AN UNIQUE METHODOLOGY FOR TRANSMISSION LINE BREAKAGE DETECTION AND ALERTING SYSTEM

Thamilazhagan.R.S.
Electrical and Electronics Engineering
Panimalar Engineering College
Chennai,India

Vishwa.P
Electrical and Electronics Engineering
Panimalar Engineering College
Chennai,India

Thiruselvabalaje.P.S.
Electrical and Electronics Engineering
Panimalar Engineering College
Chennai,India

Venis Xavier.V
Electrical and Electronics Engineering
Panimalar Engineering College
Chennai,India

MR.S.Sundaramoorthi
Associate Professor
Electrical and Electronics Engineering
Panimalar Engineering College
Chennai,India

***Abstract*— We frequently read in the news about people and animals dying from electrical shock in rural or agricultural regions after coming into contact with downed or dangling live power lines. Because the Distribution Company's safety circuitry is insufficient, a live line with broken wires is maintained. The power supply breaking mechanism and a modification to the current power distribution system are described here. Circuit breakers with shunt trip mechanisms cut off the power and prevent harm from electrical accidents brought on by conductor faults in overhead transmission lines. To give an indicator of the quantity of volts passed from one area to another, we use a variety of communication devices. We use a deep learning technique with this system to track the electrical voltage that is transferred.**

I.Introduction:

In this project, we'll keep an eye out for various transmission line faults and monitor how they're reported to the power board through alert and message. Balanced 3-phase ac is the power system's steady state operating mode. This condition is disturbed, nevertheless, because of abrupt external or internal changes in the system. A short circuit or fault happens when the system's insulation fails at one or more places or when a conducting object comes into touch with a live point. There are several reasons why problems occur, including lightning, strong winds, trees falling on power lines, cars hitting towers or poles, birds flying into power wires, line failures, etc. A symmetrical fault is one in which all three phases are involved, whereas a fault in which just one or two phases are involved

I. SYSTEM ANALYSIS

A. EXISTING SYSTEM:

There is currently no automatic system in place to identify electricity line breaks. The only remedy for these issues up to now has been human needs. We'll work with the new approaches to get over this.Any power transmission network must have a transmission line breaking detection and alerting system. It aids in the early identification and isolation of systemic issues, enabling prompt repairs and averting potential equipment damage and power outages. The employment of cutting-edge sensors and machine learning algorithms is one novel approach for a transmission line breakdown detection and alerting system. The system would be made up of a network of sensors positioned along the transmission lines that would continuously track different factors like voltage, current, and temperature. A central monitoring system would receive the sensor data and feed it to machine learning algorithms for real-time data analysis. The algorithms would be taught to recognise trends and outliers in the data that point to a line break or other type of system problem. The monitoring system would promptly notify the appropriate individuals, such as power grid operators or maintenance workers, when a defect was discovered. Depending on how serious the error is, the notice may come in the form of an automated message or an alarm. In comparison to conventional gearbox line breakage detection systems, our technology has a number of advantages. First, more precise and dependable fault detection is made possible by the employment of cutting-edge sensors and machine learning algorithms. Second, the system's ability to identify defects in real time enables quicker repairs and reduces the risk of damage or power interruptions. Lastly, the system is simple to incorporate into

Fig.1. ESP32-WROOM-32

It's a cost-effective way to increase system resilience and decrease downtime. Existing power transmission networks.
1. Early Fault Detection: To identify flaws quickly, the system makes use of cutting-edge sensors and machine learning techniques. This lowers the possibility of equipment damage and power outages by allowing for the early diagnosis of flaws before they can worsen.

2. Increased System Reliability: The system can assist in preventing power outages and minimising downtime by spotting flaws early. This increases customer happiness and the overall reliability of the electricity transmission network.

3. Economical: The technology is economical since it is simple to integrate into the current power transmission networks. It lessens the need for costly, labor-intensive, and time-consuming manual inspections and repairs.
4. Greater Safety: The system makes safety better by spotting errors before they can result in dangers like electrical fires, explosions, or other mishaps.

5. Scalability: Depending on the size and complexity of the transmission network, the system can be scaled up or down. Additionally, it can be altered to meet particular demandsand requirements.

6. Real-time Alerting: The system alerts the proper individuals in real-time, enabling them to react promptly and take corrective action.

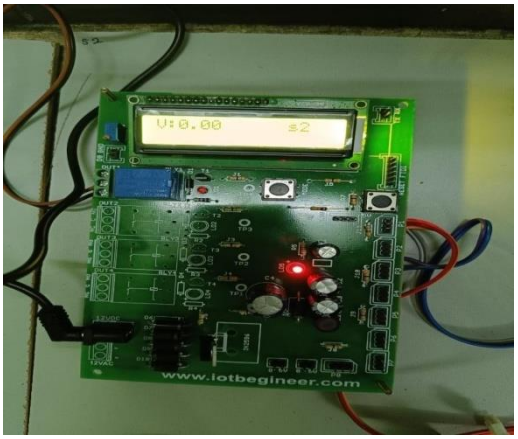


Fig.2 . **Arduino Nano Q.P.**

B. Our Project Explaination:

The purpose of this project is to create a special approach for identifying transmission line breaks and to create an alerting system to inform the necessary parties of the location and seriousness of the fault.

Even in adverse weather and challenging terrain, the approach ought to be able to properly identify line breaks in real-time. The warning system ought to give the necessary authorities early information so they may act quickly to lessen the consequences of the failure and restore electricity to the affected areas.

The goal of this project is to create an intelligent system that can recognise transmission line breakages based on data from multiple sensors and sources using advanced data analytics and machine learning techniques. The system will also incorporate remote sensing technologies, such as drones and satellite imagery, to enhance the accuracy of fault detection and location.

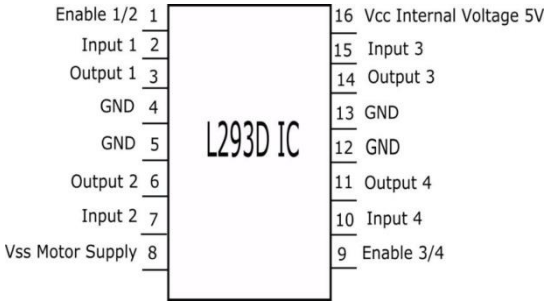
The ultimate goal of this project is to reduce downtime caused by transmission line breakages, minimize the impact on the environment, and improve the safety and reliability of the power grid.

C. Components:

Espressif Systems, the same company that created the well-known ESP8266 SoC, offers the inexpensive ESP32 System on Chip (SoC) Microcontroller. The 32-bit Xtensa LX6

Fig.4 L293D IC

Microprocessor by Tensilica is a replacement for the ESP8266 SoC and features built-in Wi-Fi and Bluetooth. It is available in single-core and dual-core versions.



Similar to ESP8266, ESP32 has inbuilt RF components like a power amplifier and a low-noise receiver.An adapter is a device that changes characteristics of one electrical system or device into those of another that is otherwise incompatible. Some simply adapt the physical design of one electrical connector to another, while others change the power or signal characteristics. on a computer, an adapter is frequently included on a card that fits into a slot on the motherboard. The card modifies data that is transmitted between the computer's microprocessor and the supported devices. The voltage supply can be identified, monitored, and measured by a DC voltage sensor. Then, it has the ability to take those measurements and convert them into a signal that can be read. The signal is frequently recorded by a specialised electrical equipment, although occasionally a witness is present to manually examine the sensor output\

The L293D is a 16 pin IC that has eight pins on each side and is used to operate two DC motors at once. For each motor, there are two ENABLE pins, four INPUT pins, and four OUTPUT pins.

D.Schematic Diagram:

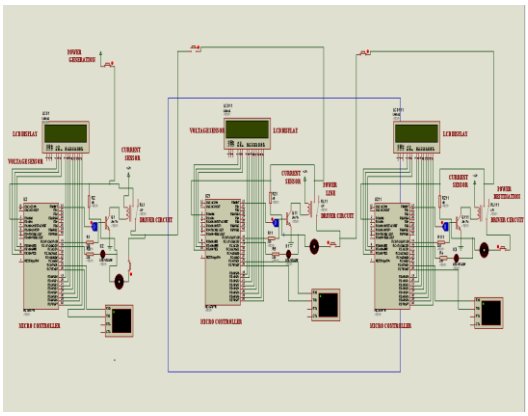


Fig.3. Micro-Controller

E . Programming language:

Intercept the initial data bytes delivered to the board following a Visit the download page to get the most recent version. The Installer (.exe) and Zip packages are your options. We advise using the first one because it automatically installs all of the drivers and the Arduino Software (IDE) that you require. The drivers must be manually installed when using the Zip bundle. If you wish to build a portable installation, the Zip file can help.

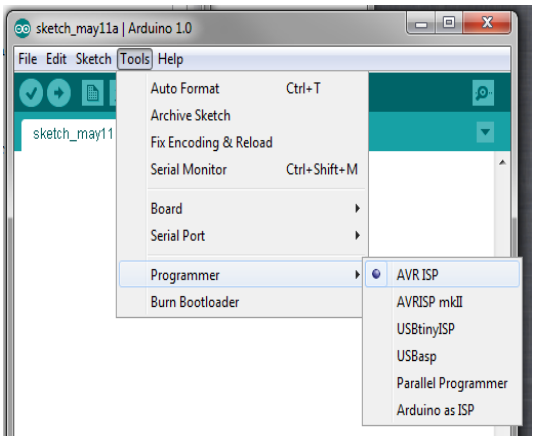


Fig. 5 Arduino UNO SOFTWARE

When the download is complete, start the installation procedure. When the operating system issues a warning, kindly accept it and let the driver installation proceed. Every time the boot loader is run, the Arduino boot loader resets the "erase Address" to zero. To specify the address in which we want to write or verify when downloading a programme, ROBOTC created the "Load Address" command. The Arduino boot loader will wipe the previous page and write a brand-new page when writing a page of memory to the Arduino. Everything works perfectly while downloading firmware because the Erase Address and the Loaded Address both begin at 0. When developing a user programme, we begin writing at memory location 0x7000, however the Boot loader deletes data beginning at location zero since the "Load Address" instruction fails to update where to delete data. To prevent the firmware from being unintentionally erased during the writing of a user programme, our update sets both the Load Address and the Erase Address.The Arduino UNO is made in a way that enables it to be reset by software running on a connected computer, as opposed to requiring a physical press of the reset button prior to an upload. A 100 nano farad capacitor is used to connect one of the ATmega8U2's hardware flow control lines (DTR) to the Arduino UNO's reset line. The reset line drops long enough when this line is asserted to reset the chip.

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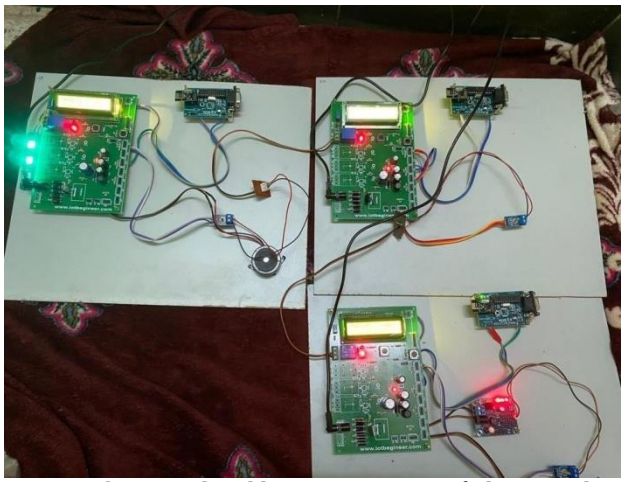

zero since the "Load Address" instruction fails to update where to delete data. To prevent the firmware from being unintentionally erased during the writing of a user programme, our update sets both the Load Address and the Erase Address.

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Instead of requiring a physical click of the reset button before an upload, the Arduino UNO is constructed in a way that allows it to be reset by software running on a linked computer. One of the hardware flow control lines (DTR) of the ATmega8U2 is connected to the reset line of the Arduino UNO using a 100 nano farad capacitor. It will intercept the initial few bytes of data transmitted to the board after a connection is opened (i.e., anything other than an upload of new code).

Make sure that the software with which it talks waits a second after opening the connection and before providing any configuration or other data when a sketch running on the board initially gets it. To turn off the auto-reset, a trace on the Mega can be severed. To re-enable the trace, solder the pads on either side of it together. It has "RESET-EN" written on it. By connecting a 110-ohm resistor from 5V to the reset line, you might also be able to turn off the auto-reset; for more information, see this forum discussion.

E. Results:

In summary, the distinctive approach for the transmission line breaking detection and warning system is a significant advancement in the discipline of electrical engineering. This system is able to detect transmission line breakage and notify operators of the problem fast and correctly by combining cutting-edge sensors, machine learning algorithms, and communication technologies. By identifying and resolving transmission line concerns early on before they become more serious difficulties, this methodology can reduce downtime and avert power outages. In addition, by optimising maintenance and repair schedules, this technology can assist utilities in saving money and enhancing system performance.

The transmission line breakage detection and alerting system is a significant innovation that could fundamentally alter how

we monitor and maintain transmission lines. We may anticipate even larger advantages in terms of improved reliability, increased efficiency, and decreased costs for utilities and consumers as technology continues to advance and develop.A microcontroller board called the Arduino UNO is based on the Arduino UNO (datasheet). It contains 16 analogue inputs, 4 hardware serial ports (UARTs), a 16 MHz crystal oscillator, 54 digital input/output pins (14 of which can be utilised as PWM outputs), a USB connector, a power jack, an ICSP header, and a reset button. It comes with everything required to support the microcontroller; to use it, just plug in a USB cable, an AC-to-DC adapter, or a battery to power it. The majority of shields made for the Arduino Duemilanove or Diecimila are compatible with the Mega.

II. SOFTWARE OUTPUT

Either an external power source or the USB connection can be used to power the Arduino UNO. The power source is automatically chosen. Either a battery or an AC-to-DC adapter (wall wart) can provide external (non-USB) power. A 2.1mm center-positive plug can be used to connect the adapter by inserting it into the board's power connector. The Gnd and Vin pin headers of the POWER connection can accept battery leads. The board can be powered by a 6 to 20 volt external supply. The voltage regulator could overheat and harm the board if more than 12V is used. The suggested range is between 7 and 12 volts. The uses a different USB-to-serial driver chip than all boards before it—FTDI—and does not. Instead, it has a USB-to-serial converter that is coded into it.

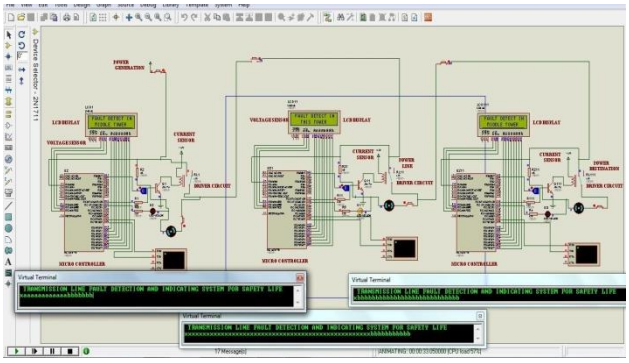

Fig. 7 Micro-Controller

Embedded systems development has historically utilised high-level language programming. However, assembly programming is still popular, especially for systems using digital signal processors (DSP). DSPs are frequently designed in assembly language by developers who are experts in processor architecture. Despite assembly programming's drawbacks in comparison to high-level language programming, performance is what drives this practise most. For example, there are twice as many CPU cycles available for audio processing if video decoding uses 80% of the CPU cycle budget rather than 90%. Many real-time applications that use DSP processors have this connection of performance to end-user features as a defining feature.

III CONCLUSION

The architecture of DSPs is quite specialised to meet the performance requirements for applications for signal processing within the constraints of cost and power specified for consumer applications. DSPs have a data pipeline with memory-access units that immediately feed into the arithmetic units, unlike a traditional load-store (RISC) design. A separate register file is used to store address registers close to the memory units instead than in the general-purpose register file. The connection of multiplication and addition to create a single cycle multiply-accumulate unit (MAC) is another specialisation of the data stream. In addition to general-purpose registers, it is integrated with special-purpose accumulator registers.

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