vision

To emerge as a leader among the top institutions in the field of technical education.

Mission

- Produce smart technocrats with empirical knowledge who can surmount the global challenges.
- Create a diverse, fully-engaged, learner-centric campus environment to provide quality education to the students.
- Maintain mutually beneficial partnerships with our alumni, industry and professional associations.

Department of Electronics and Communication Engineering

Vision

- To empower the Electronics and Communication Engineering students with Emerging Technologies, Professionalism, Innovative Research and Social Responsibility.

Mission

- Attain the academic excellence through innovative teaching learning process, research areas & laboratories and Consultancy projects.
- Inculcate the students in problem solving and lifelong learning ability.
- Provide entrepreneurial skills and leadership qualities.
- Render the technical knowledge and industrial skills of faculties.

PROGRAM EDUCATIONAL OBJECTIVES (PEO'S)

- **PEO1:** Graduates will have a successful career in academia or industry associated with electronics and communication engineering.
- **PEO2:** Graduates will provide feasible solutions for the challenging problems through comprehensive research and innovation in the allied areas of electronics and communication engineering.
- **PEO3:** Graduates will contribute to the social needs through lifelong learning, practicing professional ethics and leadership quality

PROGRAM OUTCOMES(PO'S)

- **PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
- **PO2: Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
- **PO3: Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
- **PO4: Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
- **PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
- **PO6: The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

- **PO7: Environment and sustainability:**Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
- **PO8: Ethics :**Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
- **PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
- **PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
- **PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
- **PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES(PSO'S)

- **PSO1**: Applying knowledge in various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of Engineering application.
- **PSO2**: Able to solve complex problems in Electronics and Communication Engineering with analytical and managerial skills either independently or in team using latest hardware and software tools to fulfil the industrialexpectations**.**

MAPPING OF PROJET WITH POs AND PSO

Abstract	**Matching with POs , PSOs**

ABSTRACT

Nowadays, the usage of miniature circuit breaker (MCB) in India is widely used in many fields such as in homes, restaurants, industries (small scale to big scale).MCB failure leads in damaging the consumer or industrial appliances in case of a short circuit or overload. This system automatically overrides the MCB to trip.There are many hazards caused due to the MCB fault that happen internally or externally. This paper focusses on reducing that hazard by the usage of the microcontroller Arduino .MCB failure detection and protection system uses a ACS712 Current sensor to detect the current surge. When the MCB fails to trip over while the short circuit or overload the system automatically overrides the MCB to trip. Here we use arduino Microcontroller to do all the required functions.

Keywords: *Arduino Nano,MCB Fault,Protection,ACS712 sensor*

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INTRODUCTION

Nowadays, the usage of miniature circuit breaker (MCB) in India is widely used in many fields such as in homes, restaurants, industries (small scale to big scale).MCB failure leads in damaging the consumer or industrial appliances in case of a short circuit or overload.

This system automatically overrides the MCB to trip.There are many hazards caused due to the MCB fault that happen internally or externally. This paper focusses on reducing that hazard by the usage of the microcontroller Arduino .MCB failure detection and protection system uses a ACS712 Current sensor to detect the current surge. When the MCB fails to trip over while the short circuit or overload the system automatically overrides the MCB to trip. Here we use arduino Microcontroller to do all the required functions.

