Title:

Development and Implementation of an Electric Meter Reading and Household Power Consumption Monitoring System

Rationale:

Electricity demand has increased rapidly over the years, and electricity prices have risen in response. Electric utility companies bill customers on a monthly basis using a device known as an electric meter. Meter reading, though it appears simple, is a time-consuming process that requires manpower to read the meter and record the reading. Meter readers visit residential and commercial areas to read meters and then manually calculate the amount based on the units consumed. Following the house-to-house process, a data entry officer manually enters the meter readings into the system (M.R.M.S.B. Rathnayaka, 2013).

Electric utility companies are currently struggling to keep up with the changing maximum demand of consumers. As a result, numerous issues arise, the majority of which are caused by manual meter reading processes. In the Philippines, manual meter reading systems using electric meters are installed on the grounds of residential or commercial consumers, and data on consumer consumption is collected on a monthly basis. The current system, however, has the following disadvantages: (a) a large number of meter readers must be hired to travel from one household to another to complete tasks such as reading energy consumption, recording data, and communicating with a receiving module; (b) manual meter reading may result in meter reading errors as well as leakage errors; (c) when extreme weather conditions occur and meters to be read are inaccessible to meter readers, previous energy consumption is used to calculate the current month's electricity bill.

The Philippines is not only concerned about power availability, but also about the accuracy of metering and billing strategies. With this in mind, the researchers believe there is a need to develop a solution to address the inadequacies of the meter reading system, such as human or leakage errors, by developing an automatic meter reading system. The solution aims to increase power reading efficiency, resulting in more precise billing for customers.

Statement of the Problem:

The study aims to develop a device that will aid in the control and effective billing. Specifically, it sought to answer the following questions:

1. How does the meter reader system contribute in terms of:
    1.1. Monitoring power consumption patterns?
    1.2. Reducing electricity costs?
2. What is the effectiveness of the designed and implemented meter reader system in terms of the following indicators:
    2.1. Accuracy; and,
    2.2. Functionality; and,
    2.3. Precision?
3. What is the significance of the device in the following sectors:
    3.1. Residential;
    3.2. Commercial; and,
    3.3. Electricity power industry?

Scope and Limitations:

The study is focused on developing a system that can automatically read and monitor electricity consumption. Several home appliances will be tested to track the energy consumption pattern while they are in use. In connection with the device, an Android application will be developed to help consumers in tracking their monthly electricity patterns and billing. However, the study is limited to a prototype setup consisting of Arduino, sensors, modules, a power supply, and various home appliances.