



DESIGN AND IMPLEMENTATION OF IOT BASED SMART ELECTRICITY METER

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Abstract

In the process of moving towards smart cities in Sri Lanka, Smart electricity meter could be the first step to make a change in conventional Billing and metering system. The necessity of such a globally applicable system is well experienced during the recent COVID-19 pandemic situation as well mainly due to the problems related to billing, faced by both consumers and electricity board. The system proposed by Aswin Raj et al tried to incorporate real-time pricing in smart grids. It led to conserve the energy as well due to the synchronization of electrical energy cost and demand curves. Azaza & Wallin conducted a study to identify the customers who are mostly responsible for the peak system, using responsibility factor and consumption variability and through a mining approach for smart meter data. Although digital meter which was introduced by Ceylon Electricity Board has analysing and storing capability, it does not have the communication capability. Existing smart meters in the world provide one-way communication facility from the meter to suppliers. The main contribution of this study is the introduction of two-way communications through smart metering which can be used to manage the customers' power consumption and reduce the energy wastage and eventually the electricity bill. Hardware components of the meter are selected based on the reliability and the cost. Energy analyser is used to measure voltage, current, hertz and watt-hour (Wh). The processor collects and processes the data. All power consumption details of the meter are sent to the cloud in every 30second for billing process of the company GSM module. According to the calculation, both customer and the company will receive the notifications. All features of the meter were tested both from customer's and supplier's sides. All the data from the implemented smart meter with different loads were collected to analyse the performance. The results show that the accuracy of data and satisfactory performance of the real-time monitoring system. The proposed metering system also helps to identify unauthorized use of electricity in an efficient manner through real-time monitoring system. There is one possible failure called data lost which can be occurred by GPRS/GSM communication. It can be overcome by recoding data in EEPROM of energy analyser and once the communication channel established all these historical data will be transferred to the server.

Keywords: Smart electricity meter, Smart city, IoT, Energy management systems, Smart grid