

# IoT based Controlling of Power Grid

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**Abstract** — An electric network, electric grid, or electricity network is an integrated electricity supply network for producers to consumers. It consists of electricity producing stations. The main objective of this study is to monitor the electricity grid system process, disclose this system at a dangerous level, monitor the current line, and reduce conventional systems expenses. From anywhere on the Internet, we can monitor. We can do it also if a system is enabled or disabled. It uses an electrical microcontroller to monitor a single-phase electrical device using Arduino to read sensor voltage and current and then communicate measured data via a new Android application for wireless monitoring. It enables the monitoring of several basic power quality parameters of basic voltage. The technology also determines the line frequency and power factor.

**Keywords** — Arduino Uno, power grid, android app, sensor, voltage and current, internet of things.

## I. INTRODUCTION

Computerization shows a main part in the industrial processes and IT application. Energies manufacturers provide all houses with energy through intermediary power-controlled hubs known as the Electricity Grid. Sometimes the failure of the electrical grid causes difficulties that lead to blackout of a whole region supplied by this specific grid. The project seeks to solve the problem through the use of IoT for communication and to address a number of additional challenges that an intelligent system can tackle to minimize excessive energy losses IoT's intelligent energy grid is built the at mega series controller that manages the different system operations [1]. IoT gradually becomes an essential element of our lives that can be felt within us. With Wi-Fi technology the system communicates via the internet. The most important component facilitating this endeavor is the reconnecting of the operational grid transmission system. When an energy grid fails and a different energy grid occurs, the system shifts transmission lines to the grid, making it easier for a particular location whose energy grid is OFF to supply electricity [2]. And this information, from which the grid is actively updated via IoT smartphone applications, may be used by the authorities and updates. In addition, atomic and nanostructures take use of speeds that were previously unimaginable for storing, detecting, and computing. For this reason, many researchers are currently trying to develop the new types of materials for connecting them it. Comprehensive research investigations in scholarly arts and

print and online media reports illustrating the inherent efficacy and application of IoT changes have been carried out and accessible. In the shape of print resources [3]. In addition to grid monitoring, this project also includes the advanced energy consumption tracking capabilities and even electricity stealing. The major goal of this work is 'IoT' power grid control for the basic objective is to develop an intelligent system to take advantage of a project [4]. The major goal is to shut down the Remote Control System, to monitor the power line current, to minimize the cost of traditional systems at unsafe levels. We did frequency and voltage monitoring in this project. Besides measuring the data current. From all across the internet we can check. This could also be done by enabling or disabling the system [5].

Fresh information transmission by internet of things (IoT) and storage revolution. Goals that are identifiable and intelligent by making judgments in connection with events or allowing them to be contextualized. You can pass information on yourself. They can have access or be components of other services to information utilized by others. Internet of Things (IoT) is an interconnected system for the transmission of data across a network and the transfer of information through a network, without human or human interaction [6]. It includes interconnected computer devices, mechanical or alphanumeric apparatuses, matters, natures, and persons with unique identifiers. Due to the confluence of many technologies, real-time analysis, machine education, commodity and embedded systems, the Internet of Things concept has changed. In future development of electricity grid sensors, actuators and transducers, real-time energy tracking and monitored services are anticipated to play a significant role. IoT has become a technology that offers new answers to the power grid system problems [7]. The IoT enabled sensors are utilized to communicate information via the internet and mobile applications throughout the grid system, which enables enhanced grid management. We suggested an IoT aided power monitoring and control system because of the above-mentioned advancement in IoT and the use of it in power networks. It gives customers and utilities the benefit of analyzing and managing their resources. This article presents IoT-based power monitoring with blynk software. A literature analysis highlights existing SG, IoT and IoT research. SG supports. Our additions to this article include: the integration of an open-source IoT platform that delivers information analyzes is supplied for the deployment of the IoT aided power monitoring system [8]. The hardware

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architecture enables electrical load characteristics like current, frequency, and connected load voltage to be accessed.

## II. LITERATURE REVIEW

The internet of things (IOT) has touched many different actors and received more appreciation one year since the last edition of the cluster book 2012. Smart cities (and regions), smart cars and mobility, intelligent homes and helped lives, smart industries, public safety, energy protection, agriculture and tourism have received great interest from prospective internet in the field of application of belongings in the situation to a future IoT-Ecosystem. In accordance with this trend, the Internet of Things currently looks like an area of innovation and growth for most governments in Europe, Asia and America. While greater companies are still not able to see the potential in some application areas, many of them pay high attention or even speed up the process by formulating new words for IoT and adding new components. In addition, individual and corporate end-users today have considerable skill in the area of smart gadgets and networked apps [9]. The ongoing growth on the Internet of Things estimates greater possibilities by combining related technology and ideas such as cloud applications, the future Network, large-scale information technology, robots, and conceptual technology [10].

