SMART ENERGY METER USING INTERNET OF THINGS(IOT)

TEAM 21:-

1. K.V.V.SAI KRISHNA (17481A0490)

2. K.ROHITH (17481A0483)

3. G.PAVAN KUMAR (17481A0466)

4. G.RANJITH KUMAR (17481A0469)

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1. **INTRODUCTION**

In the present scenario, the world is facing energy crisis. The optimum solution of this trending problem is to monitor and control the power consumption. In power system, the number of consumers are growing speedily and thus the energy requirement. Move the energy requirement more is need to save energy losses. To save losses we need to monitor the power consumption losses, so that we can utilize the generated power. As generation is increasing in turn are the requirements. So there is a technological advancement needed, so we develop a system with faster and advanced technology i.e. IoT . Nowadays we have a burning concept of lot i.e. Internet of Things through this concept or technology the objects are sensed controlled remotely in the existing network infrastructure.

* 1. **OVERVIEW**

Smart meter can measure and communicate detailed real time electricity usage, facilitate remote real time monitoring and control power consumptions and consumers are provided with real time pricing and analyzed usage information, which is a technical data to be transmitted to the grid, who are utility providers.

* 1. **PUEPOSE**

At the software side, a web portal is designed to display the current and voltage usage details along with the total power unit consumed.  smart meter system was developed in order to provide the objective of a smartenergy meter based on **IoT** which creates awareness about the user's energy consumption level at home.

1. **LITERATURE SURVEY**

**2.1 Existing Problem**

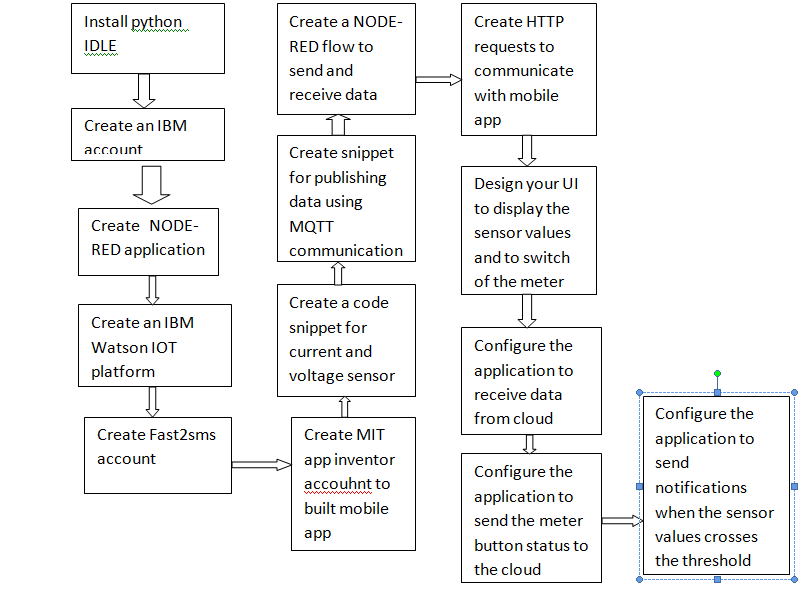
The present system only provides feedback to the customer at the end of the month. Also the meter readings are taken manually. Consumer can know the units consumed by seeing their electricity bill only. Also huge manpower is required to take the readings. There is no protection for energy meter tampering. The consumers cannot monitor the everyday energy consumption or usage. The major drawback of this system is the management of power consumption is difficult.

**2.2 PROPOSED SOLUTION-**

In the proposed method, the consumer can manage their energy consumption by knowing their energy usage time to time. This method not only provides two way communications between utility and consumer but also provides other functions that are if the consumer fails to pay the electricity bill the energy supply would be cut down from the utility side and once the bill is paid the energy supply is reconnected. Another huge advantage of this system is that it notifies the consumer & utility at the event of the meter tampering. By this information the consumer & utility can control the tampering are reduce energy crises.