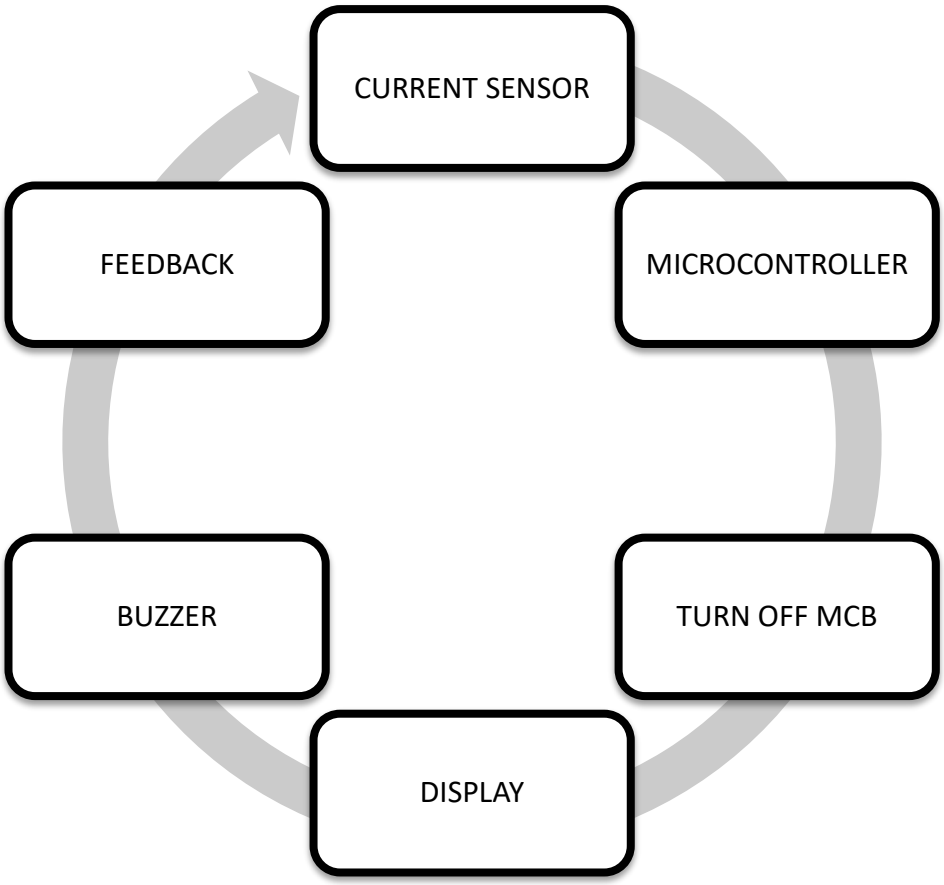
LITERATURE REVIEW

This system uses a ACS712 current sensor to detect the MCB Failure. When the MCB Failure is detected by the sensor, it sends an analog value to the microcontroller Arduino nano. The microcontroller Arduino nano sends the output to the LCD and displays the status of the MCB .It is Indicated to the User by some Alarm.

TOOLS USED

- ARDUINO NANO
- ACS712 CURRENT SENSOR
- BUZZER
- RELAY
- LCD DISPLAY

BLOCK DIAGRAM:



