



Low-Cost Smart Precipitation Gauge with a Weather Station

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ABSTRACT

Rain gauges are used to measure rainfall. For the rainfall data collection, manpower is required. In that scenario, the person needs to go where the rain gauge is located and download data from the data logger and calculate the rainfall. Some places are difficult to reach and need a flat surface to install the rain gauge. In addition, systematic and human errors, defective instruments, non-recorded data are some difficulties in the rain gauges. The number of internet-enabled loggers is currently limited in the market. While doing those, different types of rain gauges under different price points were identified. Most of the rain gauges and their material cost are expensive. Those rain gauges need special training and experience to operate and calibrate. This study introduces a low-cost tipping bucket rain gauge to overcome the problems associated with conventional systems. The 3D printed device is specially designed to use the minimum amount of raw materials possible, and all the raw materials can be easily found. A water collector is designed to collect water 10 ml on one side. An adjustable base is used to install the rain gauge in unbalance surfaces. Consequently, temperature, pressure, humidity, moisture, and altitude parameters also can be measured to operate as a fully functional weather station. Reed switch counts the number of tips that make a temporary electrical connection each time the bucket tips. The measured parameters are stored in the cloud server and displayed on the web interface. The Root Mean Square Error is a commonly used metric for calculating the difference between the values predicted by a model and the values observed in a controlled environment.

Keywords: *Internet of things, Rain Gauge, Weather station*