**3)THEORITICAL ANALYSIS**

**3.1) BLOCK DIAGRAM**

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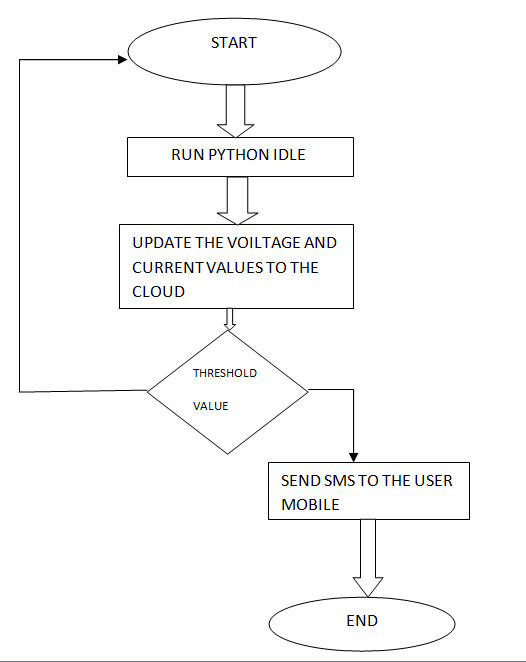
**3.2 Hardware / Software designing**

Python, IBM Cloud Nodered, MIT App inventor.

1. **Experimental Investigation**

Experimental study and design of smart energy meter for the smart grid. Smart meters will enable two-way and real-time communication between the consumers and the provider. Considering the increase of electricity demand in Saudi Arabia, smart meters can decrease the overall energy consumption.

