Smart Security And Safety Solutions Based On IoT For Large Industrial Plants

INTRODUCTION:

Abstract–Now a days the technology is increasing rapidly, that leads to an upgradation in Industrial security system.Automation in security sector makes it more authentic. There are many electrical equipment's are available in industries which are in necessity of monitoring all at a time. In this paper Industrial security system is proposed along with the alert message technique. A stand alone system through Internet of Things as a network of communication is implemented. Controlling unit codded in the Python language.

INTRODUCTION

The present scenario ensures the safety and security has become an inevitably essential. There is a regressive progress in the security system as the influence of modern technology is reaching its peak. When there is a modern Industries with minimum human effort, it's well known as modern home. Since there is an advent of wireless and digital technologies, all together it introduces a automated intelligent security system. The automated home security system can be designed with the surveillance camera and multiple sensors, and the use of these sensors will be defining the features of these sensors. Faster data transmission is taking place using the Wi-Fi to security systems which helps the user to control and monitor the system globally.

The new IoT based products and services will grow exponentially in next few years predicted by the analysts. The IoT involves different link layer technologies and a huge range of devices. IoT provides open access to particular set of data. Is a compact minicomputer which is smart enough to give the good connectivity to the internet as well as boost up the signals. This framework mainly envelopes the home security system from the sensor, networking, integrates real time data and data management. This proposed system has high latency and low cost. The system is highly reliable and consumes very less power in comparison with existing system. The home security system based on some camera connected to the home and the output for this is in real time with the minimum delay in the operation.

The objective of this paper is Industrial security using through IoT. The system records the date of entry and exit of staff members in the industrial plants.It will generate alerts if

one person is staying in the radiation rooms for more than the particular time limit by checking whether that particular person has left that area or not.It will record the data of the entry/exit using RFID cards

The alerts will be given in the form of buzzer alarms and it will display on OLED screen.The admin can see the entire information in the web application.

LITERATURE SURVEY

Existing Problems:

IoT has enabled smart manufacturing that increases safety, improves performance and services as well as reduces time and cost. It has been a driving force behind the industry movement. Efficient data collection, enhanced automation, and analytics are all possible with the help of IoT.

With a large variety of IoT devices, manufacturing units are able to leverage their workflow more efficiently and accurately. For example, companies are tracking assets, collecting data, and performing analytics using IoT sensors placed in equipment and devices. These sensors monitor the functioning of equipment to allow automated recovery and to shorten downtime in maintenance. According to statistics by The Atlantic, it is expected that the investment in IoT solutions. Many other statistical reports are indicating that IoT technology has a huge potential for manufacturing and that the manufacturing industry has been the sector most impacted by IoT in the last few years.

IoT is important in the manufacturing industry because it automates operations. The operational technology in a smart factory includes programmable logic controllers, industrial IoT devices , distributed control systems, embedded systems, and more.

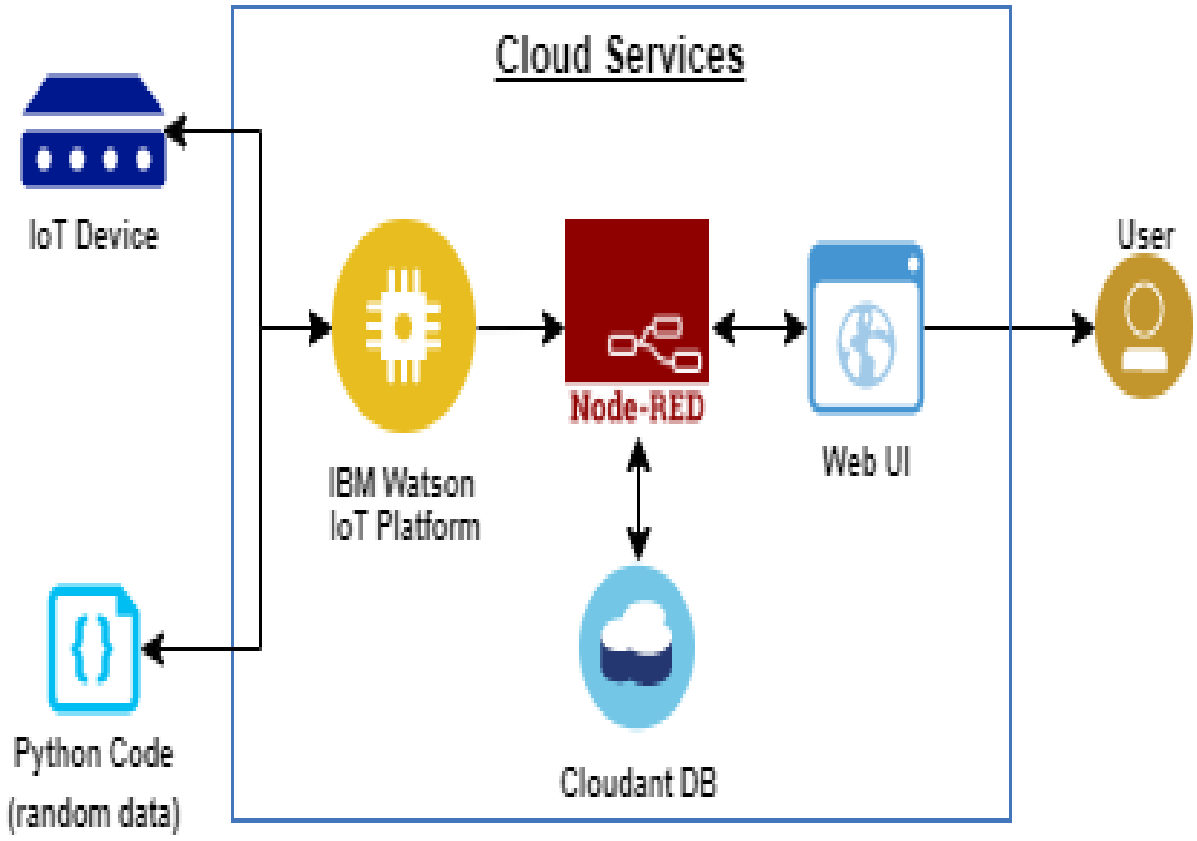
Proposed solutions:

In this paper we are proposing a Industrial Security System where the input is taken from the live person. In this paper we are using Python and Internet of Things. In this project we are acessing the random values of employees with their id's, name, skill, time and number of persons entered to the radiation room. As in every few minutes getting alert to the employee that he has to leave from the room, using ibm cloud and node red connecting it to the ibm cloud giving commands to it randomly from the python code and

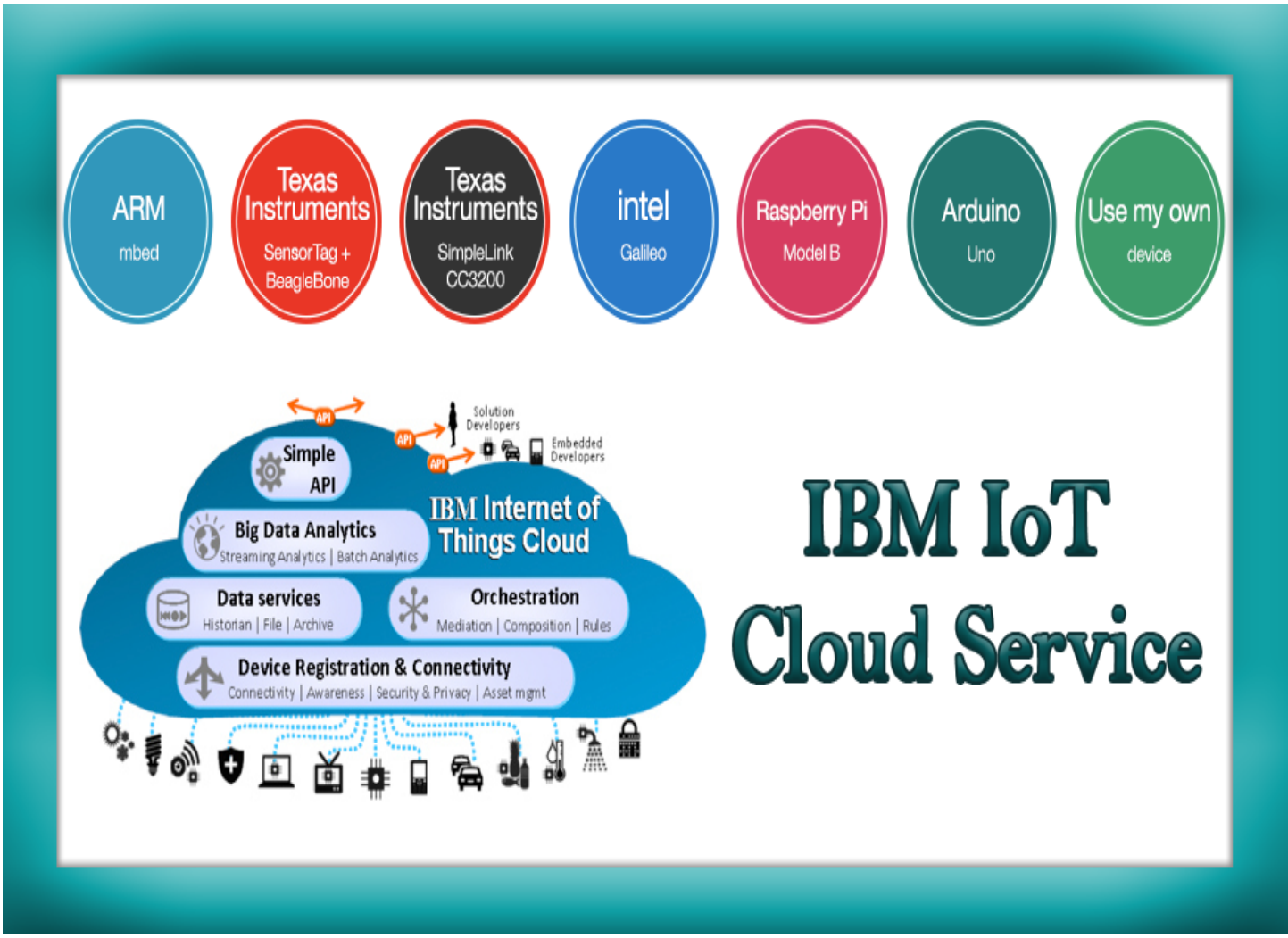
acessing values.The values are processed in the node red by using delay node setting it for fixed seconds delay acessing the id value. By acessing id value sending alert back to the employee that he has to leave from the radiation room

