

Intelligent Vehicular Flow Management System for Educational Hub



Onkar Swami, Sachin Sakhare, Subhash Tatale

Abstract: In rural and urban arenas, quantity of vehicle is expanding. To find parking area is turning into a primary concern. To design parking framework which is able to neglect physical efforts and also provide arena for vehicles parking. In later, instructive grounds are expanding which consist of Universities, designing, Art, Commerce and Science Colleges. The issue is parking spots either inadequate as indicated by the requests of understudies and staff or these spaces are ineffectively overseen. With each new individual entering college premises have an issue on grounds. In this method, we present the idea of the shrewd vehicle flow management. Here we will convey an Internet of Things (IoT) based framework which is utilized to detect the nearness and development of vehicles. Here, we have considered example of our V.I.I.T college campus to develop prototype which has 5 openings for each division. The vehicle flow management parking framework is creating in 2 stages. In the principal stage, the information, for example, vehicles utilized, offices, and so on about the educator and staff data will be gathered and information is grouped according to office. In the second stage, the observation camera is catching pictures of the vehicle. By utilizing a novel methodology like Quadrature lock-in Discrimination (QLD), decreasing poor visibility because of stray light or mist to peruse the vehicle plate number. For the majority of part, in existing propelled frameworks doesn't give office shrewd separate stopping framework. We proposed a framework which has diverse vehicle flow management framework for various office and understudy/educator just from the office can stop in apportioned spaces. The framework utilizes Raspberry Pi has confederated with the Radio Frequency Identification (RFID) per user, associated with a website page by means of its integrated Wi-Fi. RFID tags are distributed to college members and slot allocation is given dynamically by system.

Keywords : GSM, Image Processing, IoT, Quadrature lock-in Discrimination(QLD), RFID, Raspberry Pi

I. INTRODUCTION

Because of fast increment in the transport medium it subsists there an issue for leaving of transport medium. It prompts blockage and furthermore contamination. In this way, we have a need to keep up the vehicle leave the board so as to diminish the wastage of time.

In the event that we find in the bigger urban areas once we stop by the plaza centers, traveler clime or some business regions there emerges an issue for leaving of our vehicle. We think of various strategies levelled at stopping frameworks, for example, utilizing Wireless Sensor Network technique, and so on. Be that as it may, the significant downside of those frameworks is they help us to locate the accessible spaces for stopping yet not the definite area of those spaces. It can be overwhelmed by utilizing brilliant vehicle flow management framework.

Vehicle leaving is a principle issue in light of expanding in the motor digit. Looking of a stopping position round the urban areas remains the standard design. The car parks spot data have been accessible for the ongoing keen stopping framework. Be that as it may, the real downside of individuals framework is to locate isolated accessible places for stopping to foil the careful area of owed places. It will overwhelm using utilizing savvy stopping framework.

Internet of Things is utilized to speak with the gadgets. By utilizing this gadget could be controlled or checked through the web, IOT goes about as a stage to store information from the remote areas. IOT comprises of web empowered gadgets that gathers the information from the encompassing situations utilizing processors, sensors and other specialized gadgets. The gadget could be checked and followed utilizing PCs associated through web. There are various sorts of vehicle leaving framework accessible to diminish the time and the traffic clog. The sorts utilized in everyday life are by utilizing cameras, parking spot is recognized and the camera is fixed at the stopping territory columns then another strategy is by utilizing laser pillars it distinguishes the corner and target stopping position. At that point another strategy is by utilizing Light identification and field sensors. Another strategy depends on the 3D remaking. With the most recent multiplication of the vehicle accessibility finding the leaving place accessibility is progressively troublesome.

In instructive grounds, People are confronting numerous issues to discover leaving openings in least phase, persons are likewise hard to distinguish burglary vehicle which is left in parks area. Giving adequate and effective stopping in a foundation is one of the serious issues in building up the establishment. Offering safe and secure parking garage with enough space. The accessible stopping openings are not used appropriately. The fundamental explanation behind this is the lacking data the client has with respect to accessible parking spots. The driver normally pursues a theory-based way to deal with discover a parking spot and the greater part of the occasions get disappointed.

Manuscript published on 30 September 2019

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II. RELATED WORK

Vehicle halting spot is one of the huge issues in regular daily existence and it is in an indirect manner prompts the action obstruct. It illustrates IOT based ceasing position acknowledgment applying compact application. Customers may be prepared to scrutinize the nearest seasoning spot openings and get rid of paused openings using an adaptable using application. Flexible application will come as a dialogue between the end customer and the design. Arduino has put infrared sensors in place to shut down. The infrared sensor is used to detect whether it is open and activated in that cloud using the Global System for Mobile (GSM). To monitor the amount of vehicles halted in the ceasing an area, Arduinos' has been deployed [1].

It proposed automatic number plate recognition system using neural network. In this system, Camera is used to capture the number plate images. For character recognition, Optimal Character Recognition (OCR) algorithm is used. By using feature extraction technique, pull out the car plate letters from segmented data. Improving color and brightness to recognize characters, neural network algorithms are used. Number plate characters are separated using horizontal and vertical projection. Syntax checking analysis of identified characters is discussed [2].

It explained about different kind of object detection technique. It includes tracking methods, classification of methods into different variety and focuses on object detection. This paper gives a brief review of tracking methods like shape associated classification, color associated classification and motion associated classification of object with their positive and negative points and also processing framework of surveillance camera video to detect actions of moving objects [3].

It explained about character recognition and transmission in network security. Vehicle number, Steganography techniques are used for safe transmission of identified numbers. First identified numbers are enclosed into image. By using private key, data is encrypted at sender's end and the data is extracted from the image by using decryption technique at the receiving end [4].

It proposed real time adaptive CPU scheduling by using a genetic algorithm in operating system. To calculate performance of CPU, Success rate (SR), Massive rate (MR) and Effective utilization are used for all algorithms. By using CPU scheduling algorithm, it shows that the proposed genetic algorithm is excellent and give better result during overloaded or underloaded condition compared to the Earliest Deadline First (EDF) [5].

IOT is area expanding quickly in few years. It empowers us to interface moronic things. Using this advancement, we can intensification transport medium speed by building hardware parts to pass. RFID is recurrently utilized to pursue things during short proximity. Specified radio correspondence uses peruses and names to swap info. It generally utilized these two advancements in which it appears that the manual systems need to be driven and snapped and error less. The possibility of Internet of Things can lead to chaos, confusion and lengthy queues in the parks place of open area such as malls and commercial sites as a result of widespread use of vehicles. We tend to handle

related complications and provide automobile car user a problem free and snappy machine ceasing learning [6].

It proposed the reservation parks spot system. To overcome the point of misuse of time in finding parking space in a business-locked locality, the reservation constructed on a registration related vehicle stop is to be developed. The customer starts by establishing a connection to the GSM modem at the stopped end. The GSM modem provides a watchword if there is free space to be used to deny access to the paused space and exit. For the suggestion of void parks places through a green LED, IR sensor has been deployed. The customer will halt the automobile in the given zone, basically enough for a particular rest interval, after which the next customer will exigency. RFID development is necessary to access and release closed locales, and without it, the RFID tag is used to withhold the entire charge. The system must have additional core security. In this way, customers can basically hold the halting openings using the SMS [7].

Shrewd vehicle wellbeing framework with GPS System and GSM System is executed. This framework gives authority over the vehicle even after it is stolen. It gives security to vehicle by locking the entryways and ceasing the vehicle development. To restart the vehicle and open the entryway direction must be sent from versatile. This framework lessens the strain in finding stolen vehicle. In future biometric acknowledgment additionally can be added to give high security. It makes stolen vehicles recuperation simple and quick. You can find your stolen vehicle effectively utilizing your versatile with no additional expense [8].

