SMART ENERGY METERS

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1. INTRODUCTION

A **smart meter** is an electronics device that records information such as consumption of electric energy, voltage levels, current, and power factor. Smart meters communicate the information to the consumer for greater clarity of consumption behaviour, and electricity suppliers for system monitoring and customer billing. Smart meters typically record energy near real-time, and regularly report, short intervals throughout the day.Smart meters enable two-way communication between the meter and the central system. Such an advanced metering infrastructure (AMI) differs from Automatic Meter Reading (AMR) in that it enables two-way communication between the meter and the supplier. Communications from the meter to the network may be wireless, or via fixed wired connections such as Power Line Carrier (PLC).Wireless communication options in common use include cellular communications, ii-Fi (readily available), wireless and how networks over Wi-Fi, wireless mesh networks , low power long-range wireless (LoRa),Size (high radio penetration rate, open, using the frequency 169 MHz.ZigBee(low power, low data rate wireless), and Ii-SUN (Smart Utility Networks).

A) Overview

The term *Smart Meter* often refers to an electricity meter, but it also may mean a device measuring natural gas, water or district heating consumption.

Similar meters, usually referred to as interval or time-of-use meters, have existed for years, but "Smart Meters" usually involve real-time or near real-time sensors, power outage notification, and power quality monitoring.

These additional features are more than simpleAutomated Meter Reading (AMR). They are similar in many respects toAdvanced Metering Infrastructure(AMI) meters.

Research by the UK consumer group, showed that as many as one in three confuse smart meters with energy meters, also known as in-home display monitors.

The installed base of smart meters in Europe at the end of 2008 was about 39 million units, according to analyst firm Berg Insight.Globally, Pike Research found that smart meter shipments were 17.4 million units for the first quarter of 2011.Vision gain determined that the value of the global smart meter market would reach US$7 billion in 2012.

B) Purpose

The **smart meter** is future for power industry and serves as an interface between consumer and the utility company. The **smart meter** records the power usage of consumer and communicates this data in a timely manner to utility center.

2.LITERATURE SURVEY

A)Existing problem

Every month one person comes to our home and reads the electricity bill with some device irrespective of the climatic conditions

and his health conditions. So without a person we are using smart energy meters that will directly generates bill to us as a text message to our mobile.It helps us to save the time of the person and energy.

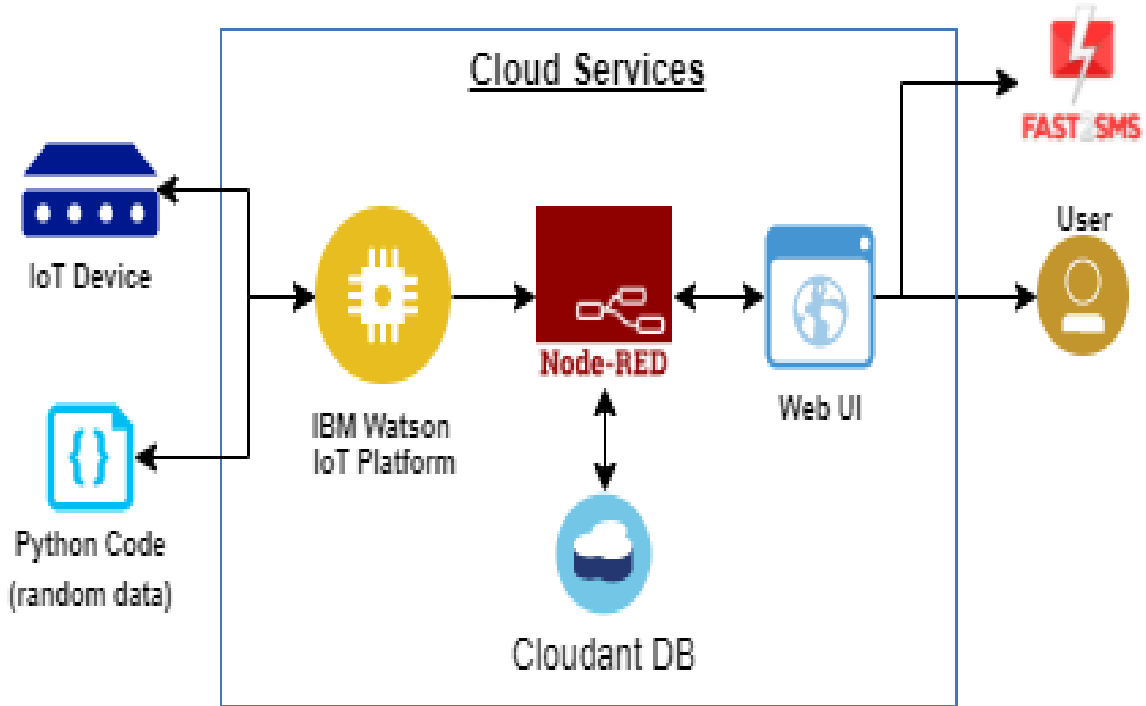
There is somewhat difficulty for the person and if we are using this solution then we will be able to do our work fastly and efficiently.

