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SMART PARKING SYSTEM

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Abstract - *The process of discovering patterns in large data sets involving methods that can be used for machine learning, statistics and database system is known as data mining.Internet of Things (IOT) plays an important role in connecting different things to the network and these things can be accessed from any remote location. In recent times people find it difficult to find an empty slot to park their vehicles in cities. In this project we design a Smart Parking System (SPS) which provides the availability of parking slots in that respective parking area for the vehicles. These informations are then used to generate reports*

***Key Words*: Smart parking system, k-means, clustering techniques, report generation, manager.**

1. INTRODUCTION

Data mining is a part of computer science field. It aims at extracting the required information from the collected data and converting it into a meaningful structure for future reference or applications. It particularly focuses on extracting data and transforming them into useful information. This technique can also be used to find patterns and also obtain ways to assume the result of observations which might be used in the future.

IoTs are applied for various things like smart grids, smart lighting, smart energy, smart city, smart health etc. This is broadly classified into three categories such as sensing, processing and connectivity. Half of the world's population are living in cities. So the cities are normally crowded. Most of the people use vehicles for transportation and due to this large number of vehicles exist. As a result people waste their time on searching parking lots to park their vehicles.Thus traffic congestion occurs and people will face difficulty in finding the parking spaces to park their vehicle. Maximum traffic occurs only in urban areas because of traffic congestion as people waste time in searching empty parking slots.

The Smart Parking System is designed by making use of some IOT supportable hardware's such as sensors and aurdino boards. IR sensors are present in each parking slot. The data from sensor is collected and sent to server for generation of report. This report is useful for end users.

1.1 K-means

The algorithm that we are using here is **K-means algorithm**. It's another name is Lloyd's algorithm. This algorithm uses iterative technique.

K-means clustering mainly focuses on vector quantisation. This algorithm divides n number of observations into k number of clusters in which each observation belongs to the cluster with the nearest mean, serving as a leader of the cluster. As a result variety of cells are formed.

The algorithm has a loose relationship to the K- nearest neighbor classifier, a popular machine learning technique for classification that is often confused with *k*-means because of the *k* in the name. One can apply the 1-nearest neighbor classifier on the cluster centers obtained by *k*-means to classify new data into the existing clusters. This is known as nearest centroid classifier .

2. ARCHITECTURE OF THE PROPOSED MODEL

The architecture used in our project gives functioning of the smart parking system .

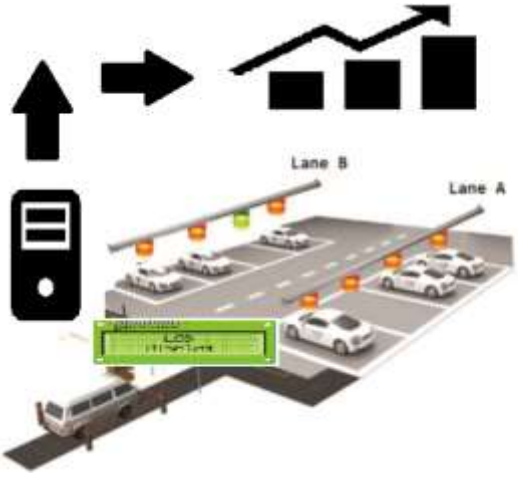


Fig: 1 Architecture diagram

At the entrance of the parking lot, the LCD display shows the parking status. If the parking lot is empty then the barrier opens and the car parks in the slot. If the parking is full the barrier remains close. When the car is parked in the slot the sensor senses the car. Whenever the parking gets filled the server is updated. The manager can access the server and generate reports using the data.