CIRCUIT DIAGRAM

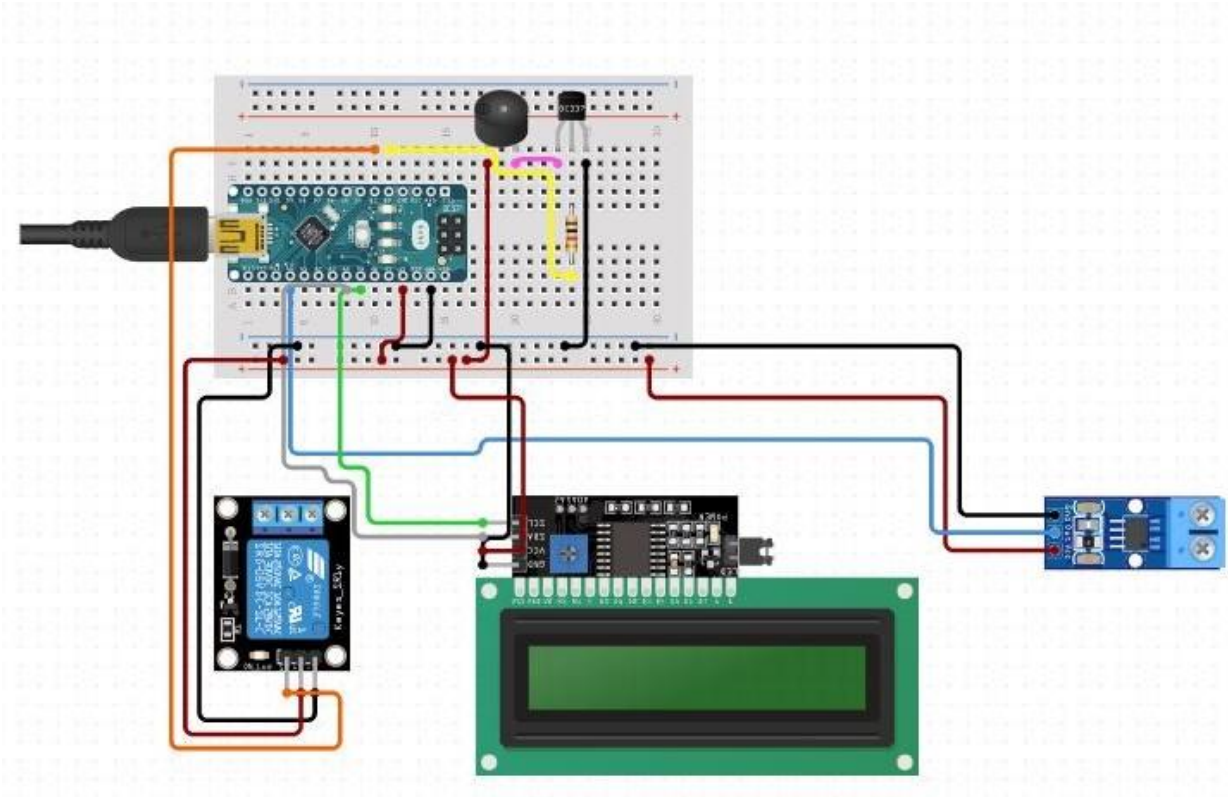


Figure 1 :Schematic diagram

MICROCONTROLLER (ATMEGA328P)

ARDUINO NANO

The Arduino nano is an open-source microcontroller board based on the Microchip ATmega328P microcontroller. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX).

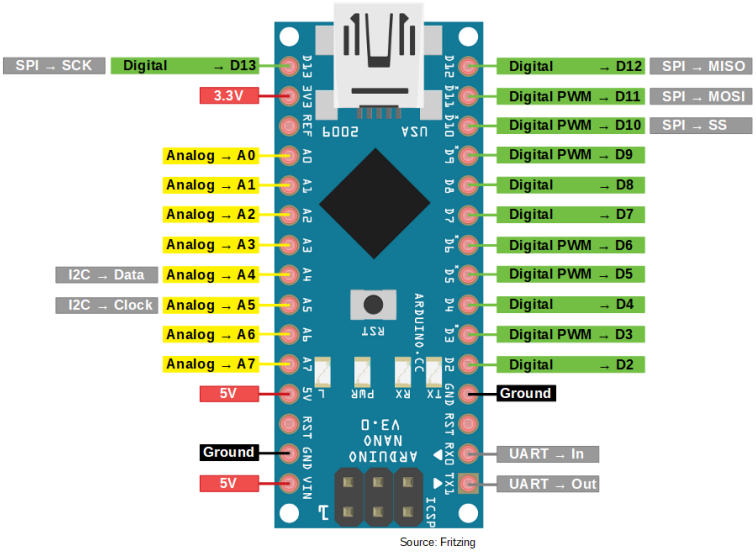


Figure 2 :ARDUINO NANO (ATMEGA328P)

ACS712 CURRENT SENSOR

This ACS721 current module is based on ACS712 sensor, which can accurately detect AC or DC current. The maximum AC or DC that can be detected can reach 20A, and the present current signal can be read via analog I / O port of Arduino.

Features

- Supply Voltage: 4.5V~5.5V DC
- Measure Current Range: -20A~ 20A
- Sensitivity: 100mV/A

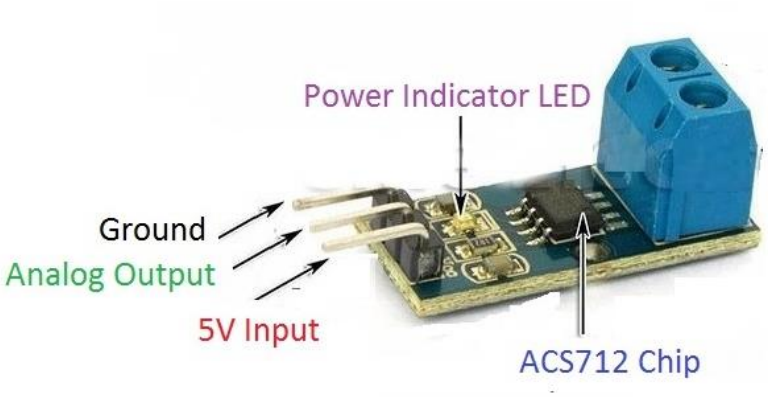


Figure 3 :ACS712 CURRENT SENSOR

RELAY

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal.

