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SMART SWITCHING OF MOTORS USING PASSWORD ENABLED CIRCUIT BREAKER USING IOT

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Abstract: **This study introduces a novel approach to smart motor control that is especially designed for use in power line maintenance and agriculture. It combines Internet of Things (IoT) technology with a password-protected circuit breaker to improve efficiency and safety. Our solution provides remote access to motor functions via Internet of Things connectivity, which is increasingly important in agricultural situations where remote and automated operations are required. Using their laptops or cell phones, farmers can easily operate agricultural machinery such as conveyor belts, irrigation pumps, and other devices, maximizing crop yields and resource efficiency. In addition, the password-protected circuit breaker lowers the possibility of mishaps and illegal access by guaranteeing that only authorized individuals can operate vital equipment. Our technology allows line operators to remotely switch motors powering crucial components in the context of power line repair, when prompt and secure interventions are crucial.**

Keywords: **Circuit Breaker, Password, GSM Module, Node MCU, Microcontroller.**

I. INTRODUCTION

Presenting a worldview move in motor control in rural applications and line support. A sharp switch to Password saltine utilizing IoT innovation in a unused time of productivity, precision and security. In rural situations where asset optimization is foremost and in line support scenarios where unwavering quality and security are obvious, this inventive framework offers a total arrangement. By consistently coordination IoT capabilities with engine control, ranchers pick up exceptional control over water system frameworks and hardware, empowering exact timing and control custom fitted to edit needs. So also, for line upkeep laborers capable for overseeing electrical dispersion systems, inaccessible motor control guarantees quick reaction times and progressed security conventions. The included Password switches include a pivotal level of security that ensures against unauthorized get to and potential abuse. Eventually, this meeting of advances empowers clients to optimize operations, decrease downtime and keep up the astuteness of basic foundation, changing the scene of rural robotization and control administration.

II. PROBLEM STATEMENT

Considering the issues of brilliantly motor start utilizing IoT-enabled watchword circuit breakers in rural and lineman security applications is based on the got to progress the operational security, effectiveness and

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control of electrical frameworks. In terms of rural and line specialist security, current challenges incorporate the chance of electrical mischances, unauthorized get to to hardware, need of real-time observing and wasteful support. These issues can lead to mischances, hardware harm and deferred repairs, influencing both work proficiency and security. Hence, to successfully address these challenges, it is exceptionally imperative to create a framework that coordinating IoT innovation into password-protected circuit breakers. The reason of this framework must be to guarantee secure control of motor capacities, avoid unauthorized utilize of electrical gear, empower real-time checking to distinguish dangers, encourage prescient upkeep through cautions and notices, optimize gear execution for expanded proficiency, and at last improve the line players. security and execution. productivity within the environment and upkeep the work.

III. BLOCK DIAGRAM

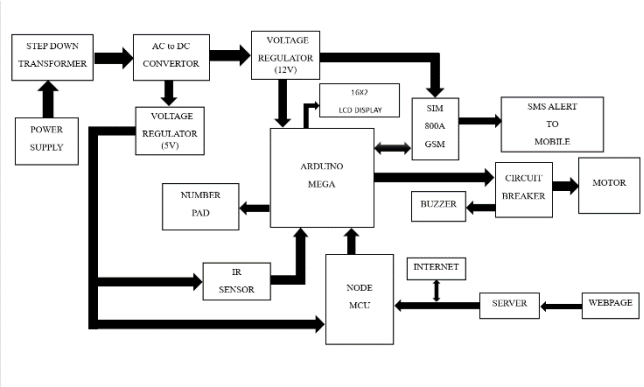

Fig 1: Block Diagram

Components Required to Perform the Task:

Arduino MEGA (2650):

The Arduino Mega may be a adaptable microcontroller board that serves as an capable organize for prototyping and making distinctive electronic devices. It is based on the ATmega2560 microcontroller, which offers a wide expand of computerized and analog I/O connectors, memory and planning control. The Arduino Mega has 54 computerized inputs/outputs, 15 of which can be utilized as PWM yields, and 16 analog inputs. It has plenty memory capacity, tallying 256 kilobytes of streak memory and 8 kilobytes of SRAM memory, engages the execution of complex calculations and the capacity of colossal data sets. In development, the Arduino Mega contains a few communications meddle such as UART, SPI and I2C, which empower steady integration with other contraptions and modules.