B)Proposed Solution

- Measuring the voltage and current consumptions of the house
- calculating the electricity bills for the house and send them the notification.
- Develop a web application using which the persons can see the sensor parameters and the bills

3.THEORETICAL ANALYSIS:

A)Block Diagram



B)Software Designing

We follow a step-by-step procedure to set up all the interfaces required for our project and develop the code in python to list the stock of products in an organisation to the cloud.

Required Software :

Python Idle (with specified packages installed)

IBM cloud

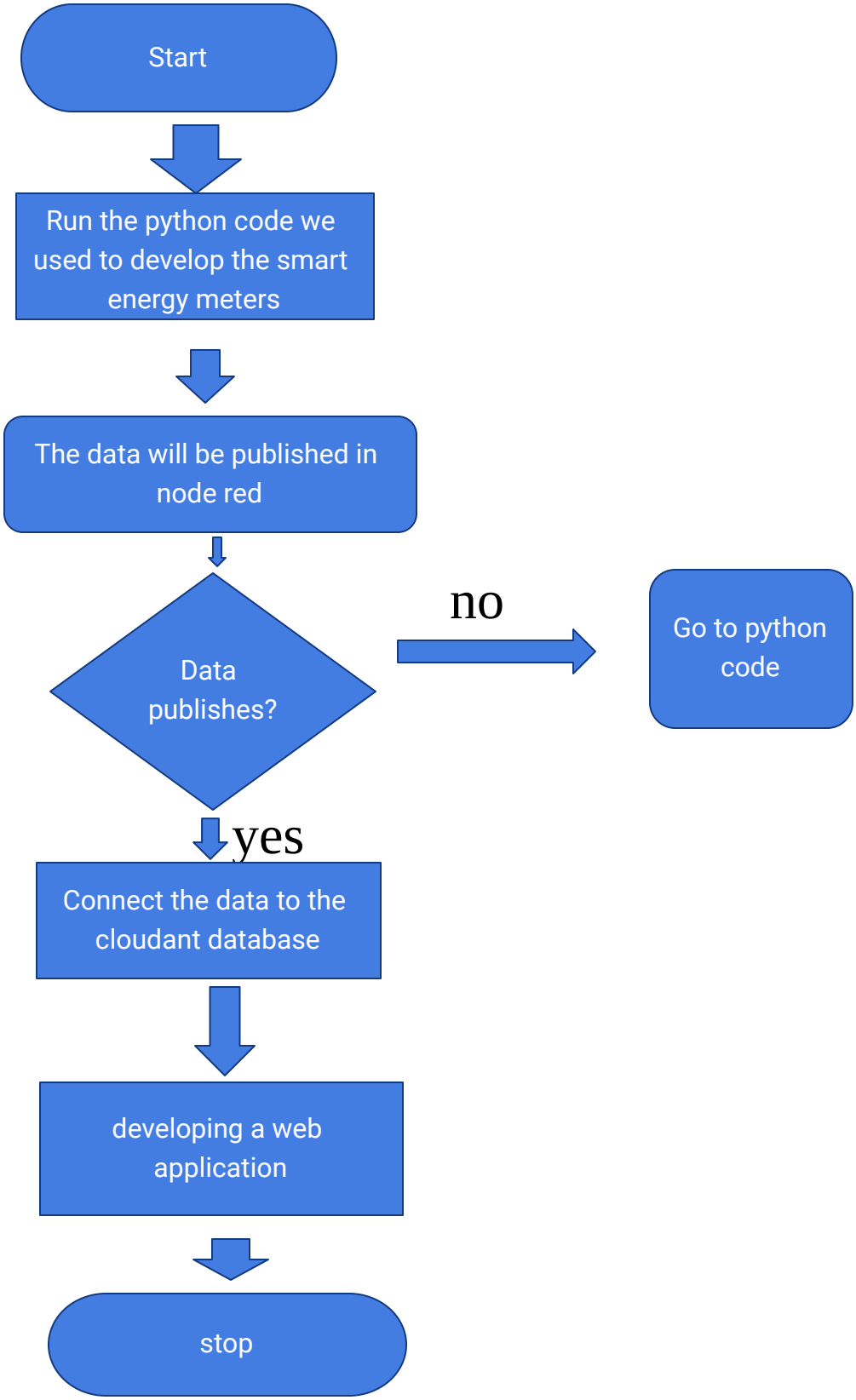
Node Red service

4.EXPERIMENTAL INVESTIGATIONS

This paper reports the results of an experimental investigation of the performance of finned heat sinks filled with phase change materials for thermal management of portable electronic devices. Aluminium acts as thermal conductivity enhancer (TCE), as the thermal conductivity of the PCM is very low. The heat sink acts as an energy storage and a heat-spreading module. The test section considered in all cases in the present work is a 80 × 62 mm2 base with TCE height of 25 mm. Heat sinks with pin fin and plate fin

The results indicate that the operational performance of portable electronic device can be significantly improved by the use of fins in heat sinks filled with PCM.