Theoritical Analysis

Block diagram:



Hardware/Software designing:

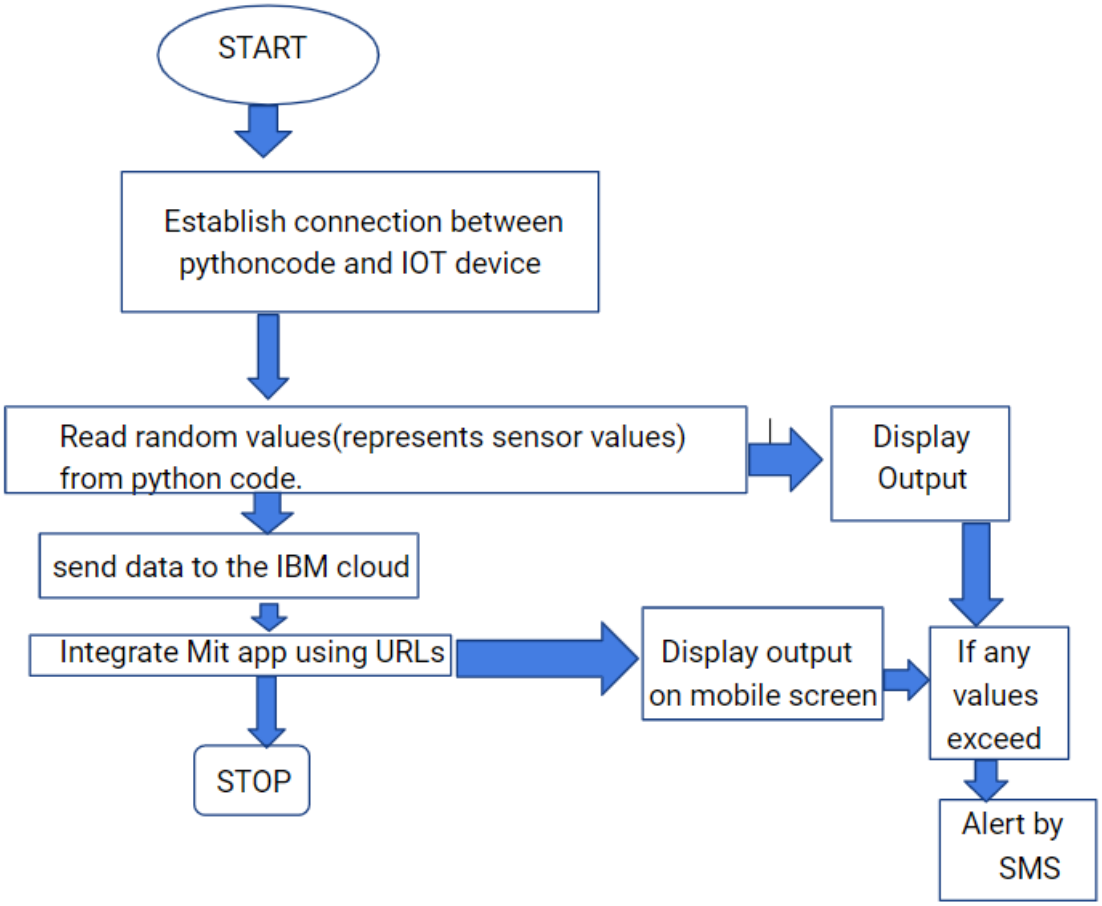


Experimental Investigations :

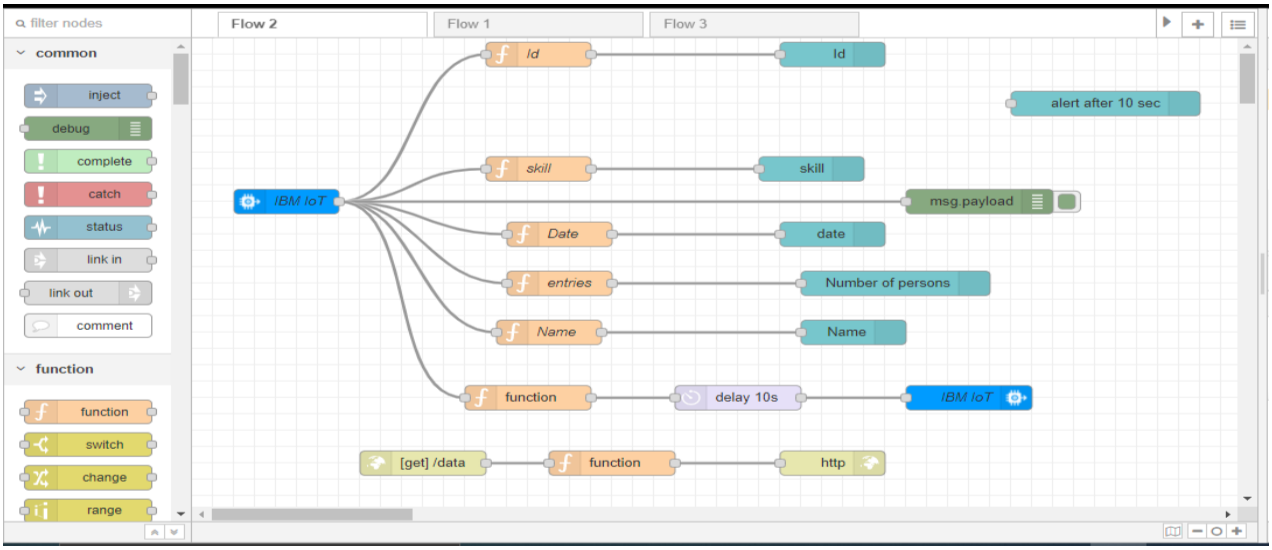
In this project in a Industrial Security System where the input is taken from the live person. In this paper we are using Python and Internet of Things. In this project we are acessing the random values of employees with their id's, name, skill, time and number of persons entered to the radiation room. As in every few minutes getting alert to the employee that he has to leave from the room, using ibm cloud and node red connecting it to the ibm cloud giving commands to it randomly from the python code and acessing values.The values are processed in the node red by using delay node setting it for fixed seconds delay acessing the id value. By acessing id value sending alert back to the employee that he has to leave from the radiation room.

Flow chart:

:



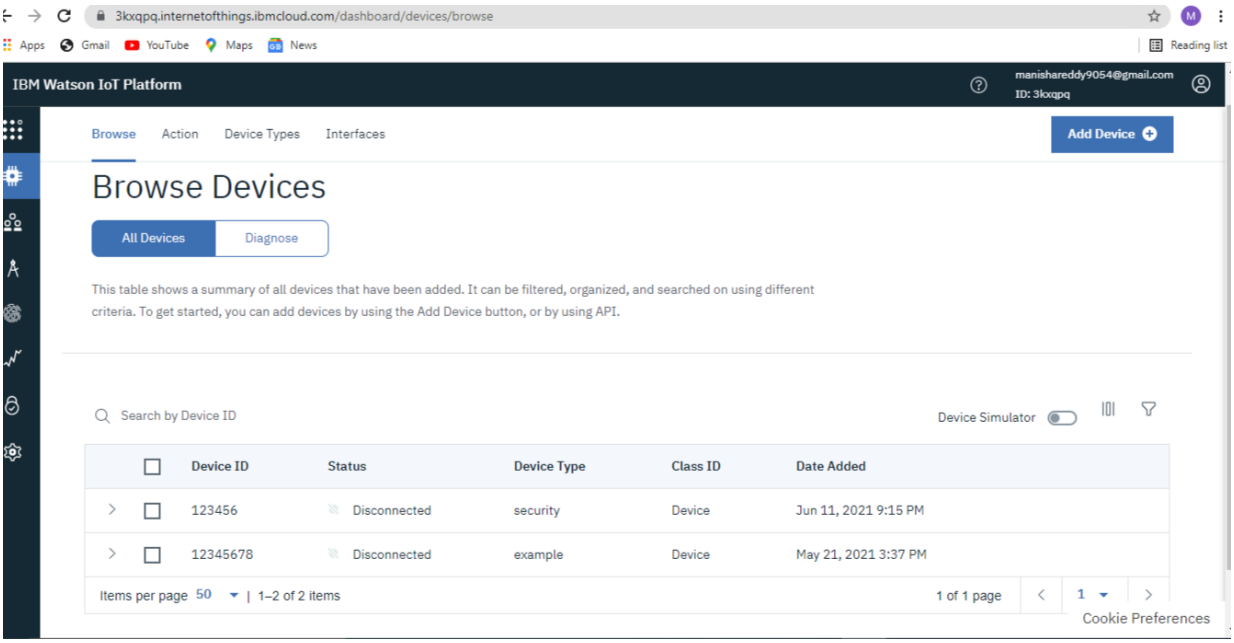
Result:




```
import wiotp.sdk.device
import time
import random
from randomtimestamp import randomtimestamp
import names
myConfig = {
    "identity": {
        "orgId": "3kxqpq",
        "typeId": "security",
        "deviceId":"123456"
    },
    "auth": {
        "token": "12345678"
    }
}

def myCommandCallback(cmd):
    print("Message received from IBM IoT Platform: %s" % cmd.data['command'])
    print("ID :", cmd.data['command'], ":",end =" ")
    print(cmd.data['commands'],", You have to leave from the room")
    print()


client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()
sk = ["python","java","sql","csharp","C","magodb","AI","ML","communication","IOT"]
while True:
    Id=random.randint(1,101)
    s=sk[random.randint(0,len(sk)-1)]
    date =  randomtimestamp()
    entry = random.randint(0,100)
    name = names.get_full_name()
    myData={'d':{'id':Id, 'skill':s ,'datetime':date,'persons':entry, 'personname':name}}
    client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0, onPublish=None)
    print("Published data Successfully: %s", myData)
    client.commandCallback = myCommandCallback
    time.sleep(2)
client.disconnect()
```

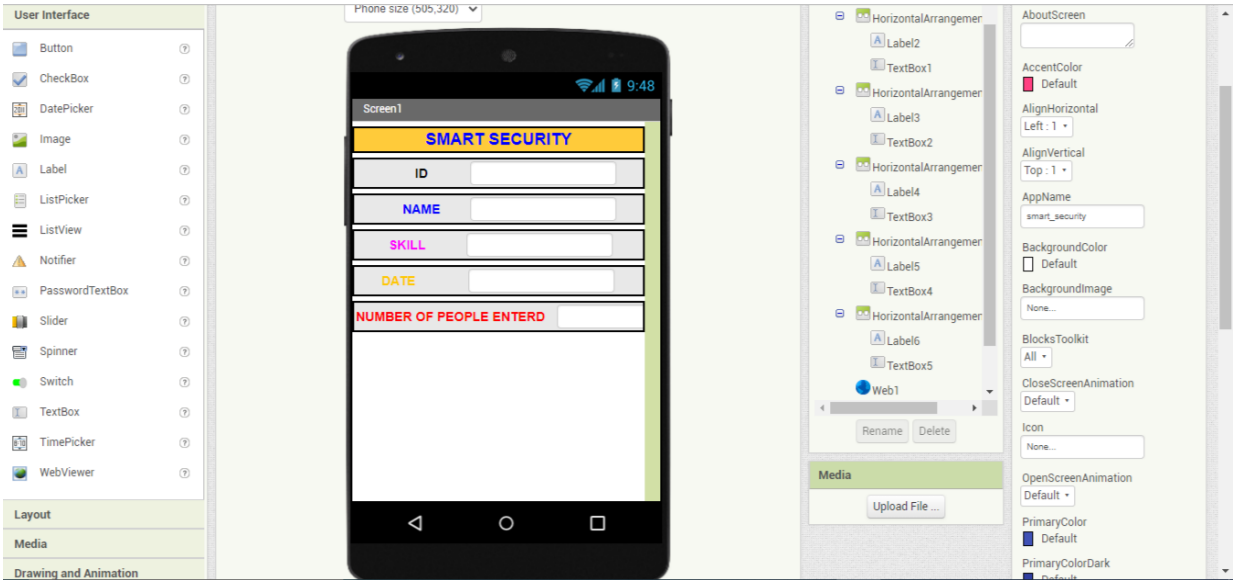



```
Python 3.9.2 (tags/v3.9.2:1a79785, Feb 19 2021, 13:44:55) [MSC v.1928 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
========== RESTART: C:\Users\lenovo\OneDrive\Desktop\codesnippet.py ==========
2021-06-19 15:40:22,158    wiotp.sdk.device.client.DeviceClient  INFO    Connected successfully: d:3kxqpq:security:123456
Published data Successfully: %s {'d': {'id': 12, 'skill': 'java', 'datetime': '21-12-2012 08:03:33', 'persons': 55, 'personname': 'Michael Sorbello'}}
Published data Successfully: %s {'d': {'id': 7, 'skill': 'IOT', 'datetime': '08-12-2007 18:13:24', 'persons': 3, 'personname': 'David Corning'}}
Published data Successfully: %s {'d': {'id': 5, 'skill': 'C', 'datetime': '30-11-1985 08:23:47', 'persons': 10, 'personname': 'Rochelle Blackman'}}
Published data Successfully: %s {'d': {'id': 16, 'skill': 'sql', 'datetime': '27-07-1983 15:33:28', 'persons': 55, 'personname': 'Michael Davey'}}
Published data Successfully: %s {'d': {'id': 4, 'skill': 'magodb', 'datetime': '22-10-1959 20:31:28', 'persons': 33, 'personname': 'Rachel Jong'}}
Published data Successfully: %s {'d': {'id': 19, 'skill': 'IOT', 'datetime': '29-02-1968 04:25:22', 'persons': 56, 'personname': 'Lloyd Yamada'}}
Message received from IBM IoT Platform: 12
12 You have to leave from the room

Published data Successfully: %s {'d': {'id': 2, 'skill': 'IOT', 'datetime': '07-11-2004 02:28:07', 'persons': 98, 'personname': 'Juan Miller'}}
Message received from IBM IoT Platform: 7
7 You have to leave from the room

Published data Successfully: %s {'d': {'id': 10, 'skill': 'communication', 'datetime': '19-12-2000 05:42:40', 'persons': 99, 'personname': 'Nancy Marcum'}}
Message received from IBM IoT Platform: 5
5 You have to leave from the room

Published data Successfully: %s {'d': {'id': 14, 'skill': 'sql', 'datetime': '11-01-1952 07:25:08', 'persons': 70, 'personname': 'Victoria Janssen'}}
Message received from IBM IoT Platform: 16
16 You have to leave from the room
```


User Interface
Button
CheckBox
DatePicker
Image
Label
ListPicker
ListView
Notifier
PasswordTextBox
Slider
Spinner
Switch
TextBox
TimePicker
WebViewer
Layout
Media
Drawing and Animation
Phone size (505,320)
9:48
Screen1
SMART SECURITY
ID
NAME
SKILL
DATE
NUMBER OF PEOPLE ENTERD
HorizontalArrangemer
Label2
TextBox1
HorizontalArrangemer
Label3
TextBox2
HorizontalArrangemer
Label4
TextBox3
HorizontalArrangemer
Label5
TextBox4
HorizontalArrangemer
Label6
TextBox5
Web1
Rename
Delete
Media
Upload File ...
AboutScreen
AccentColor
Default
AlignHorizontal
Left : 1
AlignVertical
Top : 1
AppName
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All
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None...
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Default
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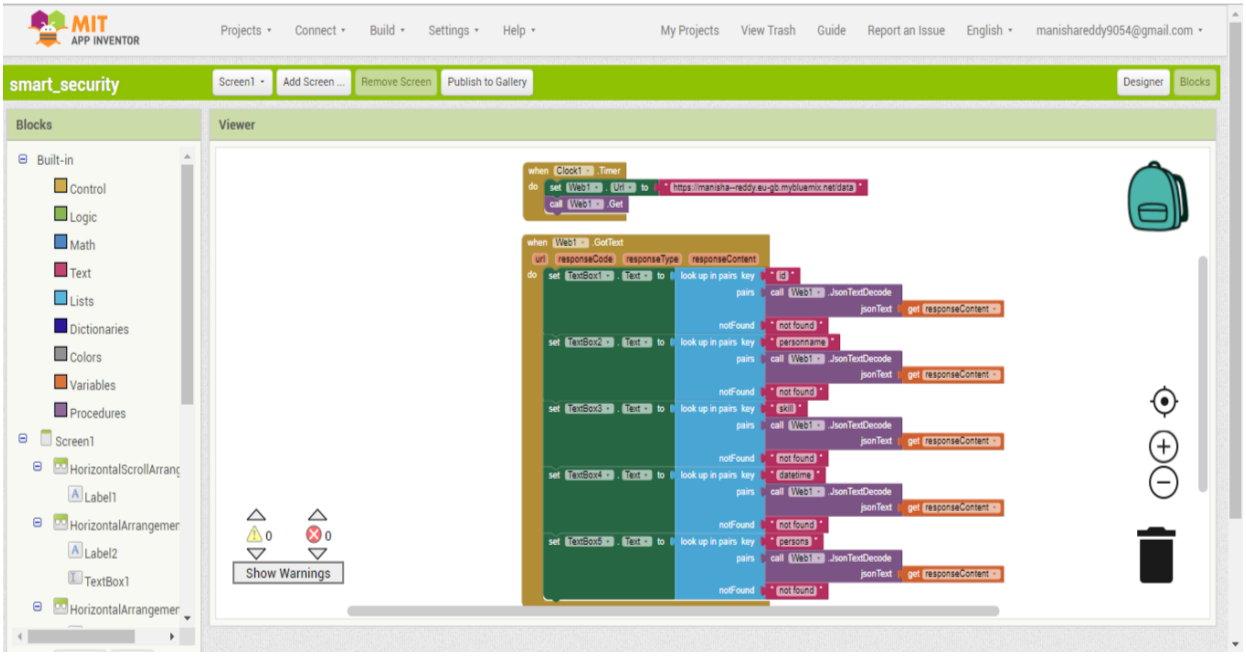
MIT APP INVENTOR
Projects
Connect
Build
Settings
Help
My Projects
View Trash
Guide
Report an Issue
English
manishareddy9054@gmail.com
smart_security
Screen1
Add Screen ...
Remove Screen
Publish to Gallery
Designer
Blocks
Blocks
Built-in
Control
Logic
Math
Text
Lists
Dictionaries
Colors
Variables
Procedures
Screen1
HorizontalScrollArrang
Label1
HorizontalArrangemer
Label2
TextBox1
HorizontalArrangemer
Viewer
Show Warnings

