Rule Based Parking System Using IOT

Patil M. Toushif Latif [1], Neha P. Joshi [2]

Lecturer, Department of Computer Engineering, A. G. Patil Polytechnic Institute, Solapur, Maharashtra, India[1]

Lecturer, Department of Computer Engineering, Thakur Polytechnic, Mumbai, Maharashtra, India[2]

ABSTRACT:-In recent times the number of vehicles are consistently rising and parking space is becoming a major issue in urban and semi urban cities so there is needs to design a parking system which will reduce manual work as well reduce the problem of vehicle parking on streets. In this work we propose the concept of smart vehicle parking system. As we see in the modern world everything is being atomized, here we will deploy an IOT based system which is used to sense the presence & movement of vehicle. We are prototyping a parking system which has 10 slots. This system assigns a slot to the owner. Owner has to park the vehicle in allotted system but when allotted a far slot i.e. slot 9, 10 for a short time of stay makes the system inconvenient to use. Hence we are using A Rule-based Service Customization Strategy for parking system in which a system is going to record your stay for some days and according to that it will allot a slot to the vehicle owner. If a person park his/her vehicle for short period say for 20-30 mins, slot 1 is allotted to him, if in between 30- 60 minutes slot 2 is allotted similarly slot 3-10 are allotted. The system uses Raspberry Pi which is interfaced to the RFID reader and IR sensor and connected to webpage via its inbuilt Wi-Fi. Every user has given a RFID tag at the time of registration whose no indicates their details. IR sensor is used for detecting empty and filled slots.

KEYWORDS: IOT, parking system, Context Aware system and rule based system

I. INTRODUCTION

Due to rapid increase in the vehicles there exists a problem for parking of vehicles. It leads to traffic congestion and also pollution. So we have a need to maintain the vehicle park management in order to reduce the wastage of time. If we see in the larger cities when we visit the shopping malls or tourist places or any other commercial areas there arises a problem for parking of our vehicle. We have so different methods of parking systems such as using Wireless Sensor Network method, etc. But the major drawback of those systems is they help us to find the available spaces for parking but not the exact location of those spaces. It can be overcome by using smart parking system. People are facing many issues to find parking slots in minimum time and it is also difficult to know the status as theft vehicle which is parked in the parking lot.

Car parking is a main problem because of increasing in the vehicle number. Searching of a parking place around the cities is the routine work. In the smart parking system the parking space information is available at the real time. But the major drawback of those systems is they help us to find the available spaces for parking but not the exact location of those spaces. It can be overcome by using smart parking system.

II. RELATED WORKS

Vehicle stopping place is one of the significant issue in everyday life and it is in a roundabout way prompts the activity clog. This paper exhibits the IOT based stopping place recognition utilizing the portable application. The client can ready to check the closest stopping place accessibility and save the stopping opening utilizing versatile application. The versatile application will go about as an interface between the end client and the framework. Infrared sensor is put at the stopping space alongside the Arduino. Infrared sensor is utilized to recognize whether the opening is possessed or void and it is refreshed to the cloud utilizing the GSM. Arduino is utilized to track the quantity of vehicles stopped in the stopping territory. [1]

This paper puts an eye on different methods to the extent the shrewd stopping framework is concerned which are as of now actualized. In caring for this stopping issue, enormous number of creators contributed a great deal in observing SPS and administration of SPS with the assistance of different innovations including remote sensor organize, Bluetooth, ZigBee, RFID, GSM, Cameras, Image preparing. IoT joined by various programming arrangements in light of versatile application. Following this overview will upgrade scientist's idea on SPS which will bring about a genuine arrangement of the strategy and calculations for extreme SPS. [2]

Combination of arranged sensor/actuator and radio recurrence recognizable proof (RFID) advancements is investigated to empower refined administrations by means of the Internet in the rising web of things (IOT) setting. In view of this mix, we propose an adaptable and minimal effort auto stopping system (CPF). A starter model execution and experimentation of a few modules of the proposed CFP has been performed. The grouping of sensors (detecting sheets) into a solitary bit utilizing the standard I2C convention has been investigated in the model, and test comes about exhibit extensive diminishment in cost and vitality utilization. [3]

This paper introduces the bland idea of utilizing cloud-based shrewd auto stopping administrations in keen urban communities, as a vital application sent on the Internet of Things (IOT). The relating IoT sub-framework incorporates sensor layer, correspondence layer, and application layer. An abnormal state perspective of the framework engineering is illustrated. To exhibit the arrangement of auto stopping administrations with the proposed stage, a cloud-based shrewd auto stopping framework for use inside a University grounds is portrayed alongside points of interest of its outline and execution. [4]

This paper displays an outline and execution of a keen and one of a kind auto stopping framework to help the advanced dreary auto stopping configuration utilizing RFID peruser and microcontroller. The framework composed with arudino controller consequently recognizes the vacant space and stops the auto at the comparing opening. The System installed with a RFID shrewd card causes us to compute the day and age amid which the auto is stopped, consequently helping a programmed web based business framework to deduct the sum for the sad day and age from the clients account. The framework has a GSM add-on module which will naturally react's to the clients SMS ask for by letting him the accessible openings at a given time. Temperature Sensors, CO_2 sensor are accustomed to demonstrating the security angles in the general stopping framework. [5]

IOT is a quick sprouting region. It enables us to interface imbecilic items. Utilizing this innovation, we can incredibly car our item by making equipment parts to convey. RFID is generally used to follow things in close range. This radio correspondence utilizes perusers and labels to trade data. We have for the most part utilized these two innovations which appear to can possibly significantly car the manual frameworks and make them quicker and mistake free. Our item, in light of the possibility of Internet of Things, goes for fathoming the disarray, perplexity and long lines in parking spots of open structures like shopping centers and business stops that is pervasive because of the expanded utilization of cars. We plan to tackle these issues and offer auto drivers an issue free and quick auto stopping knowledge. [6]

This paper is to build up a Reservation based vehicle stopping reservation framework to conquer the issue of pointless time utilization in discovering parking space in business stopping regions. Client holds the opening by making an impression on GSM modem put at the stopping end. GSM modem gives space number and a watchword if the openings are accessible which is utilized to permit or deny access to the stopping region at the passage and exit. IR sensor is utilized for the sign of void space with a green LED. Client can stop the vehicle at the given zone, and this is substantial up to a specific effortlessness period simply after that the need will be given to next client. RFID innovation is utilized for entering and leaving stopping region and furthermore used to charge the sum for stopping charges through RFID tag. The primary commitment is the framework has greater security .Thus clients can simply hold the stopping openings utilizing the SMS. [7]

Because RBSs have played an important role in demonstrating the importance and practicality of knowledge systems, they have received much attention. It should be pointed out that RBSs are not a panacea, either for DP problems or for AI problems. They do, however, represent a new technology of broad and important applicability and will undoubtedly play an increasingly important role in these fields in years to come. General Motors has undertaken several rule-based expert systems for manufacturing and service functions. Numerous aggressive development programs under way throughout the world, including the Fifth Generation program in Japan, the Alvey program in England, and the Strategic Computing and MCC programs in the United States, all aim to make significant improvements in the performance and generality of this technology over the next five to ten years. [13]

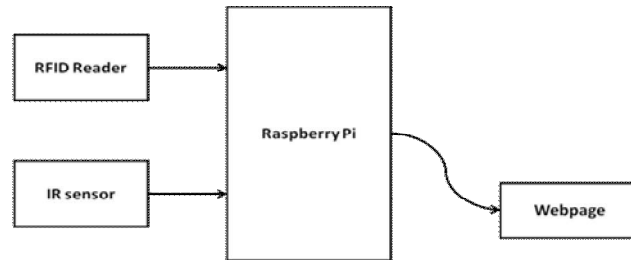## III. PROPOSED ARCHITECTURE

Fig.1. Block Diagram of proposed system

Block diagram of proposed system is shown in figure 1. RFID reader is used for reading the RFID tag which is given to every vehicle owner at the time of registration. The system note the in time, stay time of the vehicle in parking zone after studying its behavior for 4-5 times, system decides which slot has to be given to that vehicle according to predefined criteria. The predefined criteria here is, if a vehicle has very less stay time then allot it near slot for parking and if it stay for more time allot it far slot. If an unregistered person wants to park vehicle in parking zone, then first he/she has to enroll himself on website and a nearer parking slot is allotted to him/her. Raspberry Pi has inbuilt Wi-Fi unit through which one can fetch or stored status of parking slot or details about vehicle owner, in time, stay time etc. can be saved on webpage. The data involving in time, stay time, owner's information is stored on cloud and used for self-learning of the system.IR (Infrared) sensor detects the status of the parking slot i.e. whether the slot is empty or filled and updates this status on webpage so that the system can allot empty slot to the user accurately and automatically.

