SMART SECURITY SYSTEM FOR HOMES

Submitted by

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In partial satisfaction of the requirements for the degree of

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SCHOOL OF COMPUTING

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SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

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BONAFIDE CERTIFICATE

Certified that this Course Project Report titled **"SMART SECURITY SYSTEM FOR HOMES"** is the bonafide work done by **PATURI SAI ROHIT [RA2011026010200], KOUSHIKI RAY [RA2011026010199] and CATHY ANAND [RA2011026010216]** who carried out under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other work.

Sai 12/5/2023

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ABSTRACT

Everything is getting automatic and smarter with the passing of days. It is time to make our homes smarter and automated. Our resources of pure water and power are limited and most of the time we use these resources unconsciously in our household chores which leads us to a crucial future. So this is the time to utilize our resources thriftily. This system includes doors automation with password protected lock, temperature fan - controlled , automated water pump, water tap and shower, light, anti-theft security and primary fire protection using various sensors like LDR, IR, pressure, smoke, heat & object sensors controlled by mainly microcontrollers. Some features can be controlled by a remote control system for more flexibility with the help of IBM Cloud Service. The goal of this system is to make our life more easy and safe as well as to save our resources and power.

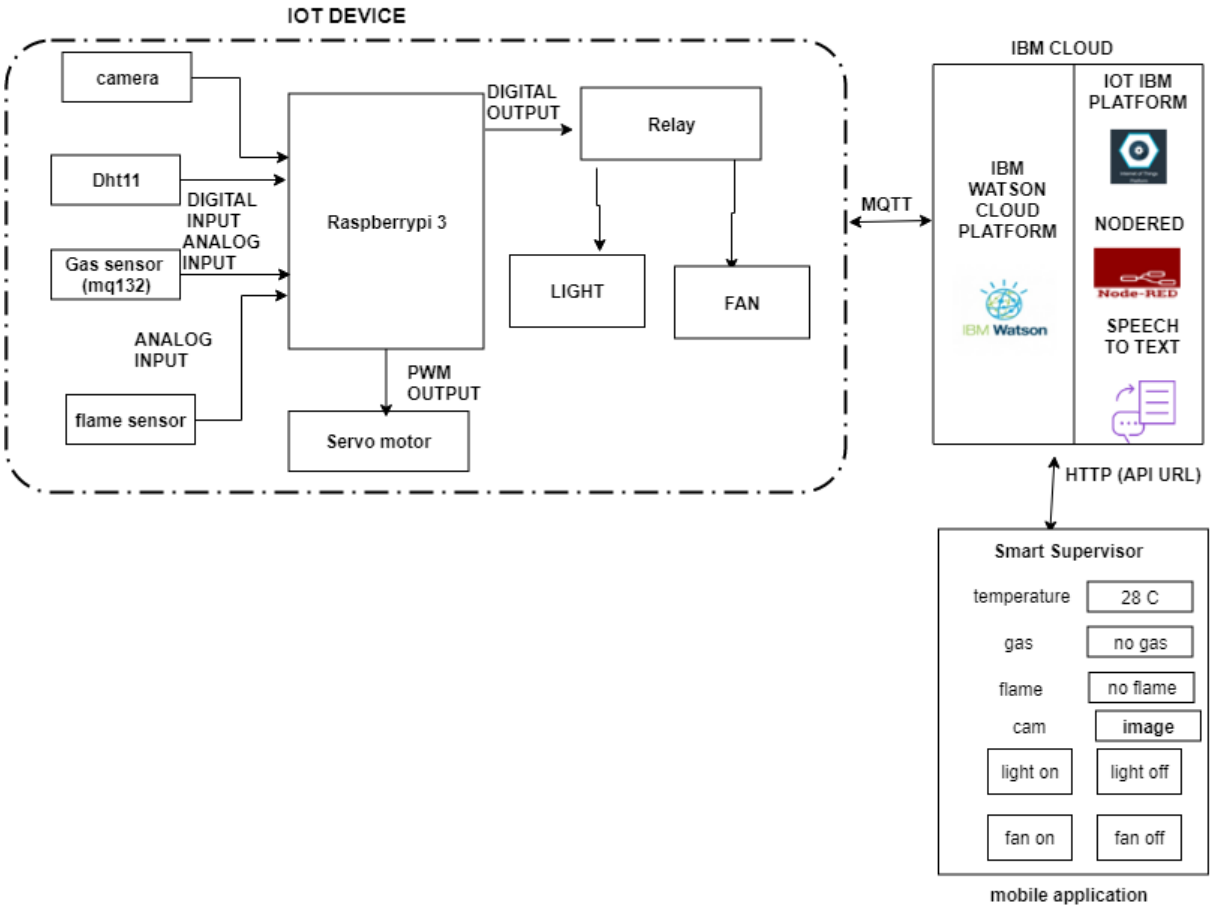
INTRODUCTION

Wireless Home security and Home automation are the dual aspects of this project. The currently built prototype of the system sends alerts to the owner over voice calls using the Internet if any sort of human movement is sensed near the entrance of his house and raises an alarm optionally upon the user's discretion. The provision for sending alert messages to concerned security personnel in case of critical situations is also built into the system. On the other hand if the owner identifies that the person may entering his house is not an intruder but an unexpected guest of his then instead of triggering the security alarm, the user/owner can make arrangements such as opening the door, switching on various appliances inside the house, which are also connected and controlled by the IBM Cloud/IBM IOT Platform in the system to welcome his guest. The same can be done when the user himself enters the room and by virtue of the system he

can make arrangements from his doorstep such that as soon as he enters his house he can make himself at full comfort without manually having to switch on the electrical appliances or his favourite T.V. channel for an example. Thus using the same set of sensors the dual problems of home security and home automation can be solved on a complimentary basis.