5.FLOW CHART


Start
Run the python code we used to develop the smart energy meters
The data will be published in node red
Data publishes?
no
Go to python code
yes
Connect the data to the cloudant database
developing a web application
stop

6.RESULT:

The message notification will be received by the user about the electricity bill.

7.ADVANTAGES AND DISADVANTAGES OF SMART ENERGY METERS

Advantages:

- Eliminating manual meter reading
- Monitoring the electric system more quickly
- Making it possible to use power resources more efficiently
- Providing real-time data useful for balancing electric loads and reducing power outages (blackouts)
- Enabling dynamic pricing (raising or lowering the cost of electricity based on demand)
- Avoiding the capital expense of building new power plants
- Helping to optimize income with existing resources

Disadvantages:

- Transitioning to new technology and processes
- Managing public reaction and customer acceptance of the new meters
- Making a long-term financial commitment to the new

metering technology and related software
- Managing and storing vast quantities of metering data
- Ensuring the security of metering data

8.APPLICATIONS:

Smart energy meters are widely used in domestic areas for the measurement of electric power consumed by the customers and these energy meters are commonly used in industrial sector for controlling the **electric power** of various machinery according to its reading and for measurement of electric power.Smart meters has been designed for various features like remote monitoring of energy consumptions, remote turn ON/OFF power supply, remote detection of energy theft, with time varying pricing system, remote fault detection, capable of monitoring power quality etc...

9.CONCLUSION:

We are reading the voltage and current values and giving those details to node red platform and integrating the bill data with the cloudant database and sending a message notification to the user.

10.FUTURE SCOPE

- Our honourable prime minister of INDIA **SHRI NARENDRA MODI** initiated 'DIGITAL INDIA' scheme where some cities will be converted into smart cities where smart grid will be implemented to materialize the smart city into reality.
- It is risky because of financial developments and regulations.
- But in the long run,attitudes will change ,wide spread usage.

11.BIBLIOGRAPHY:

- An Automated Energy Metering System - Home Based Approach Swarthy P.R1,C.Shanthi2
- A COGNITIVE ENERGY DISTRIBUTION SYSTEM SANUKRISHNAN S.B.

12.APPENDIX

A)Source code:

```
import time
import says
```

```
import ibmiotf.application
import ibmiotf.device
import random
import json

#Provide your IBM Watson Device Credentials
organization = "hh8qzq"
deviceType = "iotdevice"
deviceId = "7777"
authMethod = "token"
authToken = "7989321384"



# Initialize the device client.
V=0
C=0

Def myCommandCallback(cmd):
        print("Command received: %s" % cmd.data['command'])



        if cmd.data['command']==light on:
                print("LIGHT ON IS RECEIVED")
```

```
        elif cmd.data['command']=='lightoff':
                print("LIGHT OFF IS RECEIVED")

        if cmd.command == "setInterval":
                if 'interval' not in cmd.data:
                        print("Error - command is missing required
information: 'interval'")
                else:
                        interval = cmd.data['interval']
      elif cmd.command == "print":
                if 'message' not in cmd.data:
                        print("Error - command is missing required
information: 'message'")
                else:
                        print(cmd.data['message'])

try:
                deviceOptions = {"org": organization, "type":
deviceType, "id": deviceId, "auth-method": authMethod,
"auth-token": authToken}
                deviceCli = ibmiotf.device.Client(deviceOptions)
                #.....................................
```

```
except Exception as e:
                print("Caught exception connecting device: %s" %
str(e))
                sys.exit()

# Connect and send a data point "hello" with value "world" into the
cloud as an event of type "greeting" 10 times
deviceCli.connect()

while True:
        V=23
        C=45
        #Send Temperature and Humidity to IBM Watson
        data = {"d":{ 'VOLTAGE' : V, 'CURRENT': C }}
        #print data
        De f myOnPublishCallback():
           print ("VOLTAGE = %s C" % V, "CURRENT = %s %%"
% C, "to IBM Watson")

        success = deviceCli.publishEvent("Data", "json", data, qos=0,
on_publish=myOnPublishCallback)
        if not success:
           print("Not connected to IoTF")
        time.sleep(1)
```

```
deviceCli.commandCallback = myCommandCallback

# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

B)UI Output Screenshot: