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IoT Power Optimization: A ComprehensiveSurvey

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Abstract: ***The Receiving station fault detection correction has been a goal of power system engineers to achieve maximum required Receiving side Power from the generating station , since the creation of distribution and transmission systems. By enabling the disconnecting of faulty lines prior to any serious equipment damage. Rapid fault detection can help to protect the machinery. An accurate fault type can be used to determine the maximum power of the generation station. Various algorithms are being developed to perform this task with greater accuracy and efficiency. The cloud IOT server receives these fault condition and solution data for immediate response. It is necessary to identify issues with power transmission lines for the security and maintenance of a power system. Most defect detection methods use the electrical quantities that current and voltage transformers provide for measurement. These transformers can be expensive and must come into direct contact with the high-voltageequipment being observed.***

Keywords: Power Supply Unit, IoT, Node MCU,RS232,MAX232.

I. INTRODUCTION

Water supply and lighting systems, especially in the public sector, are still planned according to the outdated social sensitivity to power saving, which has led to the development of new techniques and technologies that allow for significant cost savings and greater environmental respect. Standards of dependability and that they typically do not benefit from the most recent advancements in technology. But as raw material prices have been rising recently, and as the body of literature has grown, we will see three answers to those problems. Using modern technologies for the light sources is the first, and possibly the most obvious. Although LED technology is regarded as the best option, it has a number of advantages. Developing a cutting-edge streetlighting system that primarily uses auto timing and LEDs command. Utilizing a remote management system, which is primarily based on intelligent lampposts that transmit data to a central management system to streamline supervision and maintenance, is the second resolution—and possibly the most innovative. We have developed street light and water-saving systems using microcontrollers. Utilizing renewable energy sources rather than conventional power sources is the third and final option, whichwill help the environment. The most often used resource in this field is solar energy since it operates on the present and preventswaste while saving electricity and labor.

II. LITERATURE REVIEW

The research papers reviewed here address the critical issue of fault detection in power transmission lines, each proposing innovative solutions leveraging various technologies and components to enhance efficiency, reliability, and cost-effectiveness.

Nagarajan&co [1]presents a fault location detection system using PIC Controller, Relay, Transmitter, and Receiver. It emphasizes cost-effectiveness and non-intrusiveness, enabling wireless data collection and analysis to minimize transmission costs, increase efficiency, and reduce maintenance.

Minal Karalkar [2]highlights the urgency of addressing frequent faults in transmission lines and proposes an IoT-based solution utilizing Microcontroller IC Atmega 16, opt coupler, Transmitter, and Receiver. This system enhances fault detection efficiency, ensures safety, and allows forecasting of future problems, thus contributing to reliability and safety.

Venkateswari [3]focuses on developing an accurate fault detection system using resistors, switches, PIC 16F77A, Zigbee, and .NET. It aims to ensure uninterrupted power supply to distant load centers by precisely locating faults, supporting real-time monitoring, and data transmission. The system is cost-effective, highly reliable, and supports maximum energy utilization.

Muhammad Kashif Sattar [4]introduces an Arduino-based fault detection and protection system for power transformers, employing Current Transformer, Potential Transformer, LM-35 Sensor, BLYNK Application, and AT Mega 320 Microcontroller.This system autonomously monitors and compares current, voltage, and temperature values to detect faults, ensuring optimal transformer operation with high efficiency and cost-effectiveness.

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Mounika [5]addresses the threat posed by transmission line faults, proposing a fault detection system utilizing Sag Monitoring System, AT 89S52/AT 89C51 Microcontroller, and Push Button.
It compares voltage signals, triggers alerts via IoT, and activates backup loads to prevent losses, offering versatility and efficiencyfor various industries.Overall, these papers
contribute to the field by offering diverse approaches to fault detection in power transmission systems, showcasing advancementsin technology, cost-effectiveness, reliability, and real-time monitoring capabilities.

III. COMPARISON TABLE

Papers	Problem	Solutionproposed	Tools used	Results	Merits
ɒer 1 (ijaers)	Developing an efficient fault location detection system for power transmission lines	Cost-effective and non-intrusive solution, enabling wireless data collection and analysis to pinpoint faults	PIC Controller, Relay,Transmitter, Receiver.	Cost of the transmission of is minimized,Efficiency can be increased.	Less Maintainance.
ɒer 2 (ijresm)	The frequent occurrence of faults in transmission lines poses a significant riskto localities, necessitating the development of an efficient fault detection system.	This solution leverages Internet of Things (IoT) technology and microcontroller expertise to enhance fault detection efficiencyand ensure the safety and reliability of power transmission systems.	Microcontroller IC Atmega 16,opt coupler,Transmitter, Receiver.	Faults can be easily detected and resolved.Future problems can be forecasted and avoided.	ecasting ofFaults.
Paper 3 (J4R)	Development of an accurate fault detection system for ensuring uninterrupted power supply to distant load centers.	A fault detection mechanism using resistors and switches, interfaced with a microcontroller and Zigbee, is proposed to precisely locate faults and transmit data for real-time monitoring and Updating.	PIC 16F77A, Resistors, Zigbee, .NET, Fault switches,Buzzer.	Cheap and Highly reliable way to locate the faults and also supports data storage.	Maximumenergy is obtained.

