IoT based Smart Parking System using Node MCU Arduino and LCD Display

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***Abstract* - This document explains the architecture and design of an Arduino based parking system. Driver or user authorization is the basic rule used to park the vehicle in the parking lot. The purpose is to provide a simple automatic parking space allocation system, using basic components such as Arduino, to provide a solution to the parking space allocation problem. If the user is authorized and the parking lot has space available, the parking door will open and allow the user to park the vehicle in the parking lot, otherwise the user will not be allowed to park even if the user is an authorized person. An IR sensor is an electronic device that emits light to detect objects in the environment. The LCD display is used to monitor the parking space and display the details of the parking space by using the IR sensor. Node MCU is one of the components used to monitor the entire system in a mobile application. The mobile app displays details such as the number of slots occupied, entry time and exit time. It also helps to show which parking space is available when parking in a multi-storey car park.**

Keywords— Arduino; IR sensor; motor; LCD display; Node MCU

I. INTRODUCTION

1.1 INTERNET OF THINGS (IOT)

The Internet of Things (IOT) is a system of interconnected computing devices, mechanical and digital machines, objects, animals or humans, each with a unique identifier (UID) and the ability to transmit data over a network without human intervention - Manual connection is required, provided. Human-Computer Interaction or Human-Computer Interaction. Things on the Internet of Things could be people implanted with heart monitors, farm animals with biochip transponders, cars with built-in sensors that warn drivers when tire pressure is too low, or any other natural or Man-made objects can be assigned Internet Protocol (IP) addresses and can transmit data over a network.

The web of things helps individuals live and work more astute, as well as deal with their lives. As well as offering savvy gadgets to robotize homes, IOT is fundamental for business. IOT furnishes organizations with

a continuous investigate how their frameworks truly work, conveying bits of knowledge into everything from the exhibition of machines to inventory network and strategies tasks. A few advantages are industry-explicit, and some are relevant across different enterprises. A portion of the normal advantages of IOT empower organized

- Screen their general business processes
- Further develop the client experience (CX)
- Set aside time and cash
- Improve representative usefulness

In a developing united states like India, where the populace and cars are developing rapidly, the implementation of an advanced parking system is critical. despite the fact that vehicle utilization is soaring, there are not enough parking spaces to accommodate them, which means that they have to make do with seldom-determined spaces. which strain the driving force to park a vehicle on the roads, it's the reason heavy,congestion the roads sluggish movement of web page traffic. despite the fact that, lot of time is wasted in searching for parking whilst looking by chance it outcomes environment via emission dangerous vehicles. This emission adulterates the air with the resource of CO2 and other gases thru combustion of fuel. additionally, even as looking parking slots, motion of traffic turns into sluggish. to triumph over all the troubles stated above, we need an green parking tool which would possibly help to lessen site traveler's congestion and enhance air at crucial places wherein website site visitors rush is more.

According to the definition of IOT, it's miles the manner to interconnection with the help of the net gadgets that can be embedded to put in force the capability in normal objects by permitting them to send and acquire data. Connectivity

- Intelligence and identity
- Scalability
- protection

II LITERATURE SURVEY

[1] clever Parking machine for monitoring automobiles and incorrect Parking, The parking issues are so many in this time due to the fact many people personal cars are increasing and shortage of space, there are many solutions for a few problems, but some of those solutions nevertheless have troubles, together with fee it's far a huge problem and the numbers of sensors in a single park.

This paper proposes a easy approach of clever parking gadget that tracking vehicles and incorrect parking. we're sing abilities to deal with some small portions such as Arduino, Ultrasonic sensor, PIR motion sensor and Nexium show to display the effects. The number one goal of this paper to resolve one of the issues that a number of humans suffered the wrong parking, with the aid of making the parking smart and with it we are able to reach the correct

performance without the excessive value or many sensors in one park.

The smart parking machine takes a signal from 3 Ultrasonic sensors in a shifting Arduino, the moving Arduino evaluation the sign and Convert the sign to code, then send the code by way of the usage of a wireless radio frequency to the fixed Arduino. The fixed Arduino will show it the usage of Nextion display touch display telling us the consequences. If any hassle at the parking automobile like incorrect park the show will display us a green vehicle and red line, a vacant park can be a black car and efficaciously park could be a inexperienced car.

After making the prototype and trying out the version we discover that the result is 95% effectively with 5% mistake due to the fact the version and the goals was small in our factor of view.

