

Chapter 7

Evolution of Smart Energy Grid System Using IoT: Smart Grid, Online Power Monitoring in Buildings, Smart Sensors for Smart Grid Protection

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ABSTRACT

The IoT is a rapidly emerging research area. It refers to an infrastructure network that includes digital data, mechanical objects, computational devices, and sensors that have unique identities. IoT delivers many solutions in various domains by providing connection of devices through the internet. Recently electricity is very important in our day-to-day lives. The consumption of electricity is also rapidly increasing. It is necessary to improve the production of electricity and also reduce the wastage of electricity in transmission lines. The energy grid refers to the next generation power grids, with bi-directional or two-way flows of electricity through the communication interface or protocols. The energy management in grid ensures stability between the supply and demand, which is maintained for reducing the wastage of electricity. In order to achieve this reduction, it is necessary to monitor the parameters of the PV system by the IoT hardware. Specifically, the authors focus on IoT technologies for monitoring the parameters of PV systems such as voltage and current by sensors in IoT.

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INTRODUCTION

The Internet of Things (IoT) is emerging rapidly and delivers numerous solutions in various domains. Current research on Internet of Things (IoT) mainly focuses on how to enable general objects and make them connected for sharing data or information. IoT allows sensing, identification, actuation, monitoring, decision making, communication, and management. Since IoT is the network of connected physical objects or devices. The definition of IoT by a researcher is an open and comprehensive network of intelligent objects that have the capacity to auto-organize, share information, data and resources, reacting and acting in face of situations and changes in the environment. With the help of the communication technologies such as wireless sensor networks (WSN) and Radio frequency identification (RFID), sharing of information takes place. Therefore, we can say IoT allows humans and things to be connected Anytime, Anyplace, with anything and anyone using any network and any service. According to our latest State of IoT—Spring 2022 report, released in May 2022. The number of global IoT connections grew by 8% in 2021 to 12.2 billion active endpoints, representing significantly lower growth than in previous years. Despite a booming demand for IoT solutions and positive sentiment in the IoT community as well as in most IoT end markets, IoT Analytics expects the chip shortage's impact on the number of connected IoT devices to last well beyond 2023. Other headwinds for IoT markets include the COVID-19 pandemic and general supply chain disruptions. In the end of 2022, the market for the Internet of Things is expected to grow 18% to 14.4 billion active connections. It is expected that by 2025, as supply constraints ease and growth further accelerates, there will be approximately 27 billion connected IoT devices. IoT cloud platforms are designed to be used in domains such as application development, device management, system management, heterogeneity management, data management, analytics, deployment, monitoring, visualization, and finally research purposes. IOT has many applications such as Creating better enterprise solutions, integrating smarter homes, innovating agriculture, building smarter cities, upgrading supply chain management, transforming healthcare, installing smart grids, Revolutionizing wearables, Integrating connected factories, Reshaping hospitality. As IoT technologies are used in our day-to-day activities from domestic to commercial sector, unavoidable challenges are also increasing.

One of the important applications of IoT is the Smart grid. SG is a data communications network which is integrated with the power grid to collect and analyse data that are acquired from transmission lines, distribution substations, and consumers. The IoT enabled smart grid allows transforming the conventional energy grids into modernized Smart Energy Grid systems. The IoT-enabled Smart Energy Grid system equipped with intelligent two-way flow of data communication can significantly improve the operation and control of the traditional energy grid

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