Paper 4 (Scholar)	Development of a novel Arduino-based fault detection and protection system to ensure optimal transformer operation.	This paper proposes an Arduino-based fault detection and protection system for power transformers, autonomously monitoring current, voltage, and temperature values and comparing them with preset thresholds to detect faults.	Current Transformer,Potential Transformer,LM-35 Sensor,BLYNK Application,AT Mega 320 Microcontroller.	Desired output can be achieved with high effieciency than others.It is cost-effective.	Cost-effective.
ɒer 5 (ijert)	The prevalence of transmission line faults poses a threat to communities, demanding an effective detection system to mitigate potential losses.	A fault detection system is implemented to compare voltage signals and trigger alerts via IoT, while activating backup loads to prevent losses during transmission line faults.	Sag Monitoring System,AT 89S52/AT 89C51 Microcontroller,Push Button.	It can be used in any type of Industries and has good efficiency.	Smart System

IV. POWER SUPPLY UNIT

This chapter describes how power supply circuits constructed with rectifiers, filters, and voltage regulators work. Reversing the AC voltage first, filtering to a DC level, and then regulating to achieve the desired fixed DC voltage are the steps involved increating a steady DC voltage. Typically, an IC voltage regulator unit provides the regulation; it doesn't change regardless of changes in the input DC voltage or the output load connected to the DC voltage. The figure shows a block diagram with the components of a typical power supply and the voltage at different points in the unit. A transformer is used to step down the AC voltage, which is normally 120 Vrms, to the level needed for the intended DC output. Step Down Transformer, Rectifier Unit, Input Filter, Regulator Unit, and Output Filter make up the Power Supply.

1) IOT

The term "Internet of Things" is not new, nor is it a novel idea. In 1999, Kevin Ashton created the term "Internet of Things" to refer to a presentation he was giving at Procter & Gamble. The IoT gadget uses less energy. When someone says a device is energyefficient, they literally mean that it can run for years. Frequently, the intended operational range exceeds five years. Making surethe data is sent and received efficiently is just as important as simply connecting a large enough battery.Long-distance communication is possible with the IoT device. A sensor that detects moisture on an Iowan farm or an instrument that gauges thesalinity of seawater five kilometers offshore in Louisiana needs to transmit and receive data. The Internet of Things gadget doesn'tinterfere with other devices and maintains a good data rate. The foundation of a denial-of-service attack is a network of machinesoverloading a specific service with more requests than it can process.

2) NODE MCU

The board is known as Devkit, and the firmware is typically referred to as NodeMCU. The ESP-12E on a board that comes withthe Node MCU Dev kit 1.0 makes it easier to use. It also features a USB interface and a voltage regulator. AI-THINKER designedthe ESP-12E board, which has an ESP8266EX enclosed in a metal cover. Either use the number in front of the GPIO or A0, D0,D1, D2, D3, D4, D5, D6, D7, and D8 as constants.At the end of each pin, we positioned the oscilloscope.

This enables us to discover, for instance, that the NodeMCU's pins are not all the same when it is turned on. By default, some are up and some are down.

3) RS 232,MAX 232

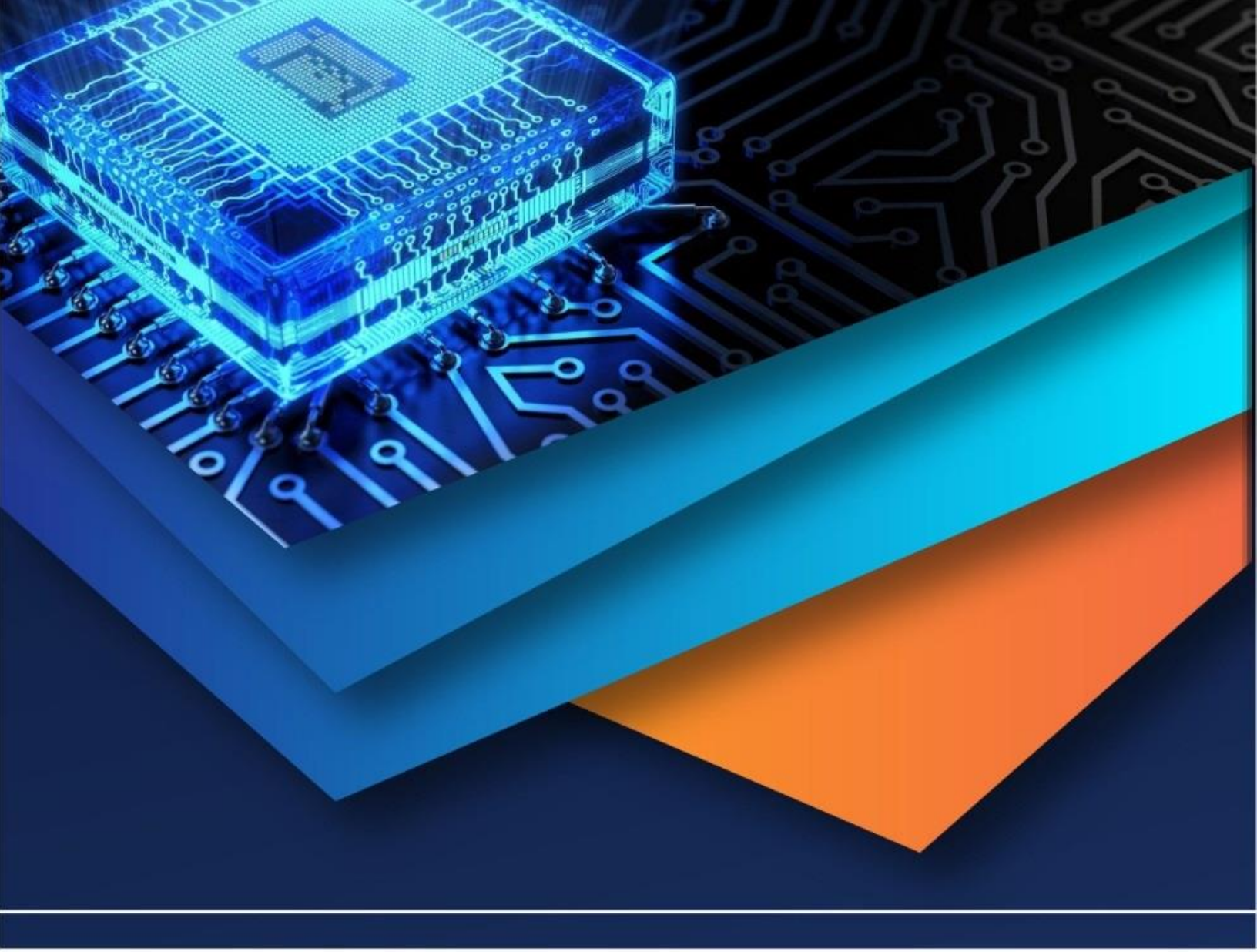
In this project, RS232 is used to communicate with the PC and microcontroller. In the telecommunications industry, data terminal equipment (DTEs) and data circuit-terminating equipment (DCEs) exchange serial binary data via the RS-232 standard.It is frequently utilized in serial ports on computers.The level logic converter in this circuit is the MAX 232 integrated circuit.With the help of a single 5 volt supply, the MAX232 dual driver/receiver can generate EIA 232 voltage levels thanks to a capacitive voltage generator. EIA-232 is converted to 5v TTL/CMOS levels by each receiver. TLL/CMOS input levels are converted into EIA-232 levels by each driver. Features of electrical signals include maximum stray capacitance, cable length, short-circuit behavior, voltage withstand level, timing, slew-rate, and signaling rate.pin identification, pluggable connectors, and interface mechanical propertieseach circuit's functions within the interface connector,interface circuit standard subsets for particular telecom applications.Character encoding (e.g., ASCII, Baudot, or EBCDIC) and character framing (bits per character, start/stop bits, parity) in the data stream are not defined in the standard.Neither error detection protocols nor data compression algorithms are defined in the standard.Although the standard states that bit rates lower than 20,000 bits per second are intended, it does not define bit rates for transmission.This speed is exceeded by many modern devices (between 38,400 and 57,600 bit/s) being typical, and 115,200 and 230,400 bit/s appearing sporadically) while maintaining signal levels that are compatible with RS-232.The hardware of the serial port—typically a single integrated circuit known as a UART—controls the specifics of character format and transmission bit rate by converting data from parallel to serial form.Specialized driver and receiver integrated circuits are often found in serial ports, which enable the conversion of internal logic levels to RS-232 compatible signal levels.The level logicconverter in this circuit is the MAX 232 integrated circuit. A capacitive voltage generator is built into the MAX232 dual driver/receiver, which allows it to generate EIA 232 voltage levels from a single 5 volt source. EIA-232 is converted to 5v TTL/CMOS levels by each receiver. TLL/CMOS input levels are converted into EIA-232 levels by each driver.

V. CONCLUSIONS

In this project a proposal of an intelligent corporation lighting and watering system is described that integrates new technologies, offering This is obtained by using the highly economical Street lighting technology and time controlled system by using the intelligent management of the lampposts. The suggested system is particularly suitable for illuminating streets in isolated urban and rural locations where traffic is occasionally light.Because of its independence from the power network, it can be used in remote locations where traditional systems would be too costly. The system can be fully customized to meet the needs of the user and is highly adaptable.

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