Naturally the notion is not new as such, but now becomes apparent when these connected concepts are first uncovered by merging synergies. The Internet of Things remains mature, however, in particular because of many limitations limiting the full use of the IOT. The following appears to be most important among these factors [11].

- Not clear methodology for the use of unique IDs and numbering spaces on a global scale for various types of permanent and volatile items.
- No accelerated application and future IOT architecture development.
- Semantic interoperability progress less rapidly for sensor information exchange in diverse contexts.
- Hard to establish a clearly-defined method to allow innovation, confidence and the data ship owner to IOT while maintaining safety and confidentiality in complicated environments.
- Schicks to build businesses that embrace the Internet of Things in its full potential.
- Missing large-scale settings for testing and learning that both make testing with sophisticated sensor systems easier and boost creativity via reflexion and experience [12].

## III. DESIGN OF POWER GRID CONTROLLING SYSTEM

The key objective of the IoT Power Grid Controller. In above, the parameter is sensed by a current sensor, a voltage sensor, a relay module and a Wi-Fi module. There is an optocoupler, an LCD display and an arduino. The microcontroller checks the sensor output constantly and provides the signal to the automatically operating system circuit [13].

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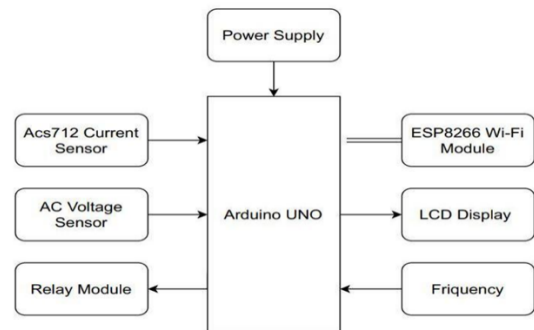


Fig. 1. Functional block diagram of the prototype.

The authors of the accepted manuscripts will be given a copyright form and the form should accompany your final submission. The following are provided the list of equipment for the project, including: arduino uno, adapter, optocoupler, voltage sensor, display LCD, relay module, voltage transmitter LM2596, current sensor, wireless Internet module [15].

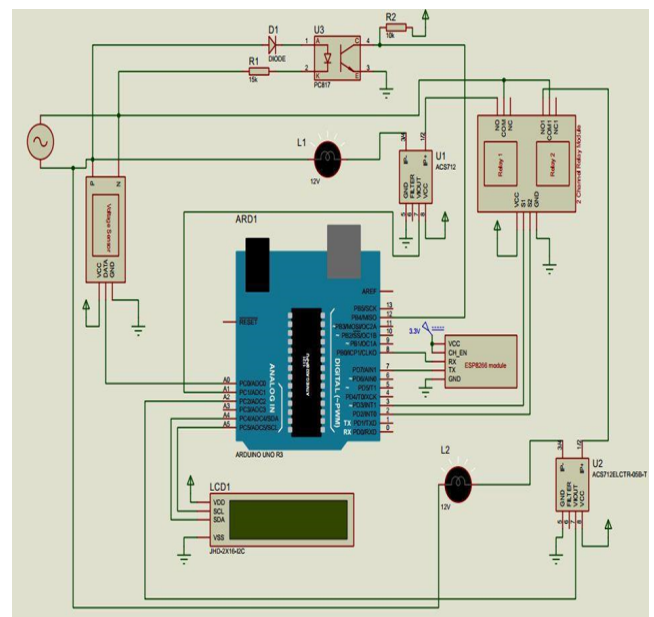


Fig. 2. User interface of proteus 8.1.

For diverse designs with a Microcontroller Proteus 8 is excellent simulation software. The fact that virtually all microcontrollers are available makes it mostly popular. It's a useful tool to test electronics hobbyists' programs and embedded creations. Simulation Software Proteus 8, one can analysis your microcontroller programming [16]. You may build PCB design using it immediately after simulation of your circuit with Proteus 8 software, thus it can be a single package for students and hobbyists. So, I guess you have some insight into what protecting software is now. Proteus 7.0 is a Virtual Systems Model (VSM) which co-models the

whole microcontroller-based designs by combining circuitsimulation, animated components and microprocessor models. This is the best tool for engineers, before building a physical prototype in real time, to test their mical controller ideas [17]. It lets users to engage with the design by means of on-screen indications, LED and LCD displays and switches and buttons, if linked to the PC. The circuit simulation, a product that employs an analytical kernel of SPICE3f5 in combination with an event-driven digital simulator, is one of the primary components of Proteus 7.0.

