SMART PUBLIC RESTROOM

Phase 4 : Development no. 2

PROBLEM STATEMENT:

• • • **IOT:** In this technology project you will continue building your project by developing the platform as per project requirement. Use web development technologies wherever needed. After performing the relevant activities create a document around it and share the same for assessment.

Solution :

Building an IoT smart public restroom system involves various components, including hardware and software. Here are the steps you might consider for this project:

1. ****Hardware Setup**:**

- Install sensors for occupancy detection, such as motion or pressure sensors, on restroom doors and inside.
- Install smart faucets, soap dispensers, and hand dryers with IoT capabilities.
- Deploy environmental sensors to monitor air quality, temperature, and humidity.
- Implement a camera system for security and monitoring.

2. ****Connectivity**:**

- Ensure all the IoT devices are connected to a network, preferably a secure Wi-Fi network.
- Configure MQTT or other IoT protocols for efficient data transmission.

3. ****Data Collection**:**

- Set up a database to store data from sensors.
- Develop software to collect and process data from all sensors.

4. ****User Interface**:**

- Create a web-based dashboard to monitor restroom occupancy, usage statistics, and environmental conditions.
- Implement user authentication and authorization for accessing the dashboard.

5. **Automation and Alerts**:**

- Program automation rules for turning on lights, water fixtures, and ventilation based on occupancy.
- Configure alerts and notifications for any maintenance issues or unusual conditions.

6. **Energy Efficiency**:**

- Implement energy-saving measures, such as turning off lights and HVAC when the restroom is unoccupied.

7. **Security**:**

- Ensure the security of the IoT devices and the data they collect.
- Encrypt data transmission and use strong authentication mechanisms.

8. **Testing and Maintenance**:**

- Regularly test the system to ensure it works correctly.
- Schedule routine maintenance for hardware and software updates.

9. **Documentation**:**

- Create detailed documentation covering hardware setup, software development, and configuration.

10. **Assessment and Reporting:**

- Compile all documentation into a project report that includes project requirements, implementation details, and the assessment of system performance.

USING PYTHON:

```
import matplotlib.pyplot as plt

# initializing the data

x = [10, 20, 30, 40]

y = [20, 25, 35, 55]
```

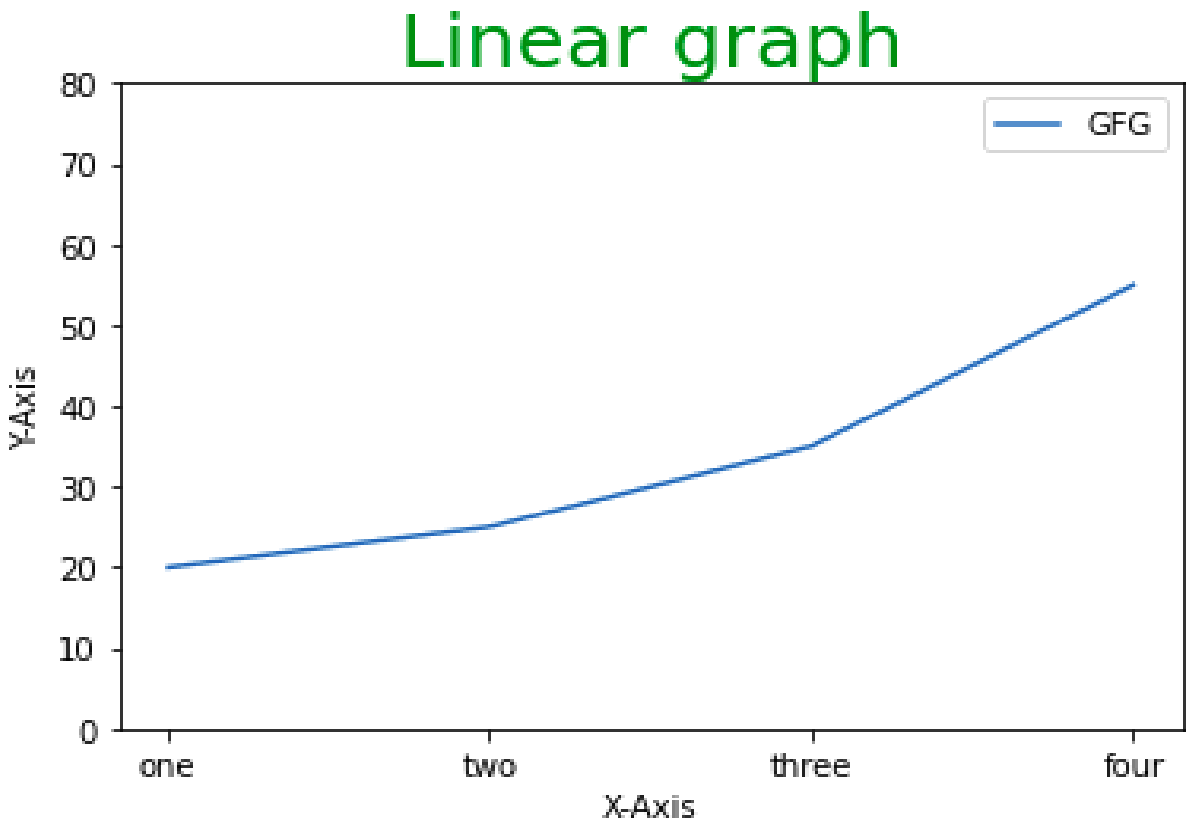
```
# plotting the data
.
plt.plot(x, y)

# Adding title to the plot

 plt.title("Linear graph", fontsize=25, color="green")

 plt.show()
```

Output :



USING PLOTLY :

```
import plotly.express as px

# Creating the Figure instance

fig = px.line(x=[1,2, 3], y=[1, 2, 3])

# printing the figure instance

print(fig)
```

Output :

2. Column Chart :

A column chart is used to show a comparison among different attributes, or it can show a comparison of items over time.

```
# Dataframe of previous code is used here

# Plot the bar chart for numeric values # a comparison will be shown between # all 3 age, income, sales df.plot.bar()

# plot between 2 attributes

plt.bar(df['Person'], df['Availability '])

plt.xlabel("Person")

plt.ylabel("Availability")

plt.show()
```

OUTPUT: