PROJECT TITLE : **SMART KITCHEN USING IBM CLOUD**

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1.INTRODUCTION

1.1 Overview

The kitchen is one of the important places in a house. Safety factor is the main aspect that must be taken into account during the activity in the kitchen. The existence of gas leakage, uncontrolled fire and excessive temperatures must be quickly identified and addressed. The purpose of this research is to make prototype of kitchen security system using Internet of Things. The system is designed using 4 types of sensors and Arduino UNO. DHT 11 sensor is used to monitor temperature and humidity, IR Flames sensor is used to detect fire, MQ-135 sensors are used to detect gas leakage, and PIR sensors are used to detect human activities in the kitchen. The sensors output are then connected to the Arduino which will control the relay. The relay acts as a fan switch in the event of a gas leak, uncontrolled fire and excessive temperature increase. Under these conditions, Arduino will also turn on the alarm and the led, and send information to the server. The results show that the system can work according to the desired specifications.

1.2 Purpose

Our **Smart Kitchen using IoT** system **with** multiregional sensors has been designed, constructed and tested. ... Gas sensors are used to detect the leakage of a gas in the system, weight sensors are used to detect the weight of the gas cylinder. Temperature sensors are used to detect the current room temperature.Although much of the work has been done until today to realize the Internet of Things (IoT) into practice, most of the work focuses on resource-constrained nodes, rather than linking the existing embedded systems to the IoT network. The Internet of things (IOTs) is a network of physical objects or things embedded with electronic, software, sensors and connectivity to enable objects to exchange data with manufacturer, operators and connected devices.Although much of the work has been done until today to realize the Internet of Things (IoT) into practice, most of the work focuses on resource-constrained nodes, rather than linking the existing embedded systems to the IoT network. The Internet of things (IOTs) is a network of physical objects or things embedded with electronic, software, sensors and connectivity to enable objects to exchange data with manufacturer, operators and connected devices.

2. LITERATURE SURVEY

2.1Existing Problem

Intelligent System for Domestic Gas Appliances using IOT. In our day-to-day life there is serious threat about leakage which leads to suffocation when inhaled, when ignited leads to explosion and causes a number of deaths.This project is about designing a LPG leakage monitoring system which is proposed for home safety. This system detects the leakage of the LPG and alerts the consumer about the leak by SMS and as an emergency measure the system will turnoff the power supply, while activating the alarm and also gives us information about the gas capacity and vessels capacity.

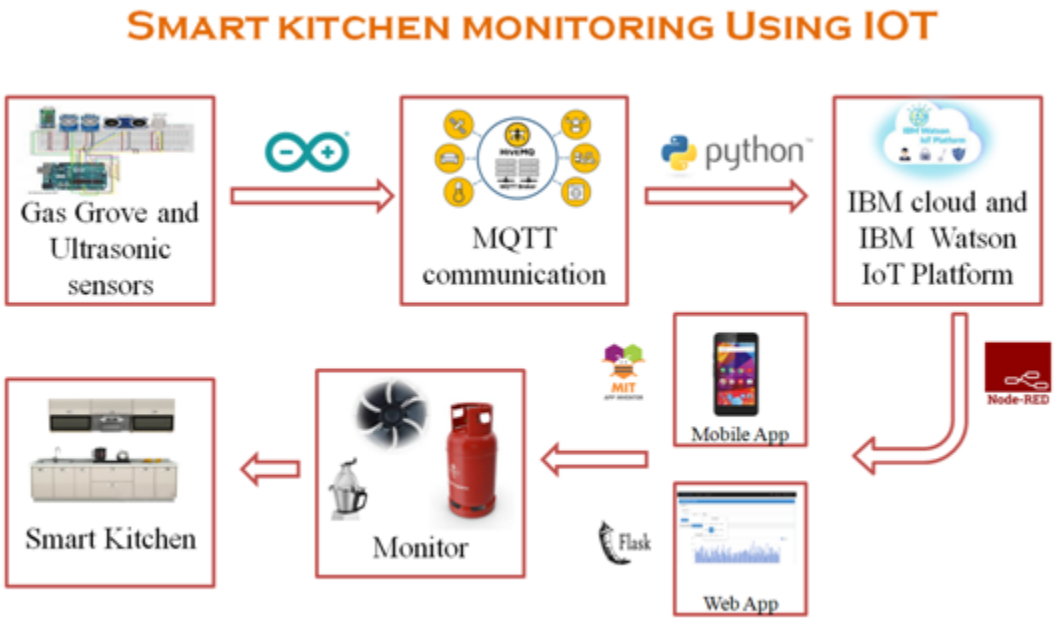
2.2 Propsed solution

When things like household appliances are connected to a network, they can work together in cooperation to provide the ideal service as a whole, not as a collection of independently working devices. This is useful for many of the real-world applications and services, and one would for example apply it to build a smart residence; windows can be closed automatically when the air conditioner is turned on, or can be opened for oxygen when the gas oven is turned on. There is a existing system which introduces the uID-CoAP architecture, a new IoT framework that aims to provide a solution and a new way to let the existing embedded systems be integrated into the IoT network.