[2] IoT based economic smart automobile Parking machine, in the modern decade we are going through parking trouble with the advancement inside the generation. The populace in urban cities is dense due to which lots of cars are strolling on road leads to parking hassle, traffic hassle. international is dealing with new project of car parking. it's far found that one thousands and thousands of motors devour oil on every day foundation. on this paper, an automated real-time system for automated car parking is proposed. This gadget is implemented with the help of internet of things (IOTs).

IOT generally exchanges facts or information between the 2 bodily gadgets. Arduino Uno is a microcontroller utilized in proposed machine. the main use of Arduino within the proposed gadget is to offer platform to talk digital devices and interactive items that can experience and control bodily gadgets. Now a day's clever cities were proposed with smart parking machine for preserving the traffic of motors. recently advancement has been taken location in the subject of internet of factors and Cloud technology. inside the proposed gadget parking hassle can be triumph over with the assist of IOT based Cloud included smart parking system. actual time information of parking is shared with the user the use of website. It in the end leads to decorate the excellent of existence of users.

The proposed gadget is implemented with the assist of Arduino Uno board for car parking and Node MCU to attach parking vicinity with web or net. The proposed machine integrated with an infrared sensor in each slot for getting facts about emptiness function of parking slot. The user ebook parking slot properly in advance, all of the vital data is to be had on server. every person has one-of-a-kind username and password. In case any misuse happened then the machine will alert the accountable person.

[3] automated Parking machine with charge control using Arduino To nowadays human beings are nonetheless using guide parking systems which consists of many issues for example, looking for free space in a car parking zone with none prior understanding if the automobile parking space is complete or not, which leads to wastage of time and gasoline. protection of automobile is also an addressable problem. retaining those in thoughts we are presenting an car parking device. thru this device, drivers can be capable of understand if there are vacant parking slots or no longer, at the side of the vacant parking slot wide variety(s) prior to coming into the parking zone thru screen display screen(s) on the access gate(s). additionally, only legal personals shall be given access get right of entry to to the parking plenty thru an RFID tag relying on the availability of parking space. moreover, we also introduced a parking charge management device which is likewise payable the use of the equal RFID tag which acts as a chargeable parking credit score card. Mary Lou prepare dinner quoted “Creativity is inventing, experimenting, growing, taking dangers, breaking rules, making mistakes and having a laugh.”

It recommended us to paintings on such a subject which could help thousands and thousands of human beings to conquer from a common problem. the main advantages of the use of a smart parking gadget are saving time and gasoline, reducing visitors congestion, the protection of vehicles and many others. it can also offer sustainable parking control. The renovation costs for the proposed gadget is very low. for this reason the property developers/proprietors can shop money.

It also facilitates the authorities through growing tax sales. It promotes automation engineering, which might also result in extra powerful and efficient use of technology inside the future. although no machine is perfect. And the proposed device additionally has obstacles. We used IR sensors for detecting automobiles which can be blocked if a person or an item is placed earlier than it in place of a automobile, which may offer fake alerts. to overcome this, multiple IR sensors perhaps used from different angles. every other trouble might be that the gadget shown here's a prototype but, in real existence implementations longer ranged IR sensor might be needed. also, another point to be stated is that IR sensors have a life time and then it needs to be replaced with new one’s time to time. .

[4] The advantage of the arduino sensing system on parking guidance facts structures Parking is a big hassle in town. while human beings go to mall, department shops or hospitals, they often waste a whole lot time to locate an unoccupied parking area. The look at pursuits to provide humans with actual-time facts about the parking spaces the usage of an app which is transmitted through Arduino structures, WIFI verbal exchange modules, and the parking route making plans mechanism. on this manner, humans will have a great command of parking data when they get into the parking zone.

With the growth of the financial system and the rapid growth in quantity of personal cars, people have a growing need for parking spaces. when humans go to mall, department shops or hospitals, they frequently should force across the whole parking lot to find an unoccupied parking area because greater frequently than not, an oversized parking is focused on too many vehicles, which wastes time,

spoils the purchasing mood, and worsens the air high-quality.

In popular, the traditional parking control device most effective presentations the wide variety of unoccupied parking spaces on the doorway display screen. The machine suggests parking information like the ultimate parking spaces via license plate identification or automated sensing devices. In this example, while humans go to paintings or buy groceries, they frequently need to pressure around the entire parking lot to discover an unoccupied parking area due to the size of the parking lot. Worse nonetheless, a few multi-level parking masses even draw out the process of seeking out an unoccupied area for client.

The system no longer best spoils a very good mood but also pollutes the environment greater because of exhaust emissions occurred when they search for parking spaces. therefore, how to guide drivers to find unoccupied parking spaces in a big car parking zone is a trouble to be solved. In latest years, the development of net of factors (IoT) connects clever items in actual lifestyles, which creates a ubiquitous computing surroundings. The software inside the sensible transportation frequently provides the records that ATIS requires via combining all kinds of packages developed. This look at adopts IoT and ATIS as its framework.

[5]superior vehicle Parking system using Arduino, This paper explains the architecture and layout of Arduino based car parking device. Authorization of motive force or person is the fundamental rule used to park a vehicle in a parking location. Authorization card could be given to each consumer, which contains the vehicle number or other info. If the person is allowed and space is to be had in the parking, then the parking gate will open and the consumer is allowed to park the car in parking region else the consumer is not allowed even the consumer is allowed character.

If automobile is permitted to park, then cellular notification could be send to person about parking. It solves the parking problem in city regions, also presents security to a vehicle and an unauthorized person is not allowed to enter right into a parking area. It enables to park vehicle in multiflora parking additionally as it will display which ground has unfastened area. h legitimate card punch on RFID reader, if a slot is available and he is authorized then gate could be opened and he'll park his automobile in the available slot. If he's authorized however loose slot isn't available, then the gate will no longer be opened and he isn't allowed to park. If the consumer is not legal, then gate will not open and doesn’t allow him to park. The task is working nice, but, as IR sensor is of low price, it occasionally receives heated and now not working nicely.

So, we need to offer a while to cool as IR sensors feel each warmness and movement. The sensors which might be used also feel sunlight, so we need to carry out the demo in darkish room. If the person is authorized and space is available in the parking, then the parking gate will open and the user is authorized to park the vehicle in parking place else the consumer isn't allowed even the person is allowed person. If vehicle is authorized to park, then mobile notification will be ship to person approximately parking.

It solves the parking issue in urban areas, also presents protection to a automobile and an unauthorized consumer isn't allowed to go into into a parking region. enables to park car in multiflora parking also as it will show which ground has unfastened space. The valid card punch on RFID reader, if a slot is to be had and he's authorized then gate can be opened and he'll park his car in the available slot. If he's legal however loose slot is not available, then the gate will not be opened and he isn't allowed to park. The prototype of our concept is prepared and may be launched everywhere for the betterment of society. This model can lessen congestion on the street, time of customers, human electricity, pollutants, protection for cars.

III PROBLEM STATEMENT

Important meeting might be ignored due to the fact unavailability of free parking space or a few different unauthorized character parked his automobile in wrong region. Lot of time and money were wasted to remedy it however until now didn’t get the pleasant solution. So, the superior parking gadget is an very essential and crucial method to this problem. This solves many troubles like, it can reduce congest in of automobile on roads which in return helps fast shifting traffic, reduces time waste on traffic, less burning of fuel which once more results in god pleasant of air, disabled and antique humans can locate parking vicinity without difficulty.

IV DATA COLLECTION AND VISUALIZATION

This system also beneficial to recognize the spots where greater parking areas can be construct. This machine also gives secure environment for parking and protection of automobile and parking area venture has 4 fundamental subsystems, first is Arduino controller system and strength supply. second is display with the intention to display to be had parking areas, 0.33 is sensors, IR sensor to sense car.

In parking device, IR sensors could be positioned at each parking slot to feel vehicle and impediment. Sensor values might be displayed on show at access gate. access and exit gate may be opened. If free parking space will no longer be to be had, then gate will now not be opened. Database is maintained to test who's entering and leaving the parking premises. all of the required additives are of properly best together with IR sensor is used in an effort to experience any obstacle also. strength deliver is required to run the complete device.

access: while the user reaches parking gate, Reader will examine the object and sends its data to Arduino and test whether or not the distance is to be had. If it is space to be had, then sign could be send to electric motor to open gate. as soon as the car receives entry, gate will be closed and once parked loose parking area counter could be decreased through 1. If the consumer is authorized and unfastened parking space isn't always available, then Arduino will ship signal to display that parking isn't always free and therefore gate will no longer be opened.

go out: vehicle moves from the parking space, IR sensor feel it and increases loose parking space by way of 1. If he's authorized the Arduino will send signal to motor to open gate. The entry and go out loop is shown in figure 1. the auto enters from access factor. while the auto is parked on parking slot, IR sensor at this place sense the car and hence it reduces to be had parking slot counter through 1 and show on LED. while the automobile comes out of the parking slot to exit, then IR sensor at sense no automobile and will increase the to be had parking slot counter by 1.

