

Electric Measuring System Documentation

Pi-Sense

11/05/2023

Important Notes:

- *The descriptions in italics in this document (except for some section headings) are exemplary and explanatory and must be removed from the completed report.*
- *Identify which section of this report was created by which team member*
- *Your documentation should have ca. 8 pages.*

1 Team members

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2 Introduction

The Electricity Measuring System is a prototype designed to measure and observe current, voltage and the temperature of an industrial factory or a lab. As a safety feature the prototype is capable of give alerts/warning system and take the necessary safety actions. The user can keep a track on the system with a mobile device or a laptop. In case of emergency the user is capable of terminate the malfunctioning/ failing sections of the electrical system remotely.

In order to gain the previously explained capabilities, it is required to implement a wireless sensor network. The Raspberry pi 3 plays a as the central system and the data processing and transfer unit of the prototype. MQTT (Message queuing Telemetry Transport) protocol is used to transfer signal wirelessly. The current sensor, voltage sensor and the temperature sensor has connected to an Arduino Wi-Fi Rev 2 which act as the nodes of the wireless sensor network. This Arduino work as a publisher to the broker to transfer the measurements.

This system is implemented by using Internet of things. Raspberry pi is connected to the internet and use the cloud technology to process and store measurements from the sensors, record of a publishers, commands etc.

3 Concept description

Block diagram of your target application.

What is the main application for your prototype?

Which devices, sensors, actuators, apps etc. are using for your application?

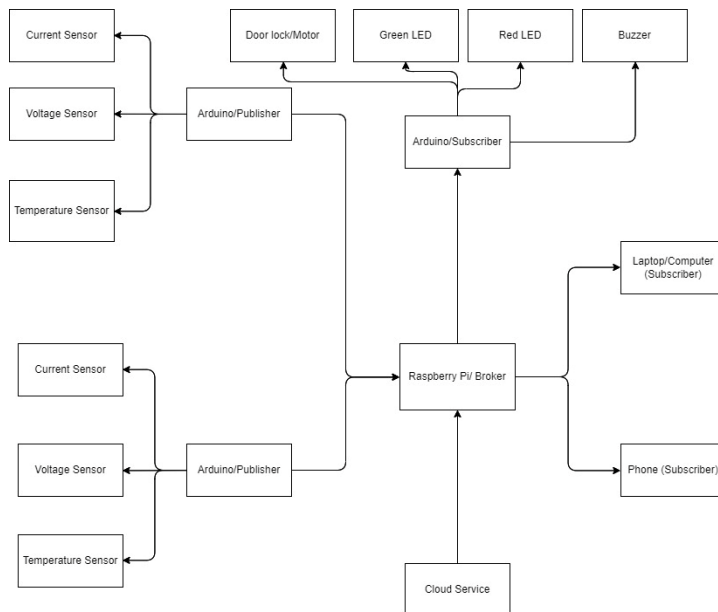


Figure 1: Block Diagram for our wireless sensor network

In the Block diagram in figure [1] we can see the general structure of our electricity measuring wireless sensor network. We will use a Raspberry Pi as a broker for all our subscriber and publisher devices. In this concept block diagram, we have 2 Arduino micro-controllers which act as publishers. Each publisher device is controlling and gathering information from a voltage sensor, a current sensor and a temperature sensor. This information will be distributed to

all subscribers of the network. The Arduino device, which acts as a subscriber is controlling the actuators of the system by using the information from the sensors and cloud service. The actuators in this case are a Door Lock/motor device for locking the door, Green and red LEDs and a buzzer or any actuator that will create an alarm sound. Additionally, all information from the sensors is being displayed for the Computer/Phone Subscriber devices for the users of the system to check on the measured values.

The main application for our system is in an industrial testing environment in which high voltage or low voltage systems are tested for their functionalities. For high voltage applications our system is designed to measure voltages and currents in internal circuits of the test device and not the applied high voltage, for example a control or driver board of an inverter. Additionally, our WAN will provide a way for the users to measure the temperature on certain points of the test device and see the information on one of the subscriber devices. In high voltage applications, safety measures are to be taken, so that no one can touch the test device while it is under high voltage, thus our System includes a door lock to prevent any person from entering the test environment after setting up the sensors. Furthermore, the system provides ways of reacting to a voltage, current or temperature above a set threshold, in which the system will alert the user using LEDs and a Buzzer/alarm device.