Design an Intelligent Real-Time Public Transportation Monitoring System Based on IoT:-

PHASE - 2 :- PROBLEM DEFINITION AND DESIGN THINKING

TEAM MEMBERS:

TEAM LEADER:

Mopuri Lokesh Dhananjayan -112821104047

Karthikeyan .s -112821104041

Mohammed Asraf Ali S-   112821104043

mukesh Varma p -   112821104048

varaprasath P- 112821104069

Historical data for public transport optimization to feed machine learning   are:-

* *Passenger data:* this contains all the details of the rider such as the time

of travel ,location and the speed.

* *Vehicle data:* This includes information about the movement of public transport vehicles,

such as their location, speed, and estimated time of arrival (ETA).

* *Traffic data:* This includes information about traffic conditions on the roads,

such as congestion levels, travel times, and incidents.

* *Weather data:* This includes information about weather conditions, such as temperature, precipitation, and wind speed.

* *Demographic data:* This includes information about the population in the area served by

the public transport system, such as age, gender, and income level.

This data can be collected from a variety of sources, such as automatic fare collection (AFC) systems, GPS tracking devices,

traffic sensors, weather stations, and census data. Once collected, the data can be cleaned and processed to make it suitable for machine learning.

Machine learning can be used to analyze historical data to identify patterns and trends in public transport usage and performance.

This information can then be used to optimize public transport services in a variety of ways, such as:-

* *Improving scheduling

* *Optimizing vehicle deployment

* *Reducing congestion

* *Improving reliability

Algorithms feed into the machine learning:-

* *Linear regression

* *Decision trees

* *Random forests

* *Support vector machines

* *Neural networks

A variety of machine learning algorithms can be used to predict the arrival time of public transport. Some of the most commonly used algorithms include:

* *Linear regression:* Linear regression is a supervised learning algorithm that can be used to predict a continuous variable, such as travel time or arrival time, based on a set of independent variables, such as time of day, day of the week, weather conditions, and traffic conditions.

* *Decision trees:* Decision trees are supervised learning algorithms that can

be used to classify data or predict a target variable by constructing a tree-like model. Decision trees are often used to predict arrival time because they can be trained on a variety of data types and are relatively easy to interpret.

* *Random forests:* Random forests are ensemble learning algorithms that combine the predictions of multiple decision trees to produce a more accurate and reliable prediction. Random forests are often used to predict arrival time because they are more robust to noise and outliers than individual decision trees.

* *Support vector machines:* Support vector machines (SVMs) are supervised learning algorithms that can be used for classification and regression tasks. SVMs are often used to predict arrival time because they can learn complex relationships between the input and output variables.

* *Neural networks:* Neural networks are deep learning algorithms that are inspired by the structure and function of the human brain. Neural networks are often used to predict arrival time because they can learn complex patterns in the data that are difficult to capture with other machine learning algorithms.

Case Study:-

* *In London, Transport for London (TfL) uses machine learning to predict the arrival time of buses on each route.* TfL uses a variety of data sources to train its machine learning models, including historical bus arrival times, real-time bus location data, and traffic conditions.

* *In New York City, the Metropolitan Transportation Authority (MTA) uses machine learning to predict the arrival time of trains on each subway line.* The MTA uses a variety of data sources to train its machine learning models, including historical train arrival times, real-time train location data, and track conditions.

* *In Singapore, the Land Transport Authority (LTA) uses machine learning to predict the arrival time of buses and trains on each route.* The LTA uses a variety of data sources to train its machine learning models, including historical bus and train arrival times, real-time bus and train location data, and traffic conditions.

Overall, machine learning algorithms can be used to predict the arrival time of public transport with a high degree of accuracy. By using machine learning to analyze historical data and predict future trends, public transport operators can provide passengers with more accurate and reliable travel information.

How we can add a machine learning algorithm:-

* Use a large and diverse dataset of historical arrival times. This will help the algorithm to learn the complex patterns in the data and make more accurate predictions.

* Clean and process your data carefully before training the machine learning algorithm. This will help to improve the accuracy and reliability of the predictions.

* Choose a machine learning algorithm that is appropriate for your data and your desired accuracy and reliability.

* Evaluate the performance of the machine learning algorithm on a

held-out test set before using it to make predictions on real-world data. This will help to ensure that the algorithm is not overfitting the training data.

Once you have trained a machine learning algorithm to predict the arrival time of public transport, you can use it to develop a variety of applications, such as:

* A real-time public transport arrival time app

* A public transport planning tool

* A public transport congestion monitoring system

By using machine learning to predict the arrival time of public transport, you can help to make public transport more efficient, reliable, and user-friendly.

conclusion:-

By performing all the steps and adding an apropriate algorithm will help us to optimise the public transportation .