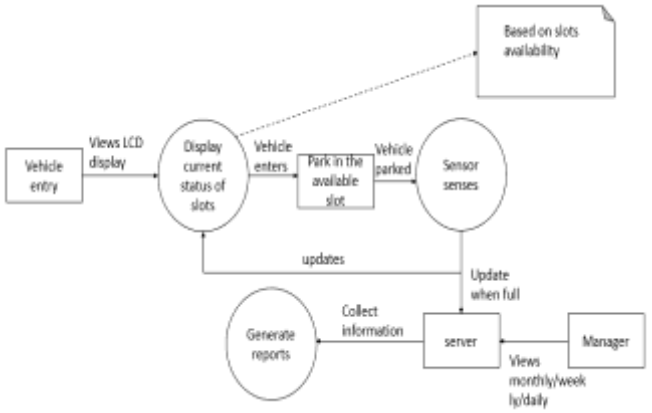


Fig: 2 Data Flow diagram

Data flow diagram as shown in **Fig-2**, is a pictorial representation of the flow of data within a system right from the start till the end. Data flow diagram is often used as a preliminary step to create an overview of the system. Data flow mainly gives the interaction between the system.

Initially when the vehicle arrives, the parking lot status will be displayed on the LCD screen. Based on the availability of the slots the vehicle parks. If the slots are empty only then the barrier remains opened and the vehicle can park in the empty slot. If there are no empty slots the barrier remains closed. The sensor senses the cars that are parked. Only when the parking is full the server gets updated. Each time a car gets parked in the slot, the LCD screen also gets updated simultaneously. The manager can access the server and generate reports using the data collected.

3. **RESULTS**

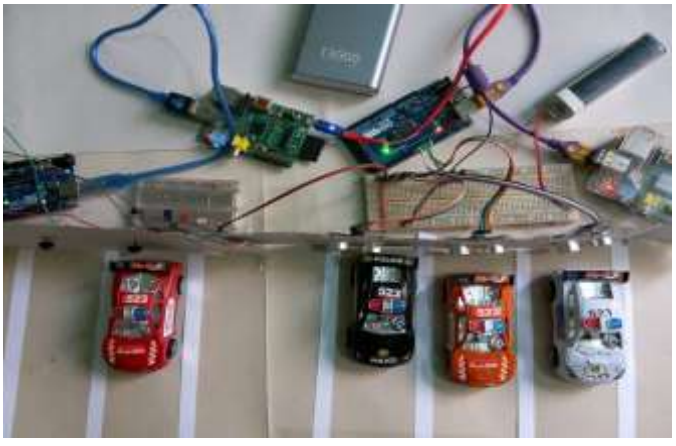
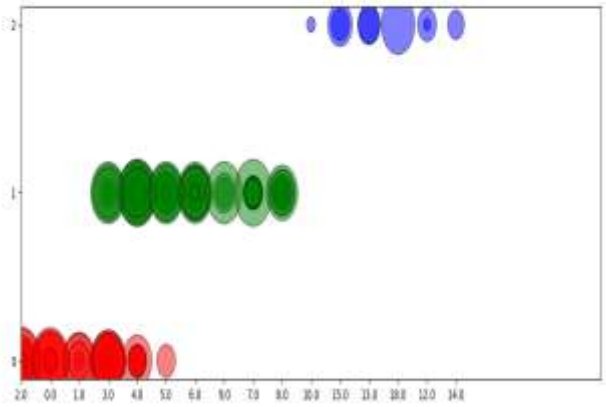


Fig:3 circuit diagram

Fig-3 represents the connection of various components used in the project. The components used are aurdino board , IR sensors, power supply, LCD and jump wires. Connection are made as shown in the figure.

The proposed algorithm is known as k-means algorithm. K-means clustering is a method of vector quantization, originally from signal processing, that is popular for cluster analysis in data mining. K-means clustering aims to partition 'n' observations into k clusters in which each observation belongs to the cluster with the nearest mean**.**



In the given algorithm we have used k-means algorithm for clustering based on the data gathered in the server. Clustering is mainly done by manager.

Through clustering we can find out on what days parking were full, and on those days the parking manager can allot some alternative parking lots for the people.

This way we can predict the parking status on different days and avoid traffic congestion. The data collected in the server can be used to plot different graphs also. The manager can decide what and how he wants to use the data.

Fig:4 Parking log

Fig-4 represent the report generated from the data collected.

4. CONCLUSIONS

This work has been made to make parking easier for the people living in the cities. People need not waste their time in finding parking lots. Air pollution will be less due to less carbon monoxide footprints in the air. People can find alternate parking lots if any particular parking lot is full and need not roam around the parking area unnecessarily.

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