V PROPOSED SYSTEM

The Arduino and hub MCU is utilized to foster the exceptionally safe and quick stopping framework ,Through this we can without much of a stretch observe the stopping spaces in the stopping region ,Arduino is utilized to see the stopping openings by utilization of IR sensors, Infrared sensor is utilized to detect assuming the article is stopped In space or not, Node MCU is the part is utilized to screen the general framework in the versatile application, Node MCU is an open-source based firmware and advancement load up uniquely focused on for IoT based Applications, LCD show is utilized to show the data about the spaces, through this thought we can handle the stopping mishap and save time.

Benefits:

- It is valuable for all clients
- High Security
- Simple to park
- Simple to see in the event that the space is accessible in stopping region
- It lessens the stopping Accident

VI MODEL EVALUATION AND RESULT

LIST OF MODULES

1. User Identification
2. Object Recognitions
3. Scanning the parking slot

MODULE DESCRIPTION

User Identification

Liquid Crystal display is used to reveal the parking slots, it suggests that the facts approximately the parking slots, through this display client can identify if the slot is available or not.

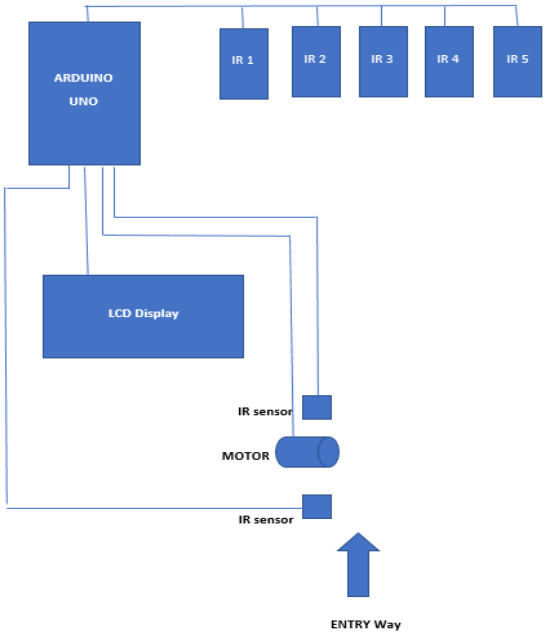
Object recognitions

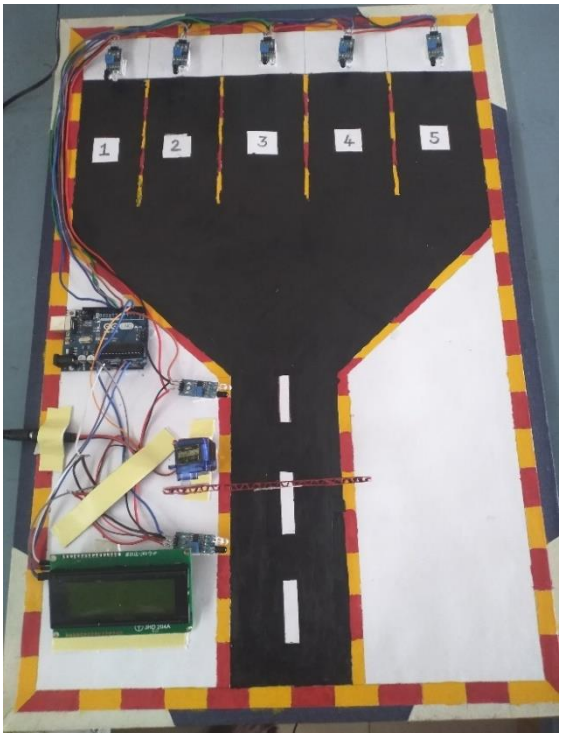
Infrared sensor is used to discover if item is to be had to nearer, if the item is towards sensor it passes the information to Arduino, then Arduino will take it as a input.

Scanning the parking slot

Arduino will take a look at the parking slots if it's far stuffed or empty, After the system, if the parking slot is available in parking location, it's going to bypass the coaching to the servo motor, if the parking slot is filled then it'd not bypass the practise to the servo motor.

VII SYSTEM ARCHITECTURE





OUTPUT SCREENSHOT

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