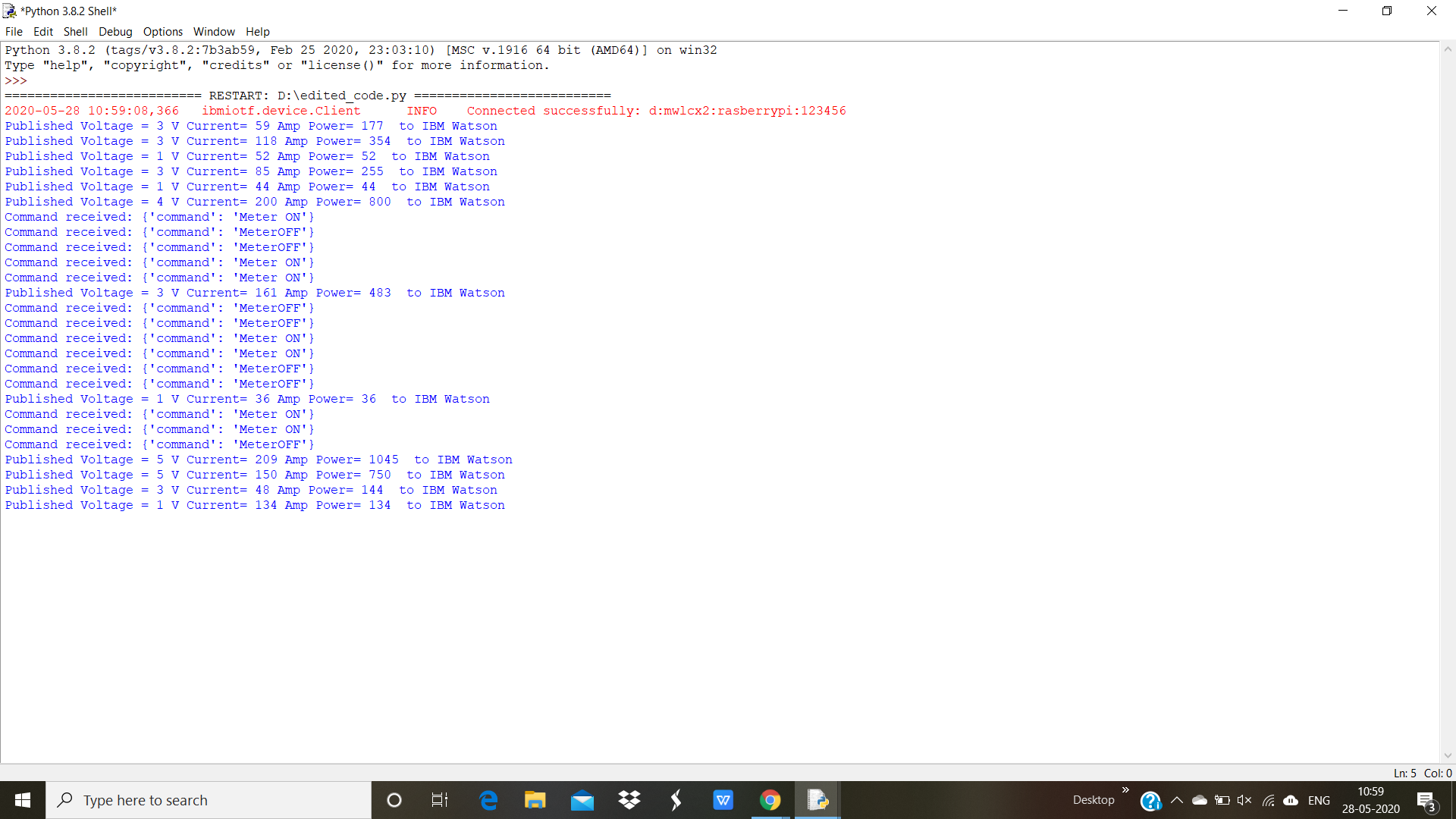
1. **FLOW CHART**



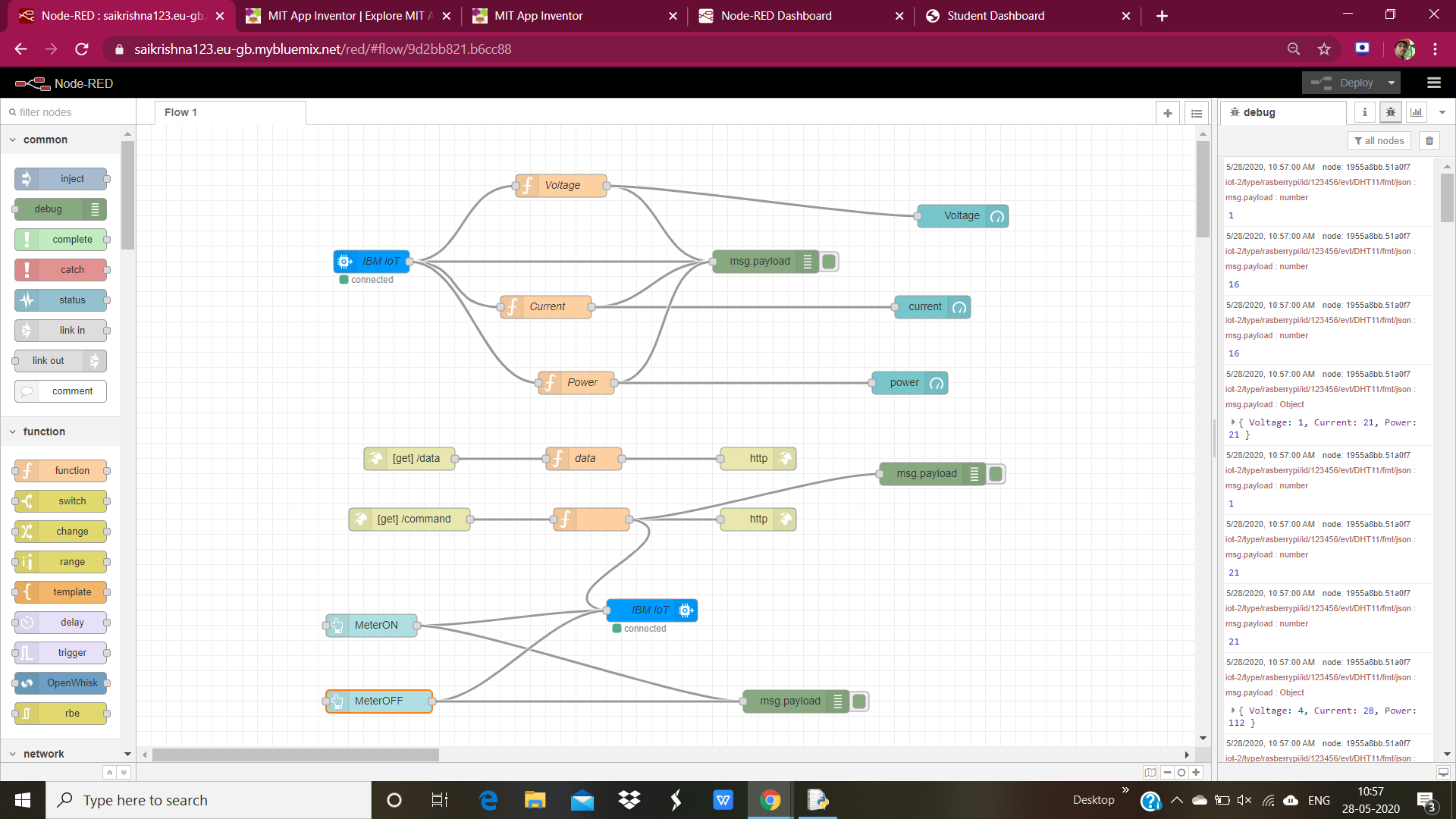
1. **RESULT**

A smart energy meter is an electronic device that records consumption of energy and communicates the information to the electricity supplier for monitoring and billing .Smart meters typically record energy hourly or more frequently, and report at least daily

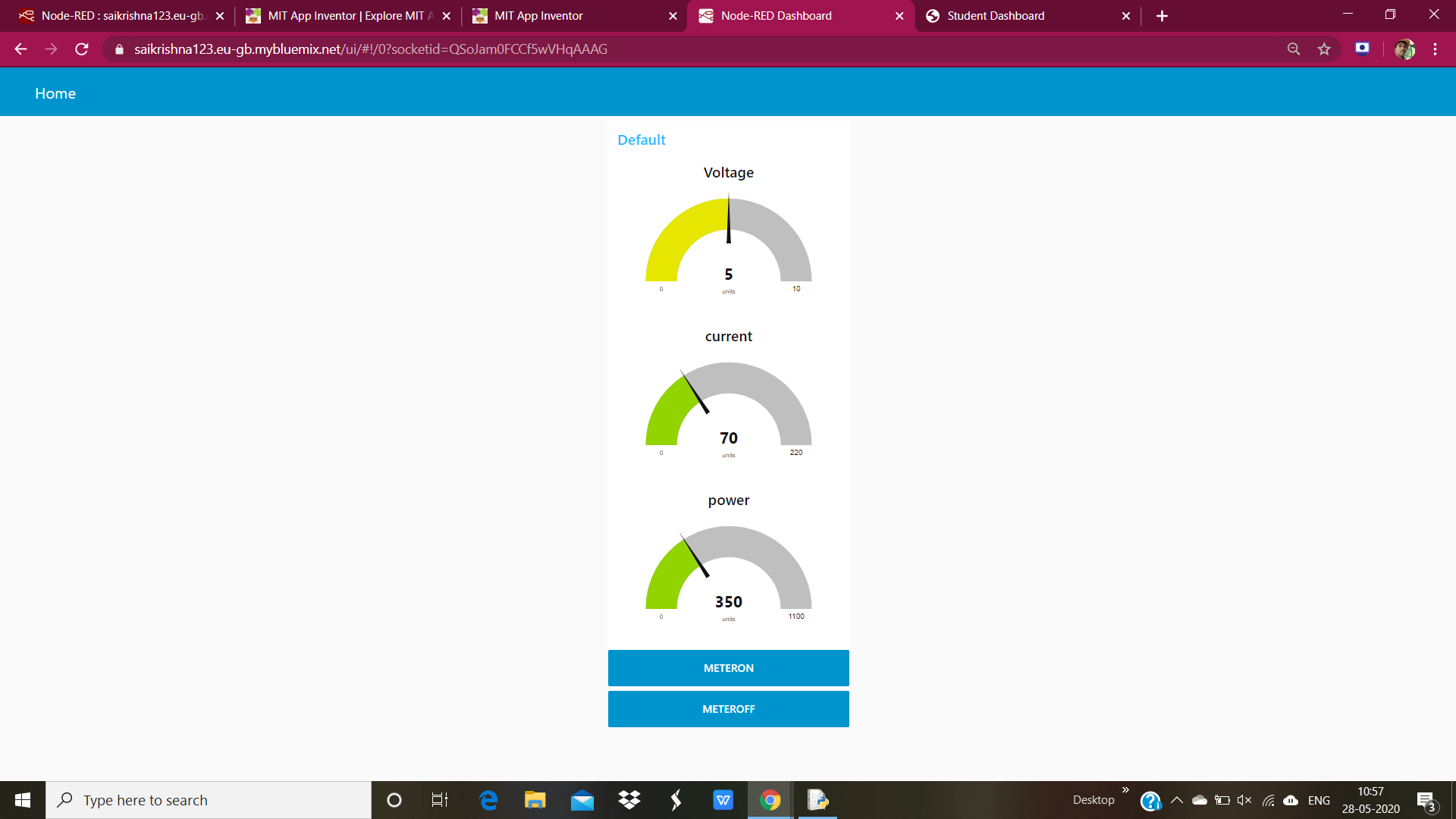
**Resultant output of Python Code:**

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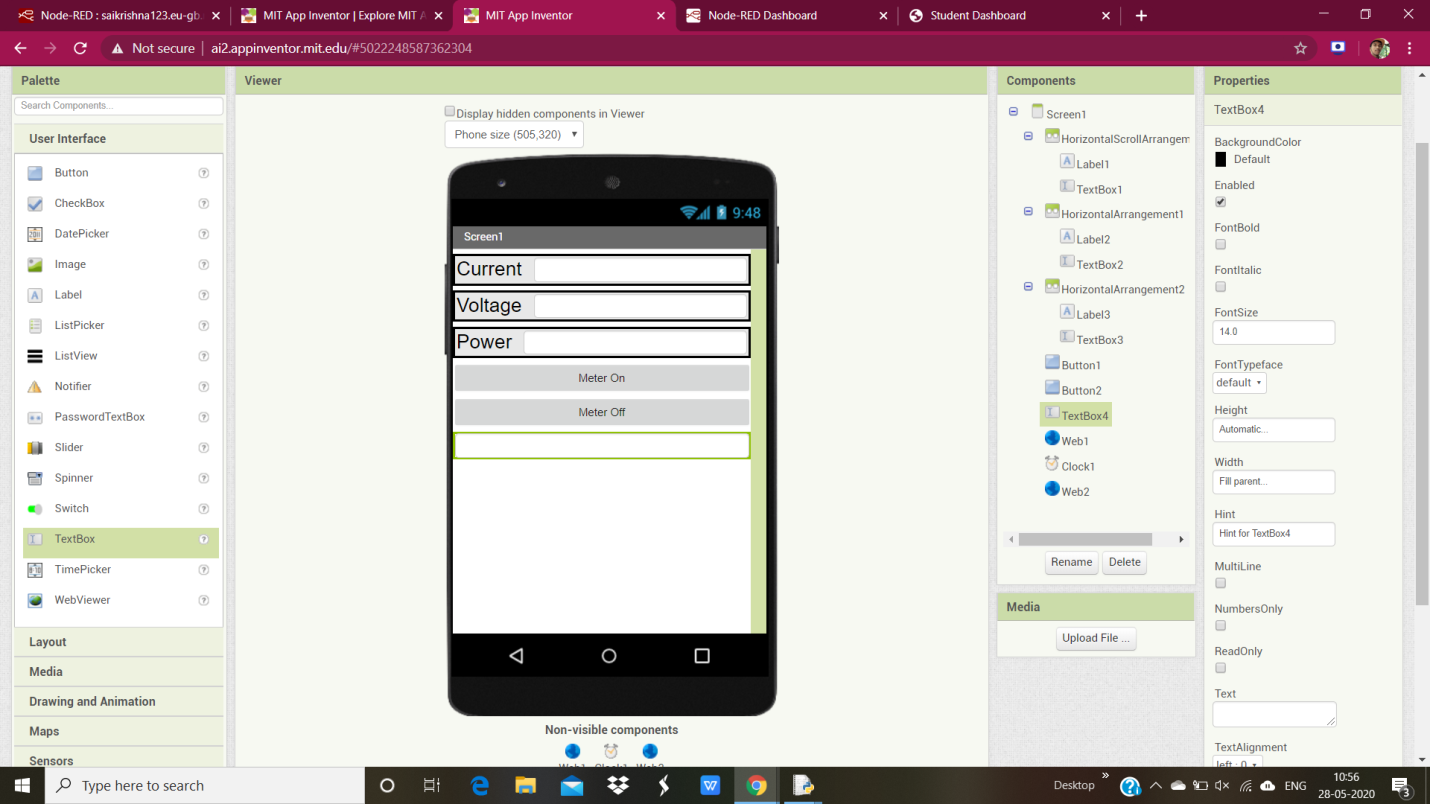
**Resultant ouput of Nodered flow :**

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**Resultant output of Nodered UI :**

****

**Resultant output of MIT App inventor(MOBILE APP) :**

****

1. **Advantages and Disadvantages**

|  |  |
| --- | --- |
| **Advantages** | **Disadvantages** |
| No need to manually submit readings | If you have SMETS 1, it may lose smart functionality after you switch |
| Easy to monitor your energy usage and spending using in-home display | In-Home Display may be inaccurate |
| Accurate bills- no more estimates! | They won’t reduce your bills alone |
|  |  |

1. **Applications:**

* Smart Meters are an electronic measurement
* devices used by utilities to communicate information for billing customers and operating their electric systems.
* **Smart** Grid Infrastructure **Meter** Designs

1. **CONCLUSION**

Smart meters are an essential upgrade to our energy infrastructure, enabling a smarter energy system and enabling energy consumers to be better informed and engaged.

**FUTURE SCOPE**

As per as Market study Techsci Research is forecasted the growth and development of smart electric meter in the coming future i.e Smart Electric Meter Market is projected to reach USD 11.51 Billion by 2023, at a CAGR of over 4%, from 2018 to 2023 owing to increasing investment in smart grid projects, increasing need

1. **Bibliography**

**Books**

Table of contents (6 chapters) Smart Grid and Smart Metering. Pages 1-15. Evolution of Electricity Meters. Pages 17-38. Basic Functionalities Inside an Energy Measurement Chip. Pages 39-64. Smart Meter Prototype Design. Pages 65-93. Short-Term Electricity Demand Forecasting and Warning Signal Generation. Pages [95-114](tel:95-114).

**Data repositories**

Github repositary

**Algorithms**

thesmartbridgeteachable.com

1. **Appendix**

**Source Code :**

**import time**

**import sys**

**import ibmiotf.application**

**import ibmiotf.device**

**import random**

**#Provide your IBM Watson Device Credentials**

**organization = "mwlcx2"**

**deviceType = "rasberrypi"**

**deviceId = "123456"**

**authMethod = "token"**

**authToken = "78901234"**

**# Initialize GPIO**

**def myCommandCallback(cmd):**

**print("Command received: %s" % cmd.data)**

**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 datapoint "hello" with value "world" into the cloud as an event of type "greeting" 10 times**

**deviceCli.connect()**

**while True:**

**voltage=random.randint(1,5)**

**#print(voltage)**

**current=random.randint(0,220)**

**power=voltage\*current**

**#Send Temperature & Humidity to IBM Watson**

**data = { 'Voltage' : voltage, 'Current': current, 'Power': power}**

**#print (data)**

**def myOnPublishCallback():**

**print ("Published Voltage = %s V" % voltage, "Current= %s Amp" % current, "Power= %s " %power, "to IBM Watson")**

**success = deviceCli.publishEvent("DHT11", "json", data, qos=0, on\_publish=myOnPublishCallback)**

**if not success:**

**print("Not connected to IoTF")**

**time.sleep(2)**

**deviceCli.commandCallback = myCommandCallback**

**# Disconnect the device and application from the cloud**

**deviceCli.disconnect()**