Relay:

A hand-off is an electromechanical switch that controls electrical current by utilizing a little electrical salute to enact an electromagnet, which at that point mechanically opens or closes contacts. It acts as a bridge between low-power control circuits and high-power loads, giving separation and affirmation.

SIM 800A GSM:

The SIM800A GSM/GPRS module may be a compact and flexible portable communication gadget that gives a dependable association to GSM systems. Planned for applications requiring remote communication, further checking and control, the SIM800A module gives consistent integration with microcontroller frameworks. Prepared with four-band GSM back, it empowers communication on the foremost utilized frequencies around the world, which guarantees compatibility with diverse arrange administrators.

NodeMCU (ESP8266):

NodeMCU ESP8266 could be a flexible and broadly utilized advancement board that coordinating the ESP8266 Wi-Fi module and gives consistent association to Wi-Fi systems and empowers IoT (Web of Things) applications.ESP8266 chipset powered by the NodeMCU board combines a microcontroller unit (MCU) with built-in Wi-Fi capabilities, making it an perfect stage for prototyping and creating IoT ventures.

IR Sensor:

An infrared (IR) sensor is an electronic gadget outlined to degree and identify infrared radiation in its environment. Infrared radiation, undetectable to the human eye, lies exterior the ruddy conclusion of unmistakable light within the electromagnetic range. IR sensors play an imperative part in a assortment of applications, from low-light or night-vision gadgets to space controls for domestic frameworks.

BC 547 Transistor:

The BC547 transistor can be a broadly utilized NPN (Negative-Positive-Negative) transistor that capacities as an electrically controlled switch and speaker. It

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comprises of three terminals emitter, collector and base. When current is related to the base terminal, the transistor to stream from the collector to the emitter. This transistor is by and large utilized for expanded since it can handle more control between the emitter and the collector compared to the base.

Resistor (1K ohm):

A resistor may well be a basic segregated electrical component that plays a basic portion in coordinating and restricting electrical current in electronic circuits. It may be a bipolar contraption arranged to make resistance by passing an electric current. The resistance of a resistor is measured in ohms (Ω), where one ohm talks to the resistance when one ampere of current passes through the resistor with a drop of one volt.

IN 4007 Diode:

The 1N4007 diode may be a commonly utilized rectifier diode that has a place to the silicon 1N400X family. Its reason is to change over rotating current (AC) signals into coordinate current (DC) signals in electronic circuits. This diode acts as a one-way switch, permitting current to flow in one course and blocking it within the inverse course.

Voltage Regulator (7805):

The 7805-voltage controller may be a broadly utilized organize voltage controller that gives a settled +5 V desert voltage to a variable input voltage in control electronic circuits. This IC is separate of the 78xx course of movement of voltage controllers and is as frequently as conceivable utilized in numerous electronic wanders due to its bold quality and effortlessness. The title "7805" proposes that it may be a positive voltage controller that gives a 5V abdicate.

I2C Module:

An I2C (Inter-Integrated Circuit) module may be a synchronous, multi-master/multi-slave transport that empowers information exchange between different electronic components in a circuit. It was designed by Philips Semiconductors in 1982 and is broadly utilized to associate slower peripherals to processors and microcontrollers over brief separations. The I2C transport is known for its effortlessness, moo fabricating costs and flexibility in applications such as computer components, frameworks and microcontrollers.

Transformer: (230V/12V)

A 230/12V transformer is an electrical appliance that changes over tall voltage (230V) rotating current (AC) into moo voltage (12V) substituting current. These transformers are routinely utilized in a few applications to step down voltage in certain electronic appliance or frameworks that require lower voltage levels for secure and advantageous operation. The fundamental side of the transformer gets another voltage input, whereas the partner side gets a lower voltage.

LCD Display: (2x16 display**)**

2x16 LCD, too known as 16x2 character LCD, may be a flexible alphanumeric show module able of showing 2 lines of content and 16 characters per line. These shows are frequently utilized in different electronic applications due to their reasonableness, ease of utilize and compatibility with microcontrollers such as Arduino. A 2x16 LCD as a rule features a backdrop illumination like yellow/green or blue for way better and runs on a 5V supply.

