INTERNET OF THINGS - Group 1

Traffic mamagement

PHASE 3 – DEVELOPMENT PART 1

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Introduction :

The sustainability and smartness of the smart city concept rely on the technologies adopted to improve the people's quality of life. The smart city governance is one significant aspect of smart city initiatives, which will facilitate the planning techniques for better decision making . One of the key elements of the smart city governance framework is the public value generated out of the smart services provided .

The government has to work on different aspects of smart city solutions such as smart health care, smart building management, smart traffic management, smart parking solutions, smart transportation, etc. to generate public value for the service they provided. The emergence of the internet of things (IoT) has evolved the concept of smart cities. In a smart city environment, the physical infrastructures of the city are equipped with smart devices, which continuously produce multidimensional data in different spaces and these data are processed to achieve intelligence for the infrastructure . Ultimately, intelligence is applied to improve the socio-economic activities of the society.

Smart traffic infrastructure is an essential component of smart city initiatives because traffic congestion is a severe issue that grows along with city development. Smart traffic management includes intelligent transport systems with integrated components like adaptive traffic signal controls, freeway management, emergency management services, and roadside units . Such systems collect real-time traffic data and take necessary measures to avoid or minimize any social issue created as part road congestions For example, access to real-time traffic maps will assist the residents in selecting appropriate route to save time and effort.

The widely used mobile applications like Google Maps or Apple Maps accurately predict traffic congestion for urban roads based on the sensor data from monitoring devices installed on highways or urban roads . These application providers establish partnerships with various transportation entities to gather traffic information. The transportation governing authorities mostly install the traffic monitoring devices on urban roads, hence such application providers (e.g. Google application programming interface) deliver updates on urban traffic congestion. Besides, such applications also use crowdsourcing with location-based services to improve traffic density prediction. They do expect smart technologies within the vehicle or any smart mobile device with the driver of the vehicle to receive real-time traffic updates. The concern here is that the users require smart devices to access these applications and mostly the services are limited to urban roads.

The traffic pattern of urban roads or highways is different from that of collector roads. The users of collector roads include pedestrians, bicycles, motorbikes, and other vehicles; hence, the traffic pattern is different from the highways. Along with urban roads, the real-time monitoring of collector roads is also essential to improve the mobility of the entire city. The real-time traffic congestion updates, warnings from traffic authorities on non-recurrent traffic incidents such as accidents spilled loads, VIP visits, ambulance services, or any other unusual road incidents will support the collector road drivers in their decision-making. For instance, closed campuses such as universities and hospitals face heavy traffic congestions during peak hours. These campuses will have more collector road segments of different length that will connect to different entry/exit points. The real-time traffic updates of roads that connect to the exit points may help the driver for selecting the most suitable route from his current position. The drivers prefer to know about the congestion state of forthcoming intersections to plan themselves and save their time on the road by choosing alternate ways. The question that arises here is how to provide real-time road congestion updates to drivers even if there are no such smart devices with them or within the car, which is the real motivation of this research.

NECESSARY STEP TO FOLLOW :

Import necessary libraries:

1.start by importing the necessary libraries :

Program :

```
importrequest
importjson
importtime
```

2.set up iot parameters

device_id = "your_device_id"

api_url = "https://your_traffic_platform/api/data"

update_interval = 60 # Time in seconds

3. Initialize and configure sensors/hardware components to collect traffic data. The specific code will depend on your sensors and hardware.

4.Create a function to collect traffic data. This function may include reading sensor values, GPS data, or capturing images, depending on your hardware.

```
def collect_traffic_data():

   data = {

        "device_id": device_id,

        "traffic_data": {

            "speed": speed_data,

            "location": {

                "latitude": latitude,

                "longitude": longitude

     }
}
}

return data
```

5. Create a function to send data to the traffic information platform:

```
def send_traffic_data(data):

    headers = {'Content-Type': 'application/json'}

    response = requests.post(api_url, data=json.dumps(data), headers=headers)


    if response.status_code == 200:

        print("Data sent successfully")

    else:

        print("Failed to send data:", response.status_code, response.text)
```

6 . Implement the main loop to periodically collect and send traffic data:

```
while True:
    traffic_data = collect_traffic_data()
    send_traffic_data(traffic_data)
    time.sleep(update_interval)
```

7. Ensure that your IoT device has an internet connection and proper security configurations to make HTTP requests to the traffic information platform.

8. Run the script on your IoT device.