Its projected E-stopping framework that gives innovative stopping the executives answer for different stopping office territories all through the town. The projected E-stopping framework empowers the car user towards get data on accessibility of car parks spot, to hold some parking garage through a reasonable GUI that implies advance booking established stopping the board office. This proposed framework can without much of a stretch recognize vehicles inappropriate leaving inside the parking garage and gauge the span of the leaving lots inhabitance by some vehicle by utilizing an incorporated segment considered leaving pattern that is sent to individually car parks garage. The projected framework likewise empowers the programmed gathering of stopping charges by giving keen installment alternatives to the driver [9].

An IoT cloud-based shrewd vehicle framework has been depicted in the projected structure. Measured as a remarkable division of an Intelligent Transport System (ITS) to brilliant urban area., The transport medium leaving framework is worked with three layers: Sensor, correspondence, and application layer. The framework API and comparing functioning stage has been depicted. An example vehicle leaving administration for academy grounds have been measured alongside secondary cloud products, OSGI-based web products, Android portable products in the execution section. Administration gives customer through data around the 'best' accessible vehicle parking area.

It is conveyed in return to the client's versatile application, following the well linked and superlative ABC&S worldview [10].

III. PROPOSED SYSTEM

From the above existing system, we want to focus on education campuses or hub. Block diagram of planned structure is shown in figure 1 and flow of structure is shown in figure 2. Pictures are taken when a vehicle arrives in the college premises. Data acquisition about vehicles in motion is done by capturing images. A high-quality surveillance camera usually enough for capturing images of vehicle and read the number plate. However, there is a major drop in the signal to noise ratio in dimming light, poor visibility condition due to fog, smog or stray light. An algorithm is implemented which relies on a source of light which is varied sinusoidal and the light scattered from the object is captured using novel approach like Quadrature lock-in Discriminator (QLD). If the number is recognized of a specific vehicle, a voice message is transmitted to the vehicle owner with parking allocation details.

An RFID reader is fitted to scan the RFID tag assigned to each vehicle owner at the time of registration. Every department has allotted a complete parking zone which consists of 5 slots. Student/teacher from one zone can't park in parking zone of another department. If any student park his/her vehicle in another slot other than allotted slots in his department, a message is transmitted to protect to convey that an individual is attempting to park vehicle in wrong parking lot. GSM hardware is managed to send message.

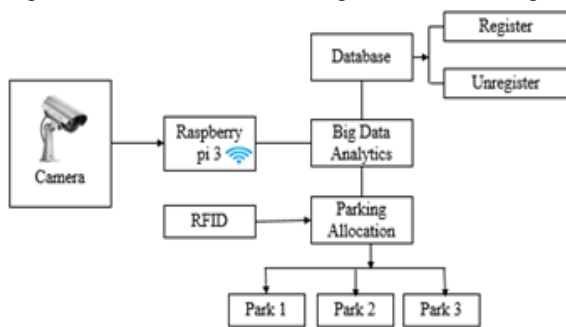


Fig. 1. Block diagram of proposed system

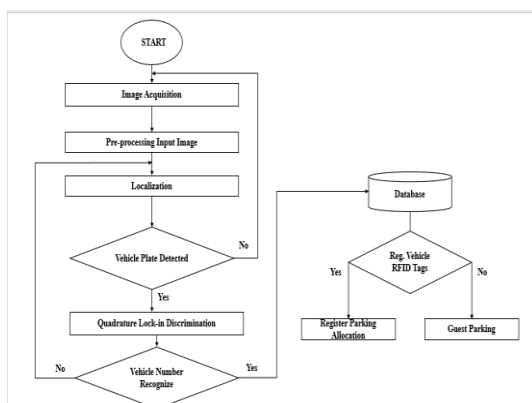


Fig. 2. Flow diagram of system

At the phase car arrives, position of car parks data will retrieve or kept in the record. WIFI unit is utilized to supply

details of car user, arrival and stay time, etc. in DB or excel file. There is an additional car parking zone is formed for guest individuals or who don't seem to be regular visitant or who don't have RFID card for parking.