Buzzer: (12V)

A 12 V test is an electronic gadget facilitated to transmit substantial signals or takes under consideration the control supply from a 12 V DC source. These ringtones are always utilized in different applications where an audio welcoming is required to demonstrate certain occasions. They ordinarily work between 8 and 15 VDC and have a characteristic sound level, as a rule measured in decibels (dB).

Jumper Wires:

Jumpers, as well known as jumper wires or jumper cables, are urgent components in equip utilized to make affiliations between unmistakable components of a circuit without securing. These wires more routinely than not contain of ensures electrical wires with connectors or pins on both closes that allow basic union to breadboards, printed circuits, or other components. Jumpers play a basic allocate in prototyping and circuit testing, allowing commonsense and passing affiliations between particular components.

IV. PRINCIPLE OF OPERATION

Arduino Mega microcontrollers act as the brains of the framework and oversee the communication between the NodeMCU, GSM modules, console interfacing and transfers. With effective preparing capabilities, Arduino Mega microcontrollers translate client inputs, execute control calculations and arrange communication conventions to successfully control the motor's start capacities.

The NodeMCU acts as a central control unit that empowers network to the Web of Things (IoT) and encourages information exchange between diverse framework components. With Wi-Fi capabilities, the NodeMCU makes a arrange environment that empowers farther observing and control of motorized devices.

GSM modules give repetition of communication channels, guaranteeing smooth operation indeed in ranges with constrained or no Wi-Fi network. With the

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presentation of SMS-based control and checking, GSM modules give an elective way to remotely get to and control motor control functions.

Keyboard interface makes strides security by requiring client verification with a watchword. This serves as an imperative get to control component to anticipate unauthorized clients from activating the exchanging capacities of the motors.

Relays act as an interface between the control framework and the engines, empowering exact exchanging based on client commands. When associated to an Arduino Mega microcontroller, transfers change advanced signals into physical activities, encouraging smooth control of engine functions.

In expansion, 12.0.12 autotransformers, voltage controllers and bridge rectifiers guarantee a steady control supply to the framework, lessening the chance of voltage variances and guaranteeing of reliability.
Somero gives clients with sound recommendations that demonstrate the start capacities of the motor. status or cautions of potential issues or malfunctions.
In expansion, the framework incorporates content message alarms for versatile gadgets that permit clients to get real-time. motor status notices, cautions or basic occasions, guaranteeing opportune reaction and intervention.

V. CIRCUIT DIAGRAM

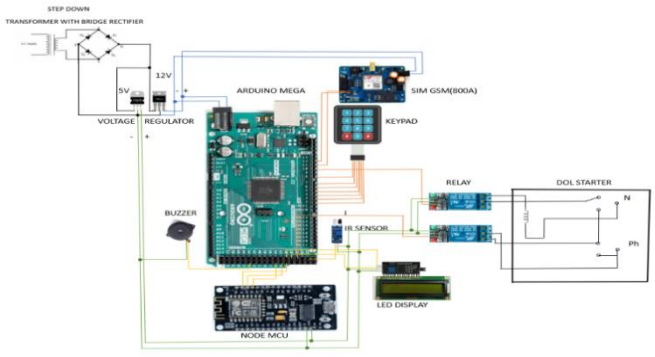

Fig 2: Circuit Diagram

Working:

To operate the password enabled circuit breaker we can use two modes of operation.

1. Offline
2. Online

OFFLINE:

- In this mode the operation of circuit breaker is done manually.
- We observe that the LED displays “Enter the Password”.
- With the help of the 4x4 keypad present on the outer box, we can enter the password.
- Generally we have two inbuilt passwords to operate the circuit breaker.
- One is to turn ON the circuit breaker and the other is for to turn OFF.
- When we enter the correct password to turn ON the circuit breaker, the circuit breaker operates and the LED displays “Circuit breaker is ON”.
- And we get an SMS to our mobile phone as “Circuit breaker is ON”.
- If the password entered is wrong, then the circuit breaker will not operate.
- When we enter a password to turn OFF the circuit breaker, it gets turned OFF and the LED displays “Circuit breaker is OFF”, also we get an SMS to our mobile phone as “Circuit breaker is OFF”.