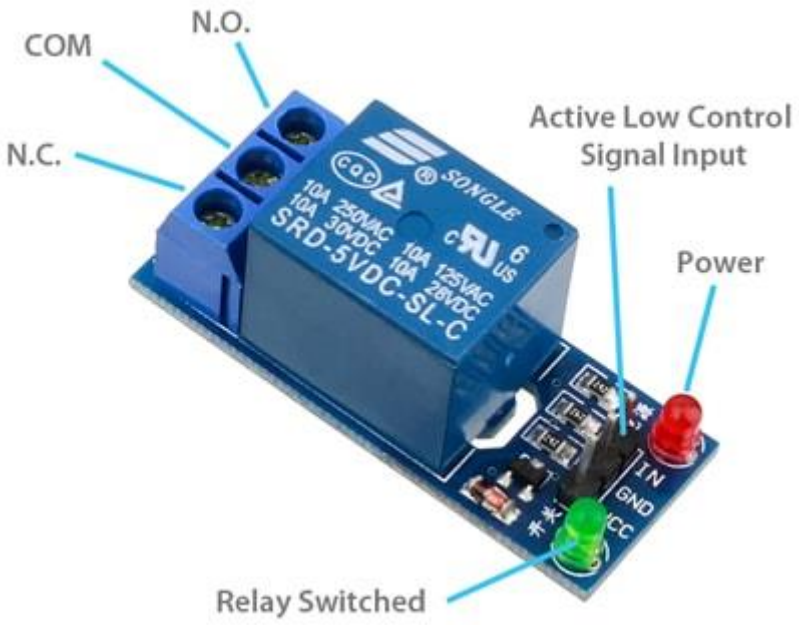


Figure 4:Relay Module

LCD DISPLAY

This is an LCD Display designed for E-blocks. It is a 16 character, 2-line alphanumeric LCD display

connected to a single 9-way D-type connector. This allows the device to be connected to most E-Block I/O ports.

Specifications

- Operating Voltage: 4.7V to 5.3V.
- Can display (16x2) 32 Alphanumeric Characters.
- Custom Characters Support.
- Works in both 8-bit and 4-bit Mode.

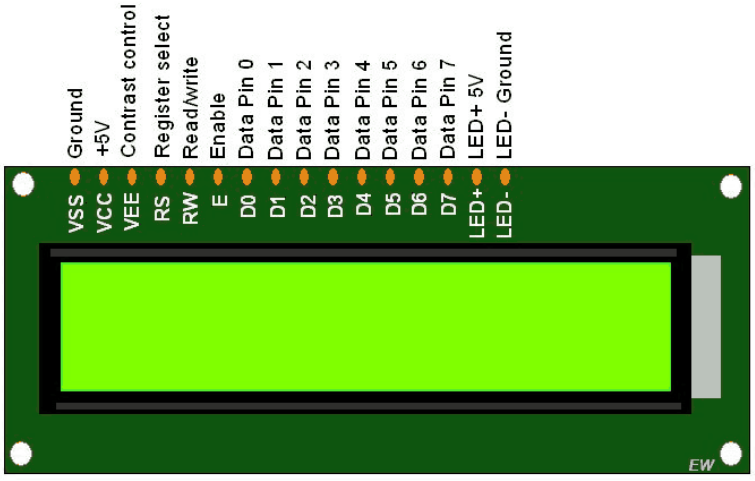


Figure 5 : LCD DISPLAY(16x2)

BUZZER

Buzzer is a device which uses sound to indicate the user.It is controlled by the microcontroller Arduino nano.When the digital pin is HIGH to the Buzzer .The Buzzer is activated and it creates the sound and Indicates the user.

SPECIFICATIONS

- The frequency range is 3,300Hz.
- Operating Temperature ranges from – 20° C to +60°C.
- Operating voltage ranges from 3V to 24V DC.
- The sound pressure level is 85dBA or 10cm.
- The supply current is below 15mA.

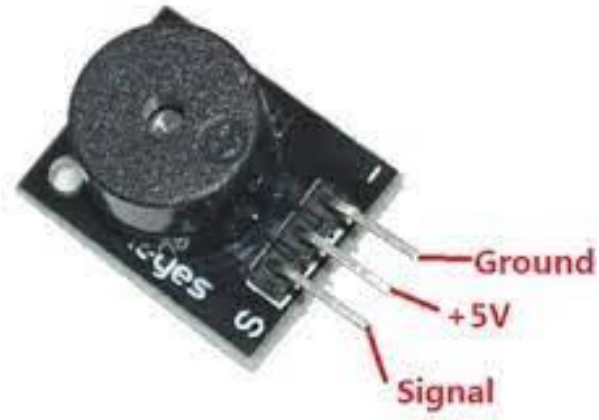


Figure 6:Buzzer

CONCLUSION

In this paper we have explained a simple MCB failure detection, protection and alerting system. It would provide protection from the hazards of MCB failure and in damaging the consumer or industrial appliances in case of a short circuit or overload.

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