Advantages and Disadvantages:

1. Lower operating costs

A fleet of IoT devices can help businesses optimize their workflows and lower operating costs because they provide real-time information. Devices can proactively advise of their status so staff can schedule the maintenance before it can affect production. They can be integrated into larger systems to optimize operational efficiency and help reduce costs. For example, smart building systems can track, monitor and control HVAC systems to monitor building usage and adjust them to take advantage of lower time-of-use costs, which saves money.

2. Increased productivity

IoT devices can manage, monitor and alert staff of changes in processes or productivity, helping them make smarter decisions about work. Automaker Ford is

using specialized IoT technology and body tracking sensor technology to protect workers from excessive physical stress and to optimize their work. Engineers and ergonomists use the data to optimize each workstation to enable more efficient movement and help workers avoid injuries. Through this novel implementation of IoT in Ford's employee safety program, they've been able to reduce assembly line injury rates by 70%.

3. Better customer experiences

IoT devices help businesses track, monitor, uncover and analyze customer data faster than before. Businesses can predict shifts or trends in customer behavior before they happen. Advanced IoT technology can enhance the customer experience by personalizing it based on past experiences. Think of the location trackers on shipping vehicles or personalized coupons offered through a mobile app on customers' smartphones when they enter a store or business. IoT devices can help businesses gather, transmit and analyze the data they have on customers, helping create a superior customer experience that engages them at a deeper level and increases customer loyalty.

4. More business insights

IoT devices help organizations gather data to identify insights about their business, both internally and externally. Retail stores use beacon technology and other IoT devices to redesign their stores based on real-time traffic patterns. Logistics firms can use internet-connected IoT devices to align delivery locations and schedules that make the most efficient use of vehicles and employees.

Businesses that use IoT to drive modernization throughout their organization will reduce their time to market for new products or services and amplify their ROI. They'll add value to the business faster and more efficiently because of the access to more actionable data from the device

disadvantages:

1. Security and privacy

Keeping the data gathered and transmitted by IoT devices safe is challenging, as they evolve and expand in use. Although cybersecurity is a high priority, IoT devices aren't always included in the strategy. Devices must be protected from physical tampering, internet-based software attacks, network-based attacks and hardware-based attacks.

Data privacy is another concern, especially because IoT devices are being used in more sensitive industries such as healthcare and finance. Information privacy laws are coming into effect globally, too, meaning that not only does it make good business sense to protect data, but businesses are legally required to do so.

Integrating encryption and security protocols with IoT devices can be difficult with a large fleet of devices. The cost in time, effort and money to do it on all devices might be prohibitive, so some businesses might use inadequate platforms because they're cheap or forego it altogether. All it takes is one breach for a

business to learn a tough lesson.