ONLINE:

- In this mode we can operate the circuit breaker through online, i.e.; without being present at the work place.
- To operate the circuit breaker, we can enter the password through online by using a web browser.
- In the web browser, there will be an input box to enter the password.
- When we enter the password to turn ON the circuit breaker, a signal is given to the NodeMCU and then to the GSM.
- If the entered password is correct, then the circuit breaker will turned ON and the LED displays “Circuit breaker is ON”, and we get an SMS to our mobile phone as “Circuit breaker is ON”.
- If the password entered is wrong, then the circuit breaker will not operate and an SMS is send to our mobile phone as “Wrong Password”.
- When we enter a password to turn OFF the circuit breaker, it gets turned OFF and the LED displays “Circuit breaker is OFF”, also we get an SMS to our mobile phone as “Circuit breaker is OFF”.

Flow Chart:

Transmitter:

Interior the brilliantly motor start framework utilizing IoT with a puzzle word switch, communication plays a key parcel in engaging communication and control between unmistakable components. The information stream starts with client inputs, where commands are entered through the NodeMCU interface. These commands, which contain instruct to control engines or work a switch, are transmitted to the Arduino Mega, which acts as the central controller of the framework.

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After getting the commands, the Arduino Mega shapes them and certifies the confirmation of the client through a secret word framework. Once confirmed, the Arduino Mega will start the suitable works out, such as turning engines on or off or getting to the switch. At the same time, the Arduino Mega sends status back to the NodeMCU around how the framework is doing.

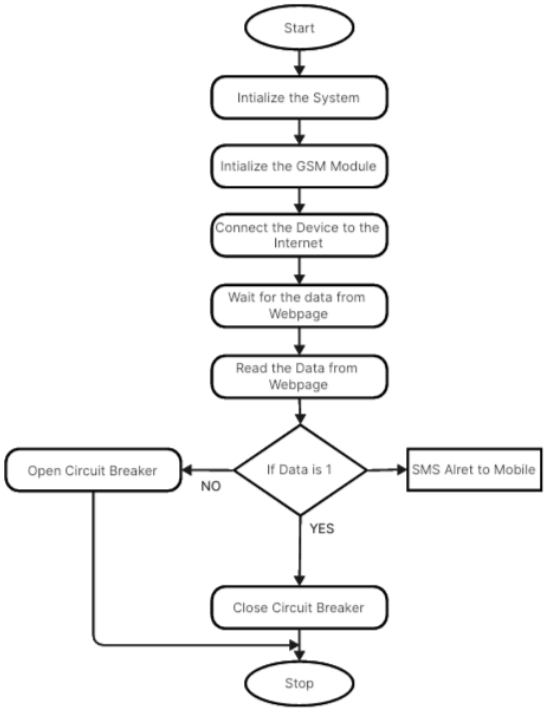

Fig 3: Transmitter

Receiver:

Within the cleverly exchanging framework of secret word security motors utilizing IoT, getting and checking information through a web page interface may be a user-friendly way to remotely control the framework. Accepting and controlling information from website starts with client inputs transmitted through the client interface. These inputs regularly incorporate commands to control engines or work a switch, as well as confirmation data entered into a secret word framework. By sending, the information is exchanged to the backend server facilitating the IoT framework. On the other hand, in case the given data is inaccurate or invalid, the backend rejects the ask and anticipates unauthorized get to the framework. Moreover, for security reasons, the backend may record verification endeavors and execute measures such as rate restricting to relieve potential drive attacks in this flowchart outlines the steps included in getting and approving information from a web page interface to guarantee security and control get to a brilliantly motor exchanging framework.

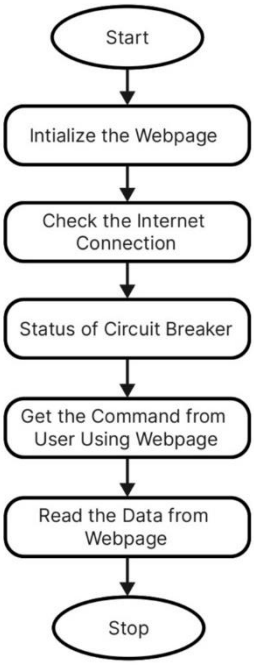

Fig 4: Receiver

VI. RESULTS

The presentation of secret word cleverly engine exchanging coordinates into IoT (Web of Things) innovation could be a critical step forward in mechanical mechanization and security measures. This framework gives progressed control of motor operation whereas guaranteeing authorized get to through password verification. By using IoT network, administrators can screen and control motor capacities remotely from anyplace, giving adaptability and comfort. Also, the integration of a password switch includes a level of security that anticipates unauthorized utilize and potential dangers. This inventive approach not as it were moves forward work productivity but moreover makes strides security guidelines in mechanical situations. The comes about of this think about highlight the common sense and viability of IoT-based arrangements with progressed security highlights in keen engine exchanging applications, clearing the