The alerts and the status of the IoT system can be accessed by the user from anywhere using Internet Connection connected with IBM Cloud, MIT App with user's smart mobile phones.

SYSTEM ARCHITECTURE AND DESIGN



IMPLEMENTATION

CODING

```
# -*- coding: utf-8 -*-


import os

import cv2

import sys

import time

import datetime


# IBM cloud modules

import ibm_boto3

import ibmiotf.device

from dotenv import load_dotenv

from ibm_botocore.client import Config, ClientError

from cloudant.client import Cloudant


# Custom modules

from commands import myCommandCallback

from config import config

def multi_part_upload(bucket_name, item_name, file_path):

    try:

        print("Starting file transfer for {0} to bucket: {1}\n".format(item_name, bucket_name))
```

```
        part_size = 1024 * 1024 * 5  # set 5 MB chunks
        file_threshold = 1024 * 1024 * 15  # set threshold to 15 MB
        # set the transfer threshold and chunk size
        transfer_config = ibm_boto3.s3.transfer.TransferConfig(
            multipart_threshold=file_threshold,
            multipart_chunksize=part_size
        )
        with open(file_path, "rb") as file_data:
            cos.Object(bucket_name, item_name).upload_fileobj(
                Fileobj=file_data,
                Config=transfer_config
            )
        print("Transfer for {0} Complete!\n".format(item_name))
    except ClientError as be:
        print("CLIENT ERROR: {0}\n".format(be))
    except Exception as e:
        print("Unable to complete multi-part upload: {0}".format(e))


def get_connections(organization, device_type, device_id, auth_method, auth_token):
    try:
        device_options = {"org": organization,
                          "type": device_type,
                          "id": device_id,
```

```
                "auth-method": auth_method,
                "auth-token": auth_token
                }
    deviceCli = ibmiotf.device.Client(device_options)
    except Exception as e:
        print("Caught exception connecting device: %s" % str(e))
        sys.exit()
                client = Cloudant(os.environ['CLOUDANT_USERNAME'],
os.environ['SERVICE_PASSWORD'], url=os.environ['SERVICE_URL'])
    return client, deviceCli


if __name__ == '__main__':
    load_dotenv()
    DEVICE_TYPE = os.environ['device_type']
    DEVICE_ID = os.environ['device_id']
    AUTH_TOKEN = os.environ['auth_token']
    AUTH_METHOD = os.environ['auth_method']
    ORGANIZATION = os.environ['organization']
    # Current list available at "https://control.cloud-object-storage.cloud.ibm.com/v2/endpoints"
    COS_ENDPOINT = os.environ['cos_endpoint']
        COS_API_KEY_ID = os.environ['cos_api_key_id'] # eg
"W00YiRnLW4a3fTjMB-oiB-2ySfTrFBIQQWanc--P3byk"
    COS_AUTH_ENDPOINT = os.environ['cos_auth_endpoint']
    COS_RESOURCE_CRN = os.environ['cos_resource_crn']
```