2. Technical complexity

Though it might seem like IoT devices are performing simple tasks such as counting entry swipes at a secure door, there's a lot of complex technology involved in creating them. Plus, if they're providing essential data to another workflow or system, they could negatively affect everything connected to it. Miscounting the number of swipes at the door isn't a big deal, but if another device confuses temperature data with entry swipe data, it can be catastrophic. And the error isn't always easy to fix.

There can be a big learning curve in deploying IoT devices. It makes sense to develop a strategy on how and why to deploy them before purchasing them. That way, you can be assured they're working as intended and you can support them.

3. Connectivity and power dependence

Many devices depend on continuous power or internet connectivity to function properly. When either goes down, so does the device and anything connected to it. Given how intertwined IoT devices are with today's businesses, everything can grind to a halt when they're down.

Businesses must understand how outages will affect their devices to plan proactively for outages -- because an outage will happen at some point. Troubleshooting and incident management processes can help alleviate that, as

can ensuring employees know what to do when devices are down.

4. Integration

There's currently no consensus regarding IoT protocols and standards, so devices produced by different manufacturers might not work with existing technology. Each one might require different configurations and hardware connections, making it hard to deploy efficiently.

The business must understand network needs to prepare for any required customization. That also means planning for extra time with device deployments to handle any troubleshooting or related tasks that might arise.

5. Time-consuming and expensive to implement

Deploying IoT devices often comes with high time and money investment requirements. There's the number of devices to be purchased and configured, staff to install them, others to integrate them into the network and support calls to the manufacturer for help. If they're all going into a single location, businesses can make up that investment quickly. If the business is spreading them out, expect the cost to rise exponentially.

By planning the deployment budget and strategy before buying, organizations can eliminate many potential obstacles they would otherwise encounter.

IoT devices can be useful to businesses today, but only if they know what they're getting into. And these are just some of the benefits and disadvantages.

Applications:

1. **Smart Homes**
2. **Smart City**
3. **Self-driven Cars**
4. **IoT Retail Shops**
5. **Farming**
6. **Wearables**
7. **Smart Grids**
8. **Industrial Internet**
9. **Telehealth**
10. **Smart Supply-chain Management**

conclusion:

In this paper, we have designed and developed a wireless Industrial Security System through Internet of Things module an. It is an active system which will show whether the person is authorized for Industry or unauthorized. It is a friendly user interface system. It is easily installable and can be used anywhere as this is a wireless system. This system is easily operable, low power consumption and low cost. This is developed for remotely controlled and uses the Wi-Fi for transmission of the data's. It is easily installed at any place and can be controlled from any remote area.

Future scope:

The Industrial security system has a long way to go. As the technologies

improving every second, with time we may have many ways for home security with more light protocol and less delay in the output. With upcoming technologies there will be good enhancement in the computer board as well as the communication protocols, which will make it simpler as well as more light and secure.

Bibiliography:

[1] K. Gill, S. H. Yang, F. Yao, and X. Lu. A zigbee-based home automationsystem.IEEE Transactions on Consumer Electronics,55(2):422–430,May 2009. [2] Y.Upadhyay, A.Borole, and D. Dileepan. Mqtt based secured homeautomation system. In2016 Symposium on Colossal Data Analysis andNetworking (CDAN), pages 1–4, March 2016.

[3] N.Singh, Shambhu Shankar Bharti, R. Singh, andDushyant KumarSingh. Remotely controlled home automation system. In2014 Inter-national Conference on Advances in Engineering Technology Research(ICAETR - 2014), pages 1–5, Aug 2014.

Appendix:

Source code:

```
import wiotp.sdk.device

import time

import random

from randomtimestamp import randomtimestamp

import names

myConfig = {

    "identity": {

        "orgId": "3kxqpq",

        "typeId": "security",

        "deviceId":"123456"

    },

    "auth": {

        "token": "12345678"

    }

}
```

```
def myCommandCallback(cmd):

    print("Message received from IBM IoT Platform: %s" % cmd.data['command'])

    print("ID :", cmd.data['command'], ":",end =" ")

    print(cmd.data['commands'],", You have to leave from the room")

    print()

client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)

client.connect()

sk = ["python","java","sql","csharp","C","magodb","AI","ML","communication","IOT"]

while True:

    Id=random.randint(1,101)

    s=sk[random.randint(0,len(sk)-1)]

    date =  randomtimestamp()

    entry = random.randint(0,100)

    name = names.get_full_name()
```

```
    myData={'d':{'id':Id, 'skill':s ,'datetime':date,'persons':entry, 'personname':name}}

    client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0, onPublish=None)

    print("Published data Successfully: %s", myData)

    client.commandCallback = myCommandCallback

    time.sleep(2)

client.disconnect()
```

UI output: