**PROJECT: Smart car parking**

**Phase\_2: INNOVATION**

**OBJECTIVIES:**

* Integrate IoT sensors into public transportation vehicles to monitor ridership, track locations, and predict arrival times.
* Provide real-time transit information to the public through a public platform.
* Enhance the efficiency and quality of public transportation services.

**STEP 1: DESIGNING**

**Sensors**:

We will need to select sensors that can accurately measure ridership, track vehicle locations, and provide other relevant data. Some examples of sensors that you may want to consider include

* People counting sensors: These sensors can be used to track the number of passengers entering and exiting a vehicle.
* GPS sensors: These sensors can be used to track the vehicle's location.
* Speed sensors: These sensors can be used to track the vehicle's speed.
* Accelerometers: These sensors can be used to detect changes in the vehicle's motion.

**Microcontrollers:**

 The microcontrollers will be responsible for collecting data from the sensors, processing the data, and communicating with the real-time transit information platform.

**Communication modules:**

The communication modules will be responsible for transmitting data from the microcontrollers to the real-time transit information platform.

The IoT sensors used in the project is Ultrasonic sensors, Inductive loop sensors and video cameras. Cloud computing allows us to store the data processed from the sensors. IoT gateways are used to get the data from the sensor and transmit to the cloud server.

**STEP 2: DEVELOPING THE PLATFORM**

The real-time transit information platform will need to be able to collect and process the data from the IoT sensors, and then provide this information to the public in a user-friendly way.

Here are some of the features that the real-time transit information platform should have:

* A real-time map of public transportation vehicles.
* Estimated arrival times for public transportation vehicles.
* Information on ridership and vehicle load.

**STEP 3: INTEGRATING**

After developing the IOT sensors and the real-time transmit information platform, we need to integrate them together. This will involve the software to connect the two systems and allow them to exchange their data.

Python libraries for IoT and real-time transmit information:

The libraries that is used to develop IoT sensor and ral-time transmit information platforms are follows

* Paho MQTT for IoT messaging
* Adafruit IO for cloud-based IoT management
* OpenTripPlanner for real-time transit information

**STEP 4: TECHNOLOGY DESIGN**

1. IoT sensors are installed in parking spaces to detect the presence or absence of vehicles.
2. The IoT sensors transmit data to an IoT gateway.
3. The IoT gateway transmits the data to the cloud.
4. A cloud-based application processes the data and determines the availability of parking spaces.
5. The cloud-based application provides real-time information on parking space availability to users through a mobile app.
6. Users can use the mobile app to reserve parking spaces and to pay for parking.

**BENEFITS OF SMART CAR PARKING:**

* Smart parking systems can help to reduce traffic congestion by making it easier for drivers to find parking spaces.
* Smart parking systems can also help to improve air quality by reducing the amount of time that drivers spend idling while looking for parking..