The system is proposed of an Android Smartphone users mobile app will be developed in android. MySQL will be used for maintaining database.

3. THEORETICAL ANALYSIS

3.1 Block diagram



3.2 Hardware & Software Designing

Hardware Components used :

1. Arduino Uno
2. MQ-5 Gas Grove
3. Ultrasonic sensor
4. Jumper Wires
5. Bread Board

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Gas Grove Sensor(MQ-5)

This module has two output possibilities – an analog out (A0) and a digital out (D0). The ***analog out*** can be used to detect Gas leakage and to measure volume of Gas leakage (by doing proper calculation of the sensor output inside program) in specific units (say ppm). The ***digital out*** can be used to detect Gas leakage and hence trigger an alert system (say a sound alarm or an sms activation etc). The ***digital out*** gives only two possible outputs – High and Low (hence its more suited for detection of gas leak than to measure volume of gas presence).

Ultrasonic Sensor

The HC-SR04 ultrasonic distance sensor. This economical sensor provides 2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach up to 3mm. Each HC-SR04 module includes an ultrasonic transmitter, a receiver and a control circuit.

There are only four pins that you need to worry about on the HC-SR04: VCC (Power), Trig (Trigger), Echo (Receive), and GND (Ground). You will find this sensor very easy to set up and use for your next range-finding project!

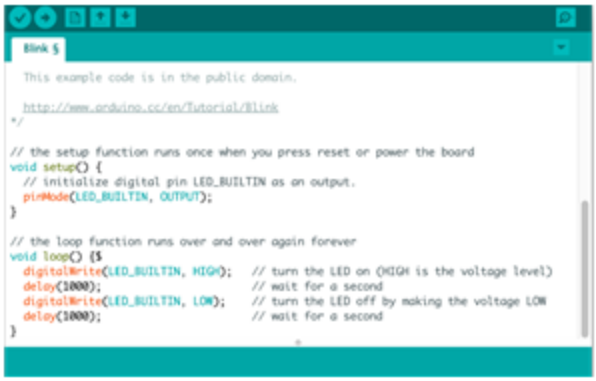
This sensor has additional control circuitry that can prevent inconsistent "bouncy" data depending on the application.

Software Used:

1. Arduino IDE
2. Python Shell
3. IBM Cloud
4. Node-RED
5. Flask
6. MIT App Inventor

Arduino IDE :

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.
This software can be used with any Arduino board.



Python Shell:

Python provides a Python Shell (also known as Python Interactive Shell) which is used to execute a single Python command and get the result. Python Shell waits for the input command from the user. To open the Python Shell on Windows, open the command prompt, write python and press enter.

IBM Cloud:

IBM Cloud is a suite of cloud computing services from IBM that offers both platform as a service (PaaS) and infrastructure as a service (IaaS). With IBM Cloud IaaS, organizations can deploy and access virtualized IT resources -- such as compute power, storage and networking -- over the internet.

Node-RED:

Node-RED is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways. It provides a browser-based editor that makes it easy to wire together flows using the wide range of nodes in the palette that can be deployed to its runtime in a single-click.

Flask:

Flask is a lightweight WSGI web application framework. It is designed to make getting started quick and easy, with the ability to scale up to complex applications. It began as a simple wrapper around Werkzeug and Jinja and has become one of the most popular *Python* web application frameworks.

```python
from flask import Flask
app = Flask(__name__)

@app.route('/')
def hello_world():
    return 'Hey, we have Flask in a Docker container!'


if __name__ == '__main__':
    app.run(debug=True, host='0.0.0.0')
```

MIT App Inventor:

MIT App Inventor is an online platform designed to teach computational thinking concepts through development of mobile applications. Students create applications by dragging and dropping components into a design view and using a visual blocks language to program application behaviour.

4. EXPERIMENTAL INVESTIGATION

1. Recording values from MQ-5 Gas Grove sensor about the leakage of gas trough digital output and also through the same sensor receiving the weight of the gas present in the cylinder.

2. Using Ultrasonic sensor the presence of the content of the jar is received in terms of quantity.

3. Arduino or Rasperrypi is used to integrate the sensors along with jumpers and bread board.

4. The data received from these is sent the python idle and through the code snippet using MQTT the variables are published to the IBM cloud's IOT Platform.

5. Through the Node-red flow the data is sent in the form of Jason through HTTP requests.

6. The Mobile app is designed using MIT app inventor and the user specifies the desired command upon callback and it is accessed through node red and changes are done accordingly.

7. Through the app You can pour the contents in jar when emptied(0ml) or stop filling it when it is overflowing(1000ml).

7. Flask is used to create Web Application to represent both sensor values and Graph in a user friendly manner.

8. Additional to this the SMS is sent to the user upon emergency alerts like exhausting of cylinder or leakage of gas.

5. FLOWCHART


Python Shell to send the Sensor Data & Receive the Command from Application
Storing the Data in IBM IoT Platform
Node-RED Flow for send & receive the data
The data sent to MIT App and Web App designed through Flask
Contents monitored through desired commands and alert sent using fast2sms

6.RESULT

The content of jar in (ml), the weight of cylinder in(kg) and the status of gas leakage is displayed both in Mobile and Web app. The notifiers send alert on emergency, and the command given by the user during those situations is executed accordingly.

7. ADVANTAGES AND APPLICATIONS

1.Smart appliances can cut your electric bill. Some equipment can calculate energy rates and schedule high-energy-use activities for low-energy-cost times of the day. For example, loads of laundry can be run when electricity rates are lowest, and integrated sensors can optimize drying times.

2.**They look cool.** The cutting-edge appearance of these appliances, including backlit touch screens, is particularly attractive to tech-loving homeowners and those with modern decorating motifs.

3.**Great laundry features.** Smart washers and dryers may not be able to sort, fold, and hang your laundry. They do, however, offer other attractive attributes, like notifying you when loads are complete. Smart washing machines can tell you if you’re running low on detergent and even order more online. Smart dryers can let you know when the vent needs to be cleaned, to avoid fire hazards from lint clogs.

4.**Kitchens too.** New flexible refrigerators can change cooling sections from refrigeration to freezing and back again, depending on your changing needs. Find a sale on ice cream, but your freezer is full? No problem! You can also see what's currently in your fridge while shopping. Or, do you want your stove to defrost and cook dinner and keep it warm until you arrive home? It's possible.

8. DISADVANTAGES

1.Smart appliances cost more. In addition to higher purchase prices, they often require more repairs than mechanical versions of the same machines. According to Angie's List, those repairs can be 50 to 100 percent more expensive.

2.**They may pose data and privacy risks.** Smart home appliances may not utilize reliable internet security protocols, giving hackers a pathway to access other connected devices in your home. Also, the more data that these devices are collecting about you, your habits, and your home, the more that data could be vulnerable.

3.**Firmware issues.** Manufacturers may not provide timely firmware updates, which means an appliance may no longer integrate with other devices, like a smart home hub and voice-activated controllers. It's also easier for hackers to access devices that aren't kept up-to-date and secure.

4.**No connection = dumb appliances.** If your smart appliances can't connect to the internet, they are no longer "smart." Before buying, be sure to check reviews for individual products as well as the manufacturer's customer service ratings.

9.CONCLUSION

Our system will detect the leakage of the gas, incase there is any leakage it will send a sms to the owner and it will turn off power and activate an alarm. The system will continuously monitor the weight of the gas. There will be automatic booking of the gas done (by setting a threshold value for the weight sensor). We will even measure the Humidity and the Temperature around the gas cylinder.

10.FUTURE SCOPE

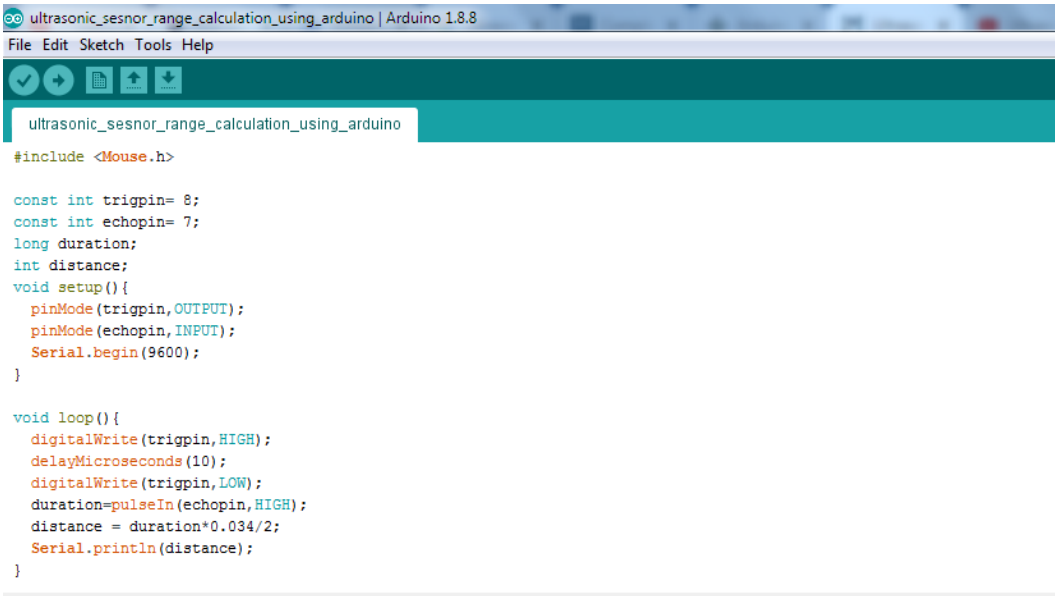
The proposed system consists of an android application. This Smartphone application provides different kind of functionalities to the user. Remote connection to the home gateway is proposed in the given system. Managing schedule of the devices and sensors is the factor of great importance in proposed system. Device monitoring and device control are also done over here.

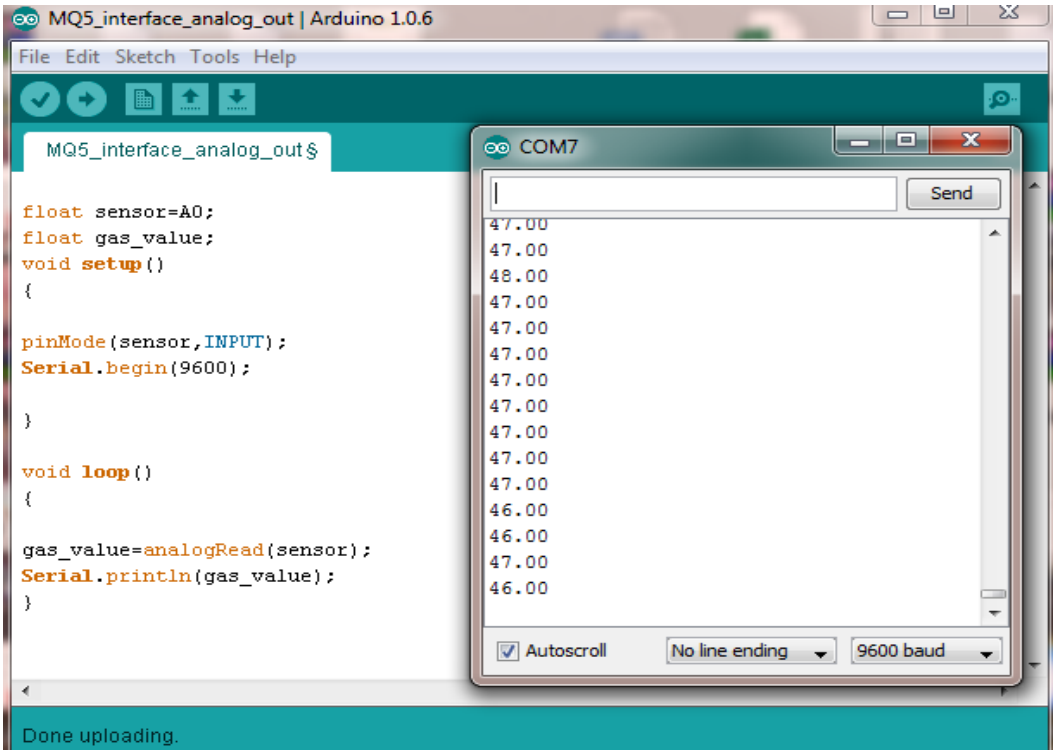
For Server Application Operating System used is Windows operating system. Application Server used is Glassfish server. Java is used as a Front End. Back End is Mysql.

10. Appendix

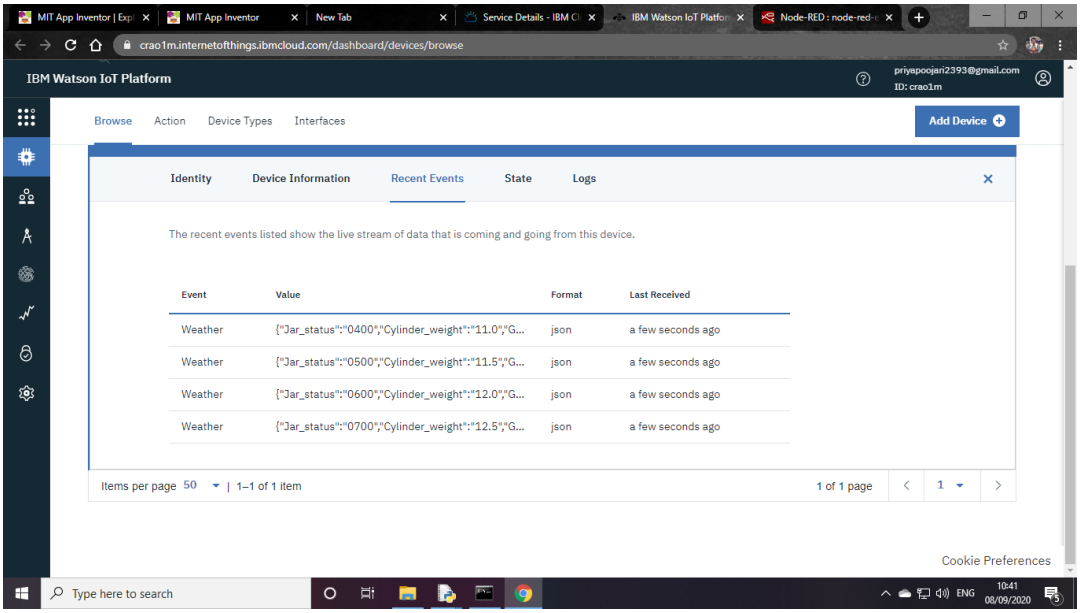
- *"Automation and Monitoring Smart Kitchen Based on Internet of Things (IoT)"* by F Nugroho and A B Pantjawati.
- *"IOT based Smart Kitchen"* by Dr.S.Karthik [2],Mr.J.Alfred Daniel
- http://iotlineup.com/category/iot_kitchen_appliances

ARDUINO SAMPLE CODES

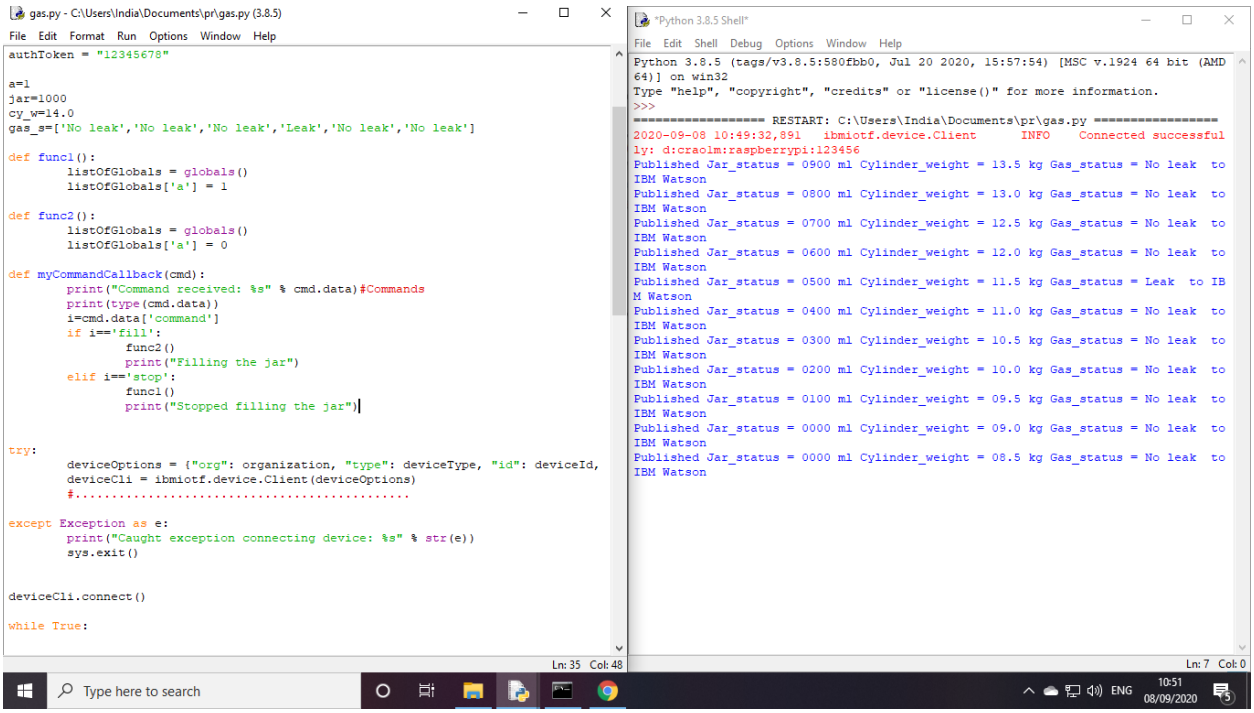




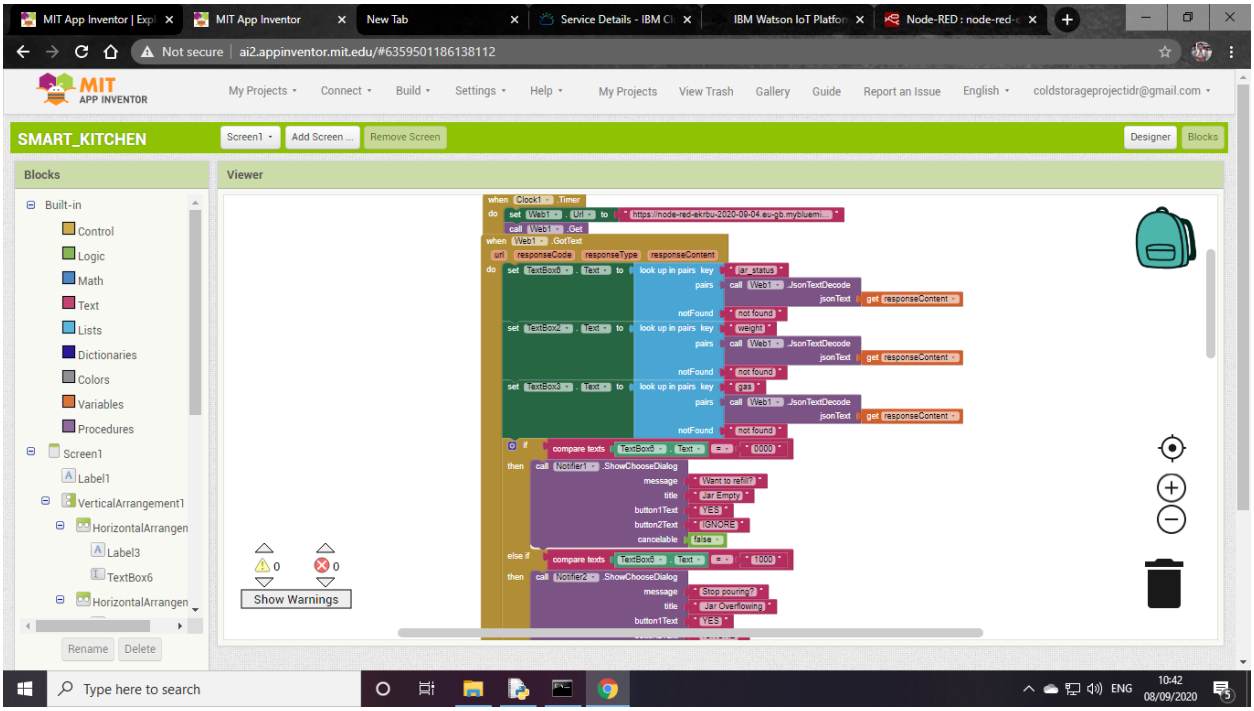
IBM IOT PLATFORM

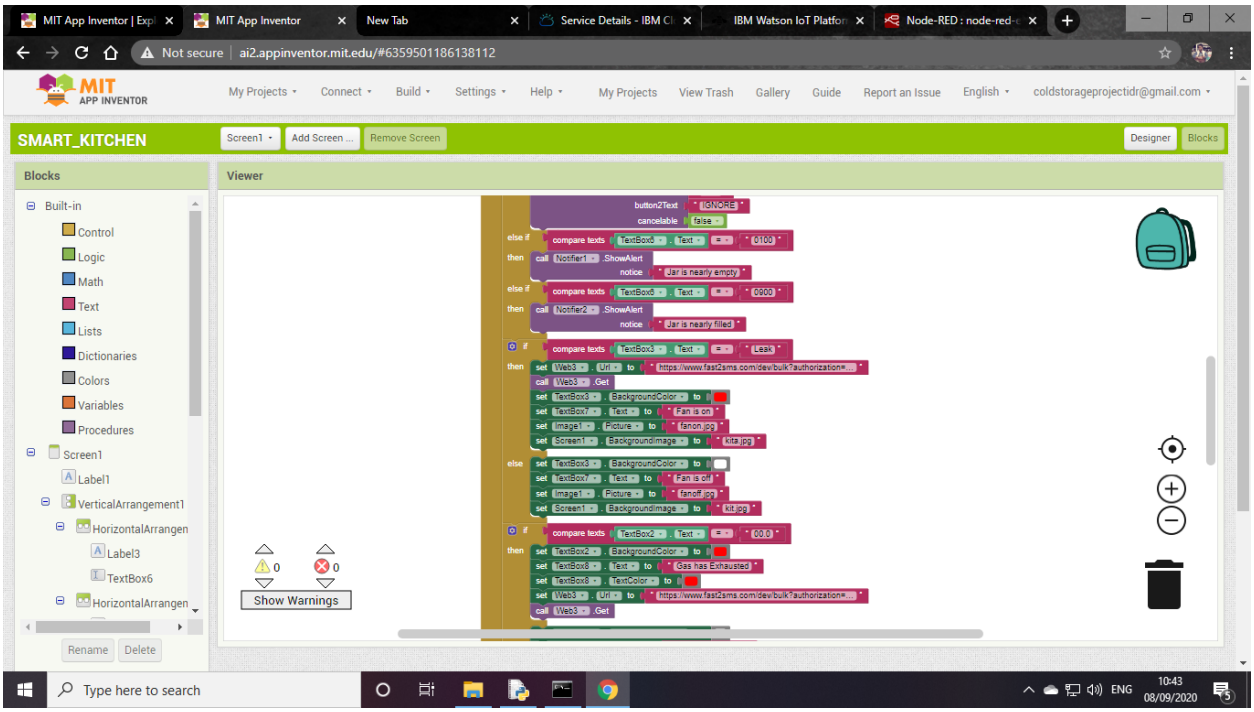


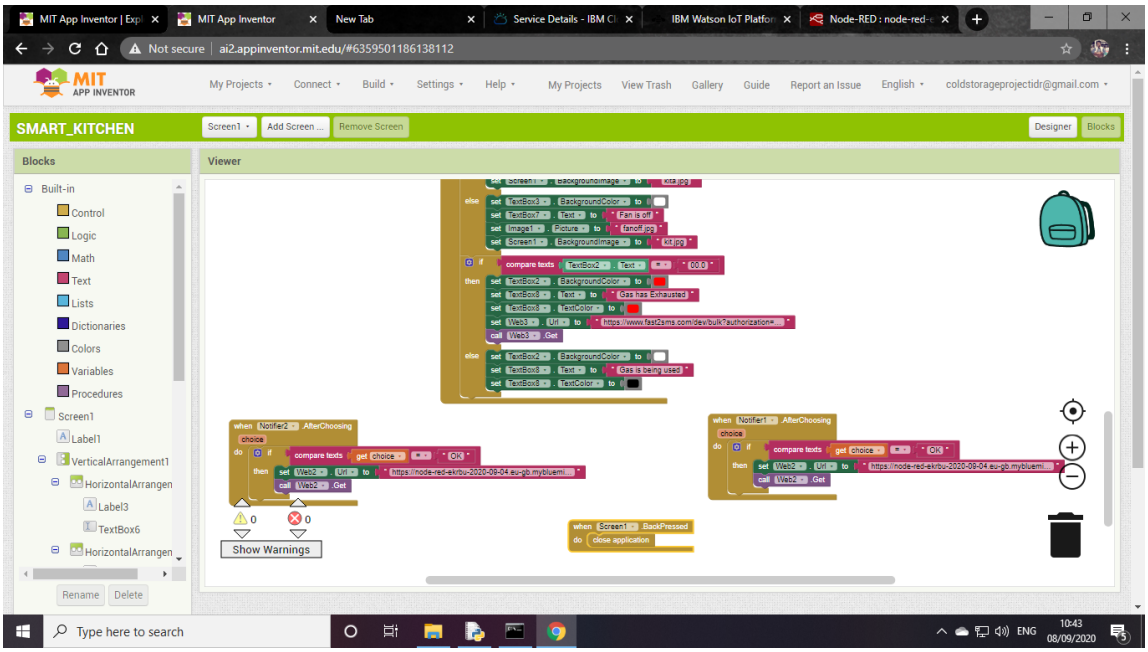
PYTHON IDLE



MIT APP INVENTOR






MIT App Inventor
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SMART_KITCHEN
Screen1
Add Screen ...
Remove Screen
Designer
Blocks
Viewer
Show Warnings
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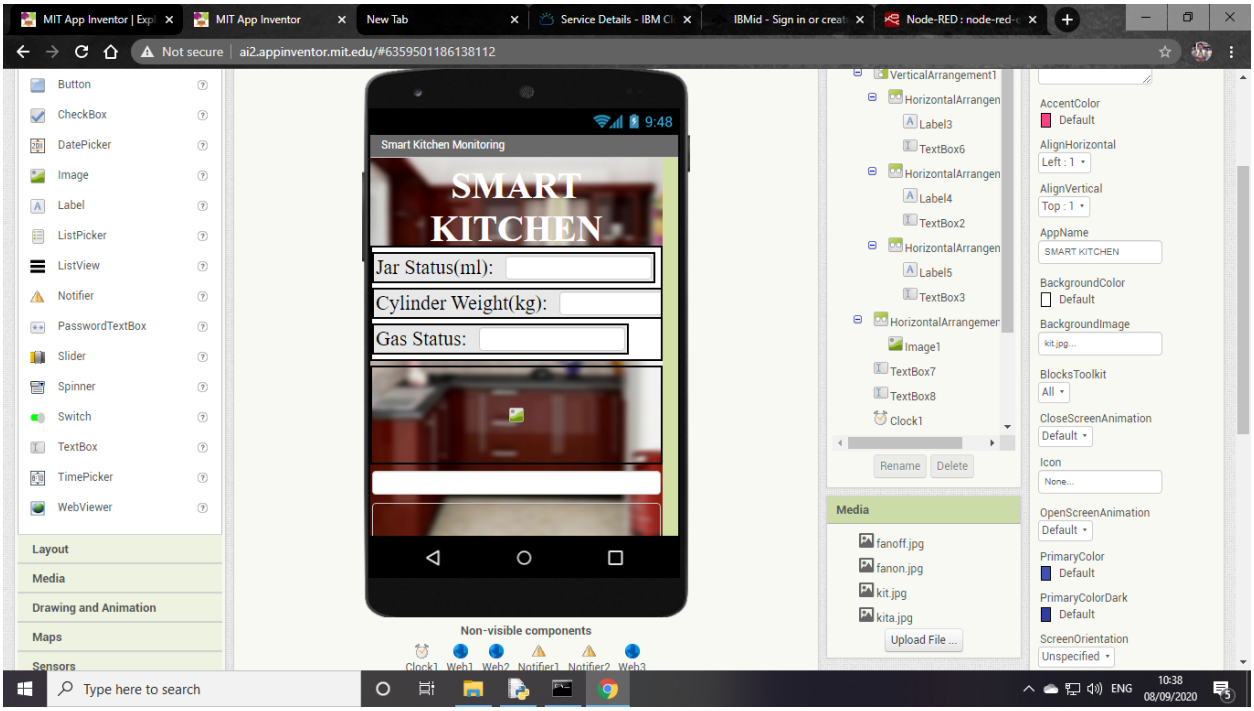
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Smart Kitchen Monitoring
SMART KITCHEN
Jar Status(ml):
Cylinder Weight(kg):
Gas Status:
Non-visible components
Media
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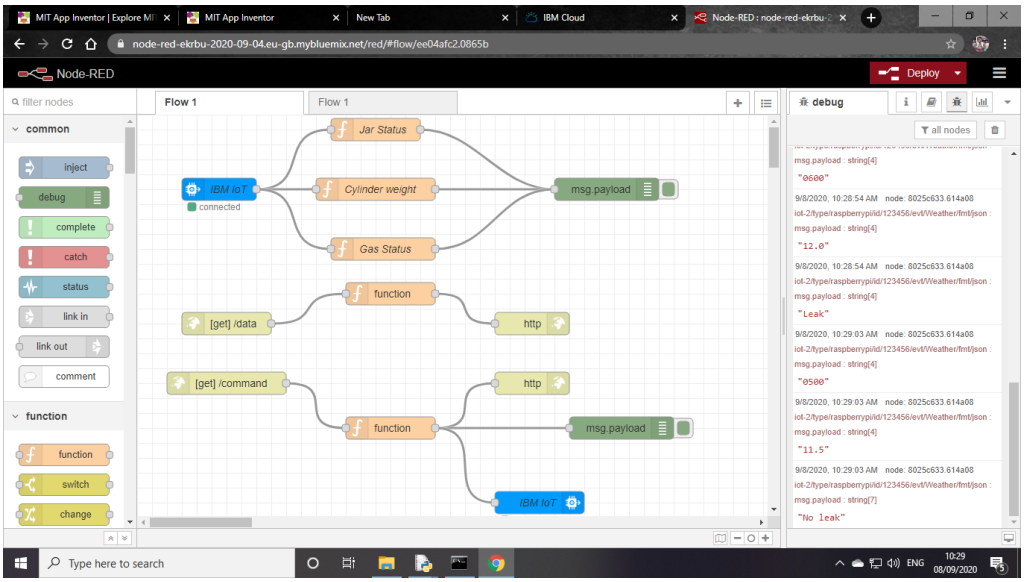
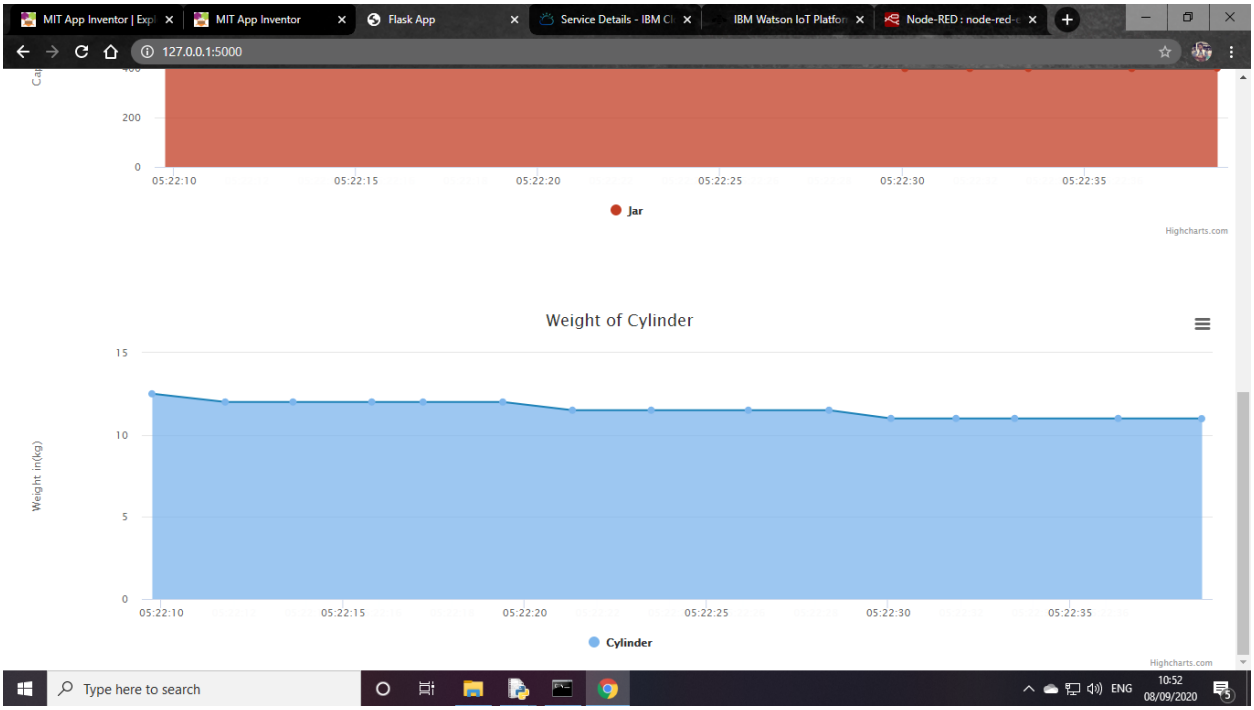
fanon.jpg
kit.jpg
kita.jpg
Upload File ...
Type here to search

NODE-RED FLOW



FLASK WEB APP



Thank you