Let there are 7 slots as shown in table below, each slot is reserved for one purpose. The set of ruled are given in table 2.

Table 1 slot no. and reservation

Slot no.	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7
Reserved for	Guest	Guest	Regular + micro + time (10 AM to 3 PM)	Regular + micro + time (3 PM to 6 PM)	Regular + SUV	Regular + mini	Stolen

Table 2 set of rules

Rule no.	Applied for
Rule 1 (R1)	Stolen vehicle
Rule 2 (R2)	Type of vehicle
Rule 3 (R3)	Timing
Rule 4 (R4)	Guest/ regular user
Rule 5 (R5)	Time duration + Email

- If a slot is empty it is represented by 0, if the slot is filled then it is represented by 1.
- If vehicle is fit in particular slot then slot no. will be represented as 1 otherwise 0.
- Stolen vehicle means R1=1 otherwise 0, R2=00 (mini), R2=01 (micro), R2=10 (SUV), R3=0 (10-3PM) and R3=1 (3-6PM), R4=0 (guest) and R4=1 (regular), R5=0 (missed time).

Conditions are as follows:
1. if (R1==1)
    Slot 7 will be allotted.
2. If ((R4==0) and (S1==0))
    Slot 1 will be allotted

3. If ((R4==0) and (S1==1))

        Slot 2 will be allotted

4. If ((R4==1) and (R2=00))

        Slot 6 will be allotted

5. If ((R4==1) and (R2==10))

        Slot 5 will be allotted

6. If ((R4==1) and (R2==01) and (R3==0))

        Slot 3 will be allotted

7. If ((R4==1) and (R2==01) and (R3==1))

        Slot 4 will be allotted

IV. ALGORITHM

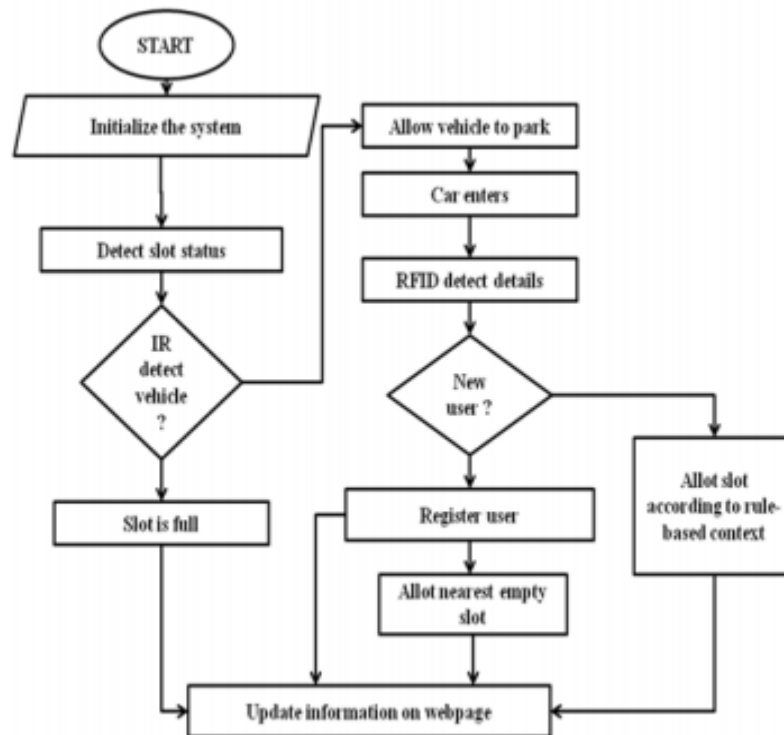|	
step 1	initialize the system
step 2	if there is any empty slot then go to step 4
step 3	parking is full
step 4	allow vehicle to enter
step 5	Fetch details of vehicle owner, vehicle no. etc.
step 6	If new user go to step 7 otherwise go to step 9
step 7	Register user and provide nearest slot
step 8	Record in time, stay time, out time and behavior of user
step 9	allot vehicle empty slot according to rule-based context
step 10	update on webpage
step 11	Stop