#### IV. SOFTWARE DEVELOPMENT AND COST ANALYSIS OF THIS SYSTEM

Open-Source software may be obtained free from [www.arduino.cc](http://www.arduino.cc), for programming the microcontroller. We may build little programs using the microcontroller via this "Arduino software." The software is named "Sketch." In the end, the drawings will be transmitted via USB connection to the microcontroller. More about "coding" later on. We downloaded and installed the Arduino software from [www.arduino.cc](http://www.arduino.cc) (This was NOT connected to the PC). Afterwards, we opened and installed the software file called `arduino.exe`. Two program settings are crucial and should be taken into account:

a) The arduino program must choose the board we wish to connect to. The "Arduino Uno" ("Arduino / Genuino Uno") is here called.

b) To let the computer, know what port the board was attached, we have to pick the proper "Serial Port." This is feasible only if the USB driver is appropriately installed. This may be verified: the Arduino has not been linked to the PC at the moment [18].

In this study effort, the team has an Android app for visualization and authentication. The Android app doesn't just talk, it includes a Firebase login system as well. Firebase is a Google-supplied API for creating and retrieving a database in real time. It also gives the created app better security. It is also utilized for backend support and other structures such as data storage, user authentication and hosting. The android studio is authenticated using the Android Studio feature of Firebase. Whenever someone authenticates using an Email or Google, a firebase user object is sent [19].

Cost analysis of the hardware system is given below.

TABLE I: COST ANALYSIS

SL NO	Components Name	Quantity	Price (BDT)
1	Arduino UNO	1	500
2	Adaptor	1	350
3	LM2596 Buck Module	1	100
4	Relay Module	1	150
5	Current Sensor	2	440
6	LCD Display	1	450
7	Wifi Module	1	350
8	Voltage Sensor	1	350
9	Opto coupler	1	45
10	Load	2	140
11	Others	1	500
<b>Total Cost</b>			<b>3,395tk</b>

This object includes the fundamental user information. Once the Android or iOS App is built-in, firebase features such as Analytics, Authentication, Storage, Messaging, Hosting, Early-Time Database, and others.

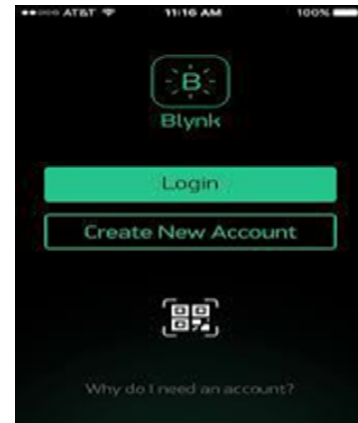


Fig. 3. Android Apps.

#### V. RESULTS AND OUTPUT OBSERVATIONS

Electricity grid is among the most potential and famous applications and systems. Efficient power transmission. Quicker restoration of electricity after power disturbances. Reduced service operation and administration expenses and eventually cheaper energy bills for customers. At the heap, a sensor was installed to determine the current; a circuit is used to measure the voltage and the power can be calculated with these two. In the cloud database, control attributes are thrown away. A software that facilitates and sends the commands from the android application to the Arduino board when loaded, causing an electromagnetic transfer to modify the status of the heap. It allows the power values and control devices to be obtained from anywhere on the world.



Fig. 4. Project picture.

#### VI. CONCLUSION

The Smart Power Grid is undergoing a transformation in the energy arena. Both owner and user-friendly technology are Smart Power Grid. Applications from anywhere on the internet may verify the current system. Authority is able to govern Internet power line system. One of the most promising and prominent Internet applications in business is the intelligent power grid. Efficient power transmission. After energy disruptions, electricity. Reduced service operation and administration expenses and eventually cheaper energy bills



for customers. Technology to save time. The requirement for the current grid systems is critical for intelligent operations in power system infrastructure. PG is a new and enhanced grid that resolves several difficulties in the old grid with efficiency and dependability. This study presents the creation of an IoT-based prototype for power monitoring and control. Blynk applications are utilized as a software solution for remote access to consumer charge data. The wide scale installation of the architecture described needs the development of cost-effectively integrated power sensing and monitoring equipment. Authors will create a cloud-based intelligent metering system for use in clever cities in future.

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