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way for more secure and more proficient mechanical operations.

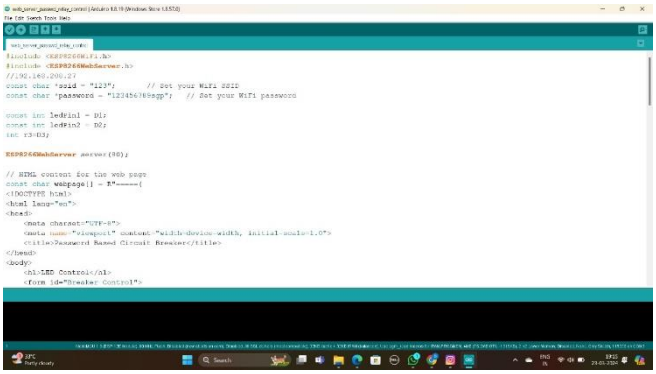

Fig 5: To Link the System to Webpage

Fig 6: Prototype

By including watchword security, this framework makes advanced security by permitting as it were authorized staff to get to and work the switch, decreasing the hazard of unauthorized utilize and potential risks. IoT highlights empower real-time observing of motor execution and give profitable data almost control utilization and potential security risks. In expansion, the framework can send alarms and notices to linemen almost breakdowns or unsettling influences by means of SMS, which permits for speedy operation and upkeep.

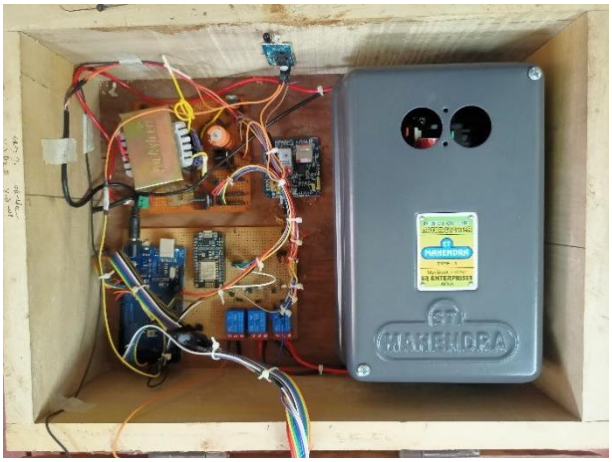

Fig 7: Prototype

ADVANTAGES:

- Enhanced Security
- Controlled Access
- Accidental Prevention
- Improved Safety Measures

DISADVANTAGES:

- Complexity of Implementation
- Dependency on Internet Connectivity

APPLICATIONS:

- Agricultural Automation
- Industrial Automation
- Electrical Substations

VII. CONCLUSION

In conclusion, the integration of smart switch innovation with Password breakers and IoT network offers critical benefits for Agriculture and lineman applications.

In agribusiness, the presentation of this innovation empowers the exact control and computerization of significant hardware such as water system pumps, transport belts and apparatus utilized in developing and preparing plants. By merging IoT capabilities, farmers can remotely screen and oversee these frameworks, optimize the utilize of assets, diminish working costs and progress in general efficiency. In expansion, progressed security highlights given by secret word switches guarantee the sharpness of motor control frameworks and ensure against unauthorized utilize and potential security dangers in rural situations.

In Lineman's operations, brilliantly exchanging innovation prepared with IoT interfacing offers profitable preferences in overseeing the electrical foundation and guaranteeing dependable control dispersion. Linemen can remotely control and screen motorized hardware such as transformers, switches and control lines, empowering more effective support and investigating. Password-equipped switches include additional security, avoid unauthorized control of basic electrical frameworks and decrease the hazard of mischances or blackouts.

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