IV. METHODOLOGY

The obscurity of a vehicle to look at a number plate because of fog, and examples of an incapability to perceive a bullet directly in the body are instances where easily-dispersed pictures in unbearable media have the potential for daytime imagery. Generally, the transporter of the projection of the photos is rendered transparent, excluding the direct appearance of the number plate and preventing the creation of photographs, glooms of interfering objects. Because it has established troublesome to get a way that's straightforward, fast, compact and transportable whereas additionally being versatile and cheap. With the availability of improved code for scrutiny, large number of pixels in the picture is the key purpose for the timing of time imaging remains indescribable even for moderate scattering. Returns the span of the time stream count that needs to be checked.

Here's how to solve the current inconvenience by using a simple algorithm rule that is the quadrature lock-in discrimination (QLD) which utilized for trajectory lightweight removal, including economical, type of routing and crossbreed parallelization of tasks. It alters concurrent information gaining and dispensation, resulting in period of time show of pictures through short delay, it will understand the rate faster than the eye. On a foggy day, vehicles traveling to the institute arena create a scene with lots of light sources in the dispersed medium, imitating the view.

However, a derivative information of moderated frequency disregards the need for spectral reduction. A reality utilized by electrical lock-in detectors to haul out weak signals from noise. The technique of quadrature Lock-in Detection (QLD) depolarize particular segment establishment terribly merely, by creating a replica of the statistic. The reference is to multiply by sinusoid and the alternative by a sinusoid 90° part replaced to the current stage. Thereby, obtaining segment and quadratic transfer factors in interest of growth's in frequency. After this, the amplitude of frequency of interest is added to verify the dimension. Images must also be created at speeds faster than 30 fps to replicate ordinary hallucination through motion stability and to prevent glare. Here we have a tendency to report execution of QLD in computer code, performed at the moderated frequency, that provides the advantage of skillfulness, low value and advancement. Although deliver processed images with a frame rate of 30 fps, limited by milliseconds of order delays and time camera performance.

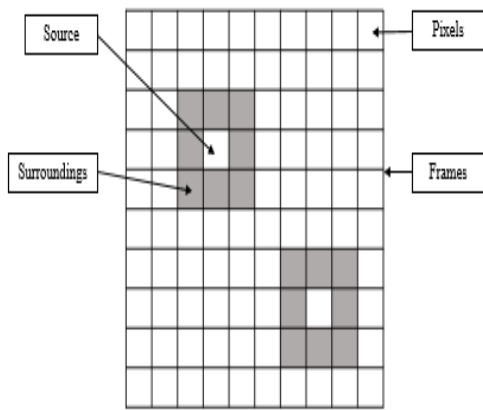


Fig. 3. 10 × 10 pixel frame contains white region (1 × 1 pixel) i.e. source and dark region i.e. surrounding

A. Numerical Explanation

The simulated cases are of a light origin, two of which are penetratingly sinusoidally controlled, and the third is stable in control. The surveillance camera is taking a picture of the situation, emulated by a frame of $n \times n$ pixels, in which there are 5 non-intersecting subsets of the size $m \times m$ pixels, corresponding to the direct image of the input image. Amount of frames N differentiated by different time intervals (Δt). Duplicates of scattered photos are dispersed evenly among zero and X , adding a non-specific range to each element in each frame, where X will depend on the power of scattering. Output to a sequence of clamorous frameworks like one in Fig. 3d. Every n^2 pixels acquired from sequence of N such frames when time sequence is replicated. From successive frames, the intensity values are selected for each pixel at time instants t_s . Main purpose is to extract the trajectory object from the given input of interest.

$$R(j, k) = \frac{[\sum s[I(j, k, t_s) \cdot \sin(\omega_i t_s)]^2 + [\sum s[I(j, k, t_s) \cdot \cos(\omega_i t_s)]^2]^{1/2}}{(1)}$$

In QLD, the given quantity (1) was calculated for each pixel (i, j) to reduce noise where $\sin(\omega_i t_s)$ and $\cos(\omega_i t_s)$ are pre-evaluated arrays [23]. Given equation provides the image because of trajectory photons and these values are evaluated in same set of time series and saved frames. How significant is the contrast of noise ratio (CNR) values with the standard deviation in the input or source region of intensity units as well as the nearest zone.

V. RESULT AND DISCUSSION

Experiments that simulate everyday situations, in many cases, performing such real-time imaging operations. QLD usually requires sinusoidal modulation of vehicle images in the same format as intensity modulation, but in other things the intensity remains the same. The discriminating or transmitted light depends on the fact that it maintains its polarization, while the disruptive light and ambient light ignore different expansions. The pictures of vehicles were taken by the camera and multiprocessing procedure was followed for acquiring the data from the images and doing real-time processing on those data. Frames of dimension

500 × 500 pixels, with display period 3ms remained fixed by 30 fps.

The first case shows the backside view of the car on the crowded place. We have captured the number plate of the car which is a blur image. We can use QLD even when the image is blur and the large number of unwanted sources are available to view. QLD can be used in Foggy weather too. QLD when used at right frequency release the light sources of interest. The second case, automobile pictures is captured within the night. These images were brought in real-time at 30 fps, on processing data acquired over 70 milliseconds. Longer period of time-series has processed sharper contrast image.

In third case, the image is of excellent quality because it has immense quantity of pixels. We consider this image as a well obtain image. So, QLD can also be used when the images are of good quality. Finally, we make it clear that there will be real-time scattering of images using QLD, comparative measure amongst the object and the viewer while navigating the image. The QLD process is able to describe the order image in scattered ways, as shown by the above three cases. Summarization of the specified planned structure, by applying modulation and QLD performed on light emanating from a lightly scattering medium to separate light from continuous-wavered light sources and wavelengths. By the worthiness of method having simplicity, minimal cost and portability have brought the application. Also, the option of well-known erected time orientated imaging alongside pulsate beacon.

QLD has allowed us to multiply and store for each element at the same time. Additionally, this approach permits us to free alternative hardware threads for their several activities. Advantage of QLD is that it needs one buffer which will store one frame. There are totally different algorithms accustomed cut back noise on pictures like non-local suggests that, Linear filters like Gaussian and wiener filters, Markov Random Field (MRF)-based strategies, Wavelet-based strategies, Analytical correction strategies. In non-local means methods, it's going to eliminate non-repeated details. So, it's computationally overpriced [15]. In linear filters, there is the regulation of noise estimation to smooth the back signal. To apprise the worth of a component through a malfunction, it applies repeated restricted method and pretend mitigating. Typically, this is high-priced [16].

In Markov Random, it uses abstraction correlation data to get extra rigorous consequences compared to the clutter and preserves fine structure over time. So, implementation cost is high [17]. In Wavelet-based methods, Wavelet constants can be prejudiced even when these paths attempt to separate the signal from the sound. In that ways provide subtle detail, especially in the supreme clamorous pictures [18]. In Analytical correction methods, these ways assume a continuing signal during a little area, that isn't forever true. Also, these ways don't preserve edges and degrade fine structures [19]. In QLD method, it'll overcome all the noise drawback and gives nearly nine contrast-to-noise ratio of input pictures. In Fig. 7.



Graph shows the processing time per frame. Optimal Character Reader (OCR) is used for character recognition in the images. It helps to convert image character into text character but average execution time of the system is 45 seconds and image quality 480×640 [20]. In our framework, it gives 0.16 ms average execution time and it identify vehicle number plate using QLD algorithm in different state like smog, night, light mode.