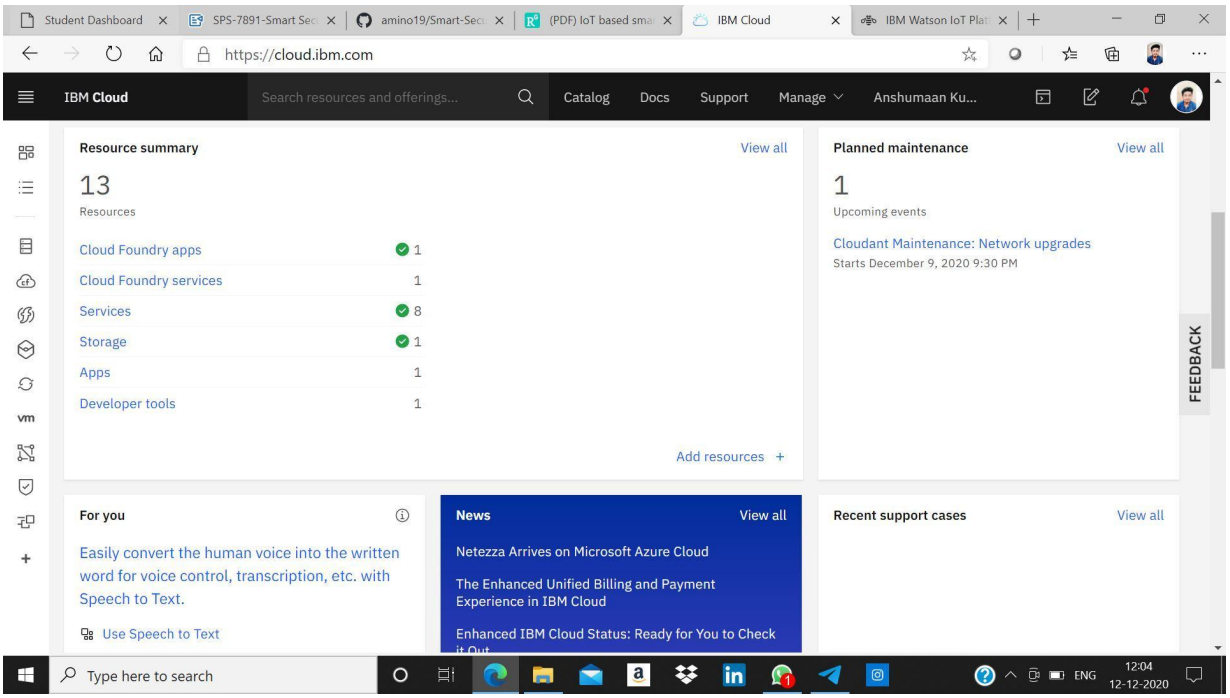
```
    video = cv2.VideoCapture(config['video_path'])
    face_classifier = cv2.CascadeClassifier(config['model_path'])

    client, device_cli = get_connections(ORGANIZATION, DEVICE_TYPE, DEVICE_ID, AUTH_METHOD, AUTH_TOKEN)
    client.connect()
    device_cli.connect()
    # Create resource
    cos = ibm_boto3.resource("s3",
                         ibm_api_key_id=COS_API_KEY_ID,
                         ibm_service_instance_id=COS_RESOURCE_CRN,
                         ibm_auth_endpoint=COS_AUTH_ENDPOINT,
                         config=Config(signature_version="oauth"),
                         endpoint_url=COS_ENDPOINT
                         )
    while True:
        check, frame = video.read()
        gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)

        faces = face_classifier.detectMultiScale(gray,
                                         config['face_classifier_scaleFactor'],
                                         config['face_classifier_minNeighbors']
                                         )
        # drawing rectangle boundaries for the detected face
```

```
        for (x, y, w, h) in faces:
            cv2.rectangle(frame, (x, y), (x + w, y + h), (255, 0, 0), 2)
            cv2.imshow('Face detection', frame)
            pic_name = datetime.datetime.now().strftime("%y-%m-%d-%H-%M")
            pic_name = pic_name + ".jpg"
            pic = datetime.datetime.now().strftime("%y-%m-%d-%H-%M")
            cv2.imwrite(pic_name, frame)
            person = 1
            my_database = client.create_database(config['cloudant_db'])
            multi_part_upload("safetydetectors1910", pic_name, pic + ".jpg")
            if my_database.exists():
                print("'{CLOUDANT_DB}' successfully created.")
                json_document = {
                    "_id": pic,
                                                                                "link":
"https://safetydetectors1910.s3.jp-tok.cloud-object-storage.appdomain.cloud/" + pic_name
                }
                new_document = my_database.create_document(json_document)
                if new_document.exists():
                    print("Document '{new_document}' successfully created.")
            time.sleep(1)
            t = 34  # temperature
            h = 45  # humidity
            data = {"d": {'temperature': t, 'humidity': h, 'person': person}}
```

```
        def myOnPublishCallback():
            print("Published data to IBM Watson")
                                success = device_cli.publishEvent("Data", "json", data, qos=0,
on_publish=myOnPublishCallback)
        if not success:
            print("Not connected to IoTF")
        time.sleep(1)
        device_cli.commandCallback = myCommandCallback
        person = 0
        Key = cv2.waitKey(1)
        if Key == ord('q'):
            video.release()
            cv2.destroyAllWindows()
            break
    deviceCli.disconnect()
```

SCREENSHOTS AND RESULTS

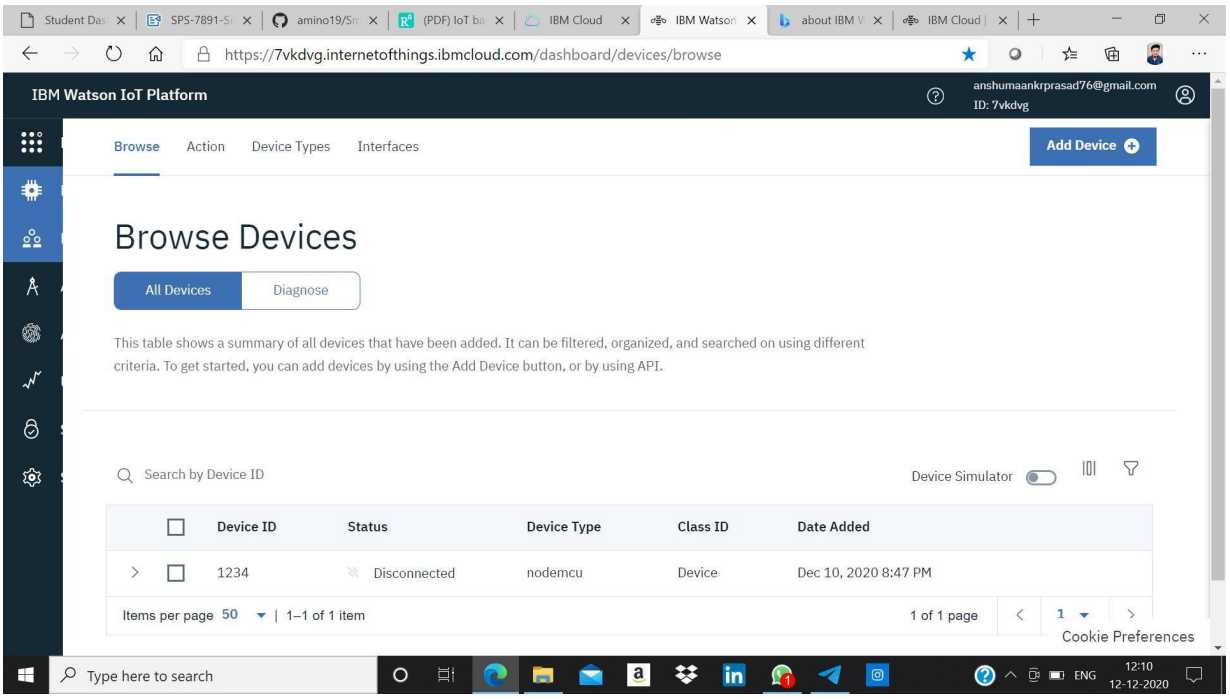
IBM Cloud Platform



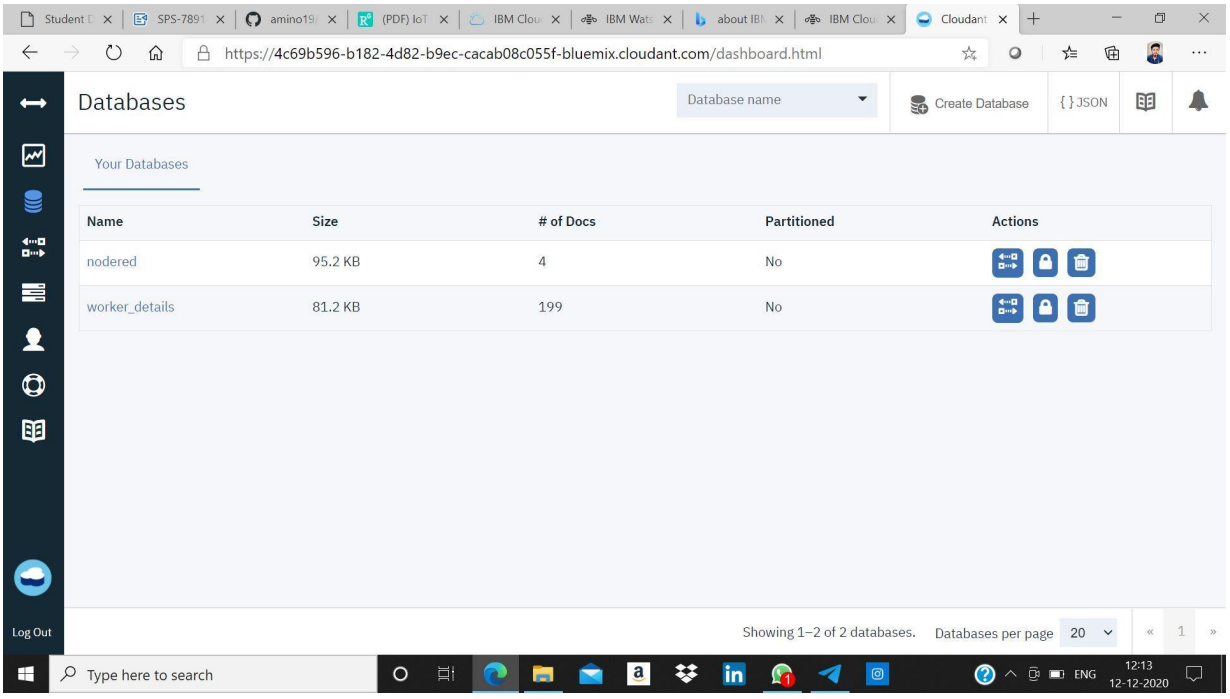
IBM Cloud® offers the most open and secure public cloud for business with a next-generation hybrid cloud platform, advanced data and AI capabilities, and deep enterprise expertise across 20 industries.

IBM Watson IOT Platform

IBM Watson IoT Platform is a managed, cloud-hosted service designed to make it simple to derive value from your IoT devices. Watson IoT Platform and its additional add on services - Blockchain service and analytic service - enable organizations to capture and explore data for devices, equipment, and machines, and discover insights that can drive better decision-making.

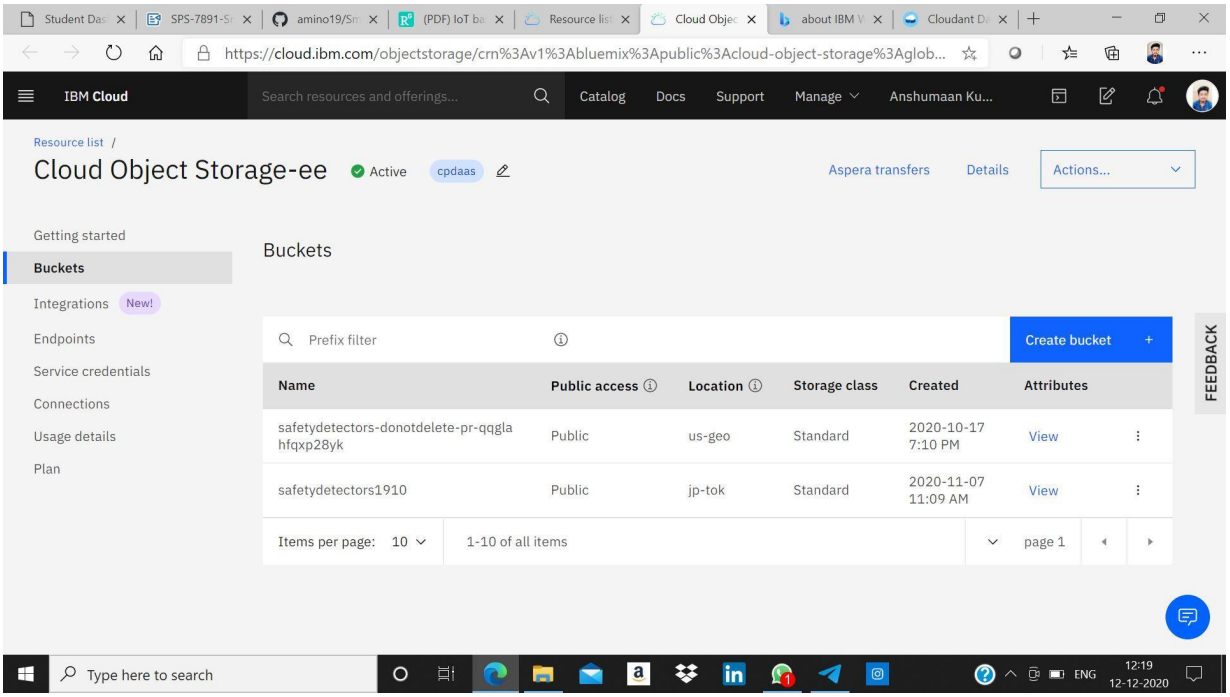


IBM Cloudant DB



IBM Cloudant® is a distributed database that is optimized for handling heavy workloads that are typical of large, fast-growing web and mobile apps. Available as an SLA-backed, fully managed IBM Cloud™ service, Cloudant elastically scales throughput and storage independently.

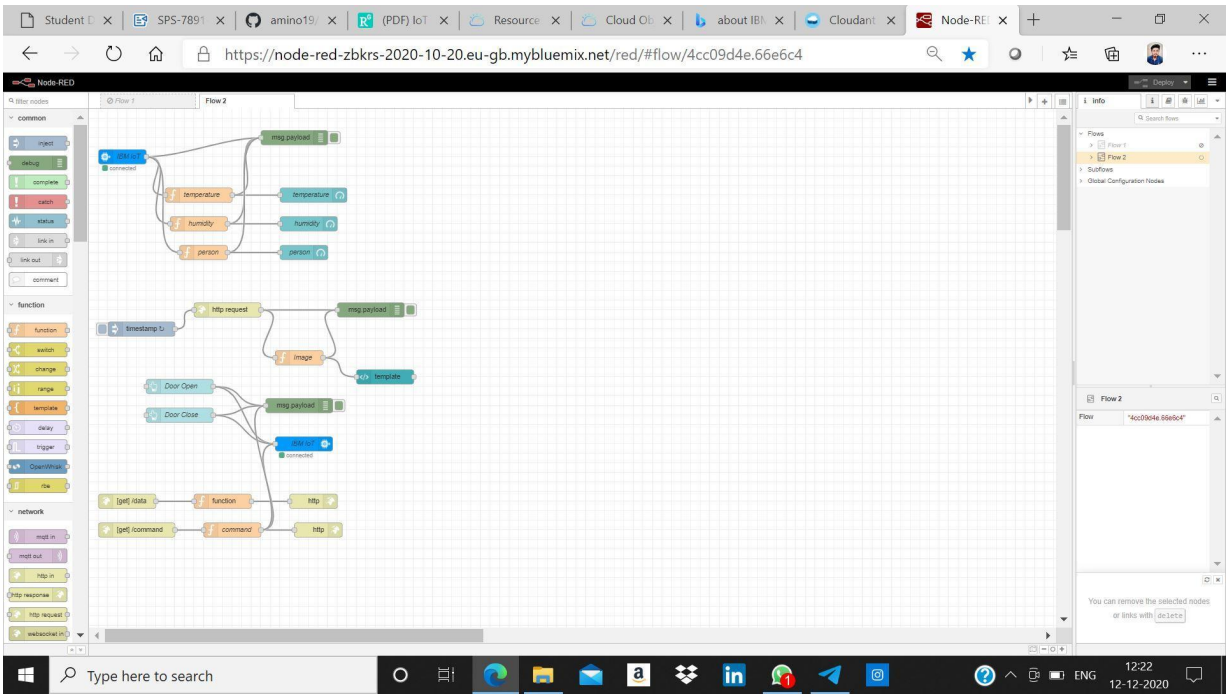
IBM Cloud Object Storage



IBM Cloud Object Storage is integrated with IBM Watson Studio on IBM Cloud. When a machine learning project is created in IBM Watson Studio, an instance of IBM Cloud Object Storage is created automatically to accelerate the handling of the data required to train and deploy machine and deep learning models.

Node Red App/Services

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.



CONCLUSION

This low cost system with minimum requirements takes care of both home security as well as home automation. This home security uses MIP App, providing better AI companionship features as private security. IBM Cloud/ IOT Platform cares for different services without any sensors/devices being triggered. Since MIT App Inventor Account provides designing as well as companion with QR code/ 6 digit code, it can be accessible to admin. Since it analyzes with admin, there's no chance to get faulty with the alarm service.

A prototype of the system was made and tested as shown and described. This security system works accurately and efficiently in every aspect of the functioning.

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