V. FLOWCHART

VI. CONCLUSION

Automatic vehicle parking system is very important factor in the traffic areas. It can be automated without human being. It reduces the time consumption. So by implementing our smart parking system using IR Sensors and RFID we can manage our time and vehicles can be parked easily. The information related to number of current available parking lots in parking area will be available for user. Web server is best solution for providing information to availability of parking lots to the user. This will help to reduce the waiting time for the user to park the vehicles. Stolen vehicles can also be detected as the database can be made global due to IOT.

REFERENCES

[1] Yuvaraju. M, Monika. M, "IOT based vehicle parking place detection using arduino", IJESRT, ISSN: 2277-9655, May, 2017.
[2] Ndayambaje Moses, Y.D.Chincholkar, "Smart Parking System for Monitoring Vacant Parking", International Journal of Advanced Research in Computer and Communication Engineering, Vol. 5, Issue 6, June 2016.
[3] ElMouatezbillahKarbab, DjamelDjenouri, SaharBoulkaboul, Antoine Bagula, "Car Park Management with Networked Wireless Sensors and Active RFID", IEEE, 2015
[4] ZhanlinJi, Ivan Ganchev, MaritinO'Droma and Xueji Zhang, "A Cloud-Based Intelligent Car Parking Services for Smart Cities", IEEE, 2014
[5] VatsalaDaur, PreritBhandari, Laxay Jain, Nalini N, "Smart Car Parking System", IJARCSSE, Volume 6, Issue 5, May 2016.
[6] D.Sathya, S.Kumaresan, "smart-parking system based on RFID AND GSM TECHNOLOGY", International Journal of Scientific & Engineering Research Volume 8, Issue 5, ISSN 2229-5518, May-2017.
[7] K.Sushma P. RaveeendraBabu, J. Nageshwara Reddy, "Reservation Based Vehicle Parking System Using GSM and RFID Technology", K.Sushma et al. Int. Journal of Engineering Research and Applications, Vol. 3, Issue 5, Sep-Oct 2013, pp.495-498.
[8] Arduino 1G.Kiruthikamani, 2B.Abinayaa, 3B.Saranya, 4 P.Devi and 5R.Gayathri 6, Smart Vehicle Safety System Using,International Journal of Trend in Research and Development, Volume 3(6), ISSN: 2394-9333 www.ijtrd.com IJTRD | Nov-Dec 2016 Available Online@www.ijtrd.com 804.
[9] Pampa Sadhukhan ,An IoT-based E-Parking System for Smart Cities

[10] ZhanlinJi 1 , Ivan Ganchev 1,*, MáirtínO'Droma 1,†, Li Zhao 2,† and Xueji Zhang 3, Article A Cloud-Based Car Parking Middleware for IoT-Based Smart Cities: Design and Implementation, Sensors 2014, 14, 22372-22393; doi:10.3390/s141222372 sensors ISSN 1424-8220 www.mdpi.com/journal/sensors

[11] RuhiKiran Bajaj 1 , MadhuriRao 2 , HimanshuAgrawal, www.iosrjournals.org Conference on Recent Trends in Computer Engineering (CRTCE -2018) 36 | Page Internet Of Things (IoT) In The Smart Automotive Sector: A Review ,IOSR Journal of Computer Engineering (IOSR-JCE) e-ISSN: 2278-0661,p-ISSN: 2278-8727, PP 36-44

[12] AkanshaShrivastava, Lokesh VK , Smart and Secured Parking System (SSPS) ,Volume 6, Issue 6, June 2016 ISSN: 2277 128X International Journal of Advanced Research in Computer Science and Software Engineering Research Paper Available online at: www.ijarcsse.com

[13] Frederick Hayes-Roth ,Rule-Based Systems