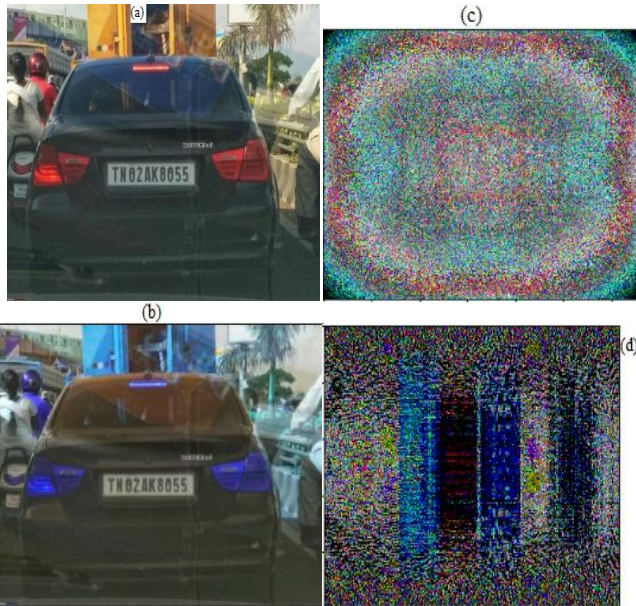


Fig. 4.(a) Vehicle image is captured through smog (b) Preprocessed input image (c) signal image of given input (d) Processed image, applying QLD, shows contrast-to-noise ratio image

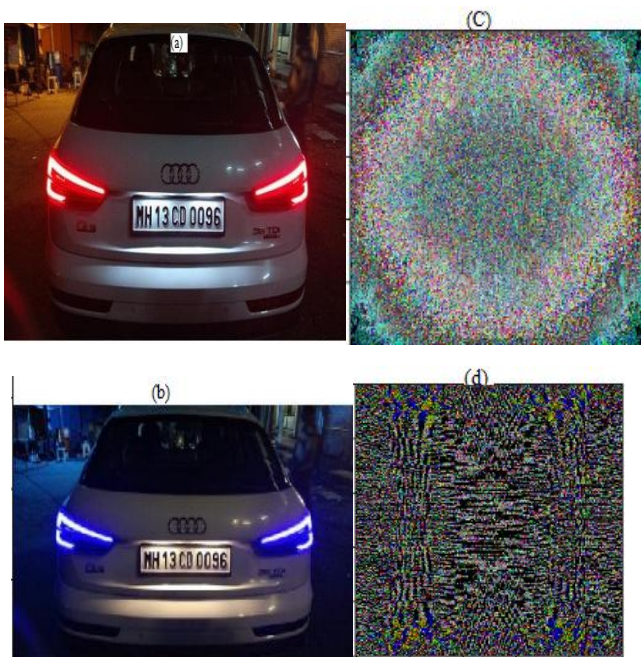


Fig. 5.(a) Vehicle image is captured in night mode (b) Preprocessed input image (c) Signal image of given input (d) Using QLD, shows contrast-to-noise ratio image of night mode image.

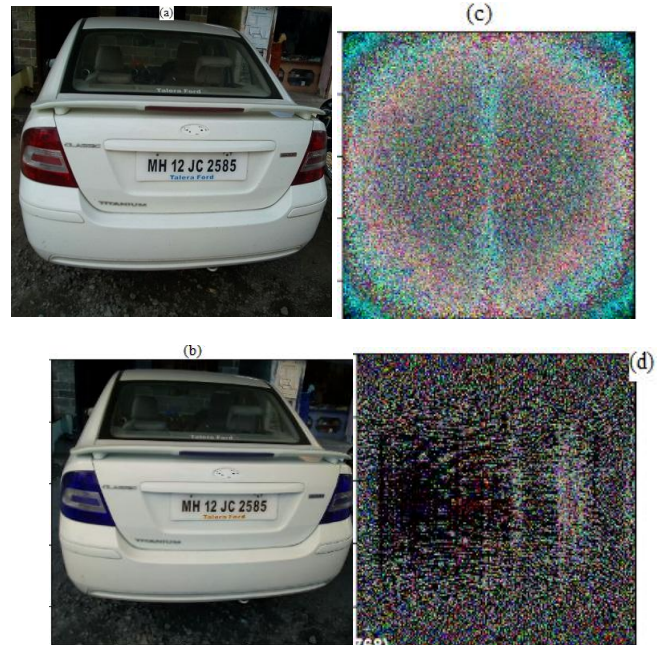


Fig. 6.(a) Vehicle image is captured in light medium (b) Preprocessed input image in scattering medium (c) Signal image of light scattering medium (d) Processed image by applying QLD, shows contrast-to-noise ratio image in light medium.

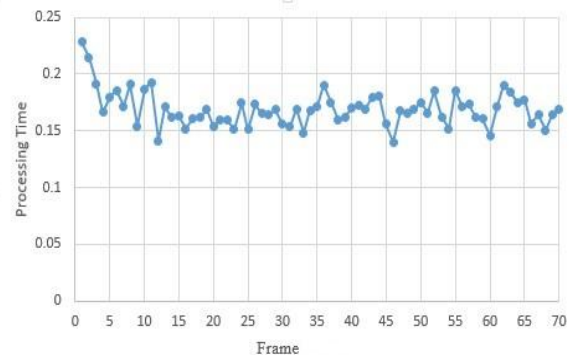


Fig. 7. Processing time per frame of Images.

VI. CONCLUSION

Programmed vehicle leaving framework is significant factor in the rush hour gridlock regions. It tends to be mechanized without sole. It diminished the well time usage. Along these lines, by executing our transport medium framework utilizing surveillance camera and RFID, Person car can be effectively left and also deal with user-time. Data identified with amount of contemporary accessible car parks areas inside stopping region. It able to be manageable to client. The web server is giving data to the client for access to the car parks areas. It can get infuriating by thinking that the client will leave the transport medium. As of the IoT, records can be functioned worldwide so purloin transport medium can also be identified. In future work, Machine learning can be used to automate the process of parking allocation. The system will be able detect people entering the institution without helmet.

REFERENCES

1. Monika. M, Yuvaraju. M, "IoT based vehicle parking place detection using Arduino," IJESRT, 2017, ISSN: 2277-9655.
2. Akhil Khare, S. B. Tatala, "Real Time ANPR for Vehicle Identification using Neural Network," IJAET, 2011, Vol 1, Issue 4.
3. Shipra Ojha, Sachin Sakhare, "Image Processing Techniques for Object Tracking in Video Surveillance- A Survey," IEEE, 2015, DOI: 10.1109.
4. Akhil Khare, S. B. Tatala, "Character Recognition & Transmission of Characters through Network Security," IJAET, 2011, Vol 1, Issue 5.
5. Dr. M. S. Ali, S. R. Sakhare, "Genetic Algorithm Based Adaptive Scheduling Algorithm for Real Time Operating Systems," IJESA, 2012, Vol.2.
6. D.Sathya, S.Kumaresan, "Smart-parking system based on RFID AND GSM TECHNOLOGY," IJSER, 2017, Volume 8, Issue 5.
7. K.Sushma P. Raveendra Babu, J. Nageshwara Reddy, "Reservation Based Vehicle Parking System Using GSM and RFID Technology," IJERA, 2013, Vol. 3, Issue 5.
8. G.Kiruthikamani, B.Abinayaa, B.Saranya, P.Devi, R.Gayathri, "Smart Vehicle Safety System Using Arduino," IJTRD, 2016, Vol. 3, Issue 6.
9. Pampa Sadhukhan, "An IoT-based E-Parking System for Smart Cities," ICACCI, 2017, DOI:10.1109.
10. Ivan Ganchev, Zhanlin Ji, Li Zhao, Xueji Zhang, Máirtín O'Droma, "A Cloud-Based Car Parking Middleware for IoT-Based Smart Cities: Design and Implementation," MDPI, 2014, ISSN: 1424-8220.
11. Sagar Kawthankar, Chinmay Raut, "A Survey on Smart Automobiles using Internet of Things for Digital India," IJRTER, 2017, DOI: 10.23883.
12. Akansha, Shrivastava, Lokesh VK, "Smart and Secured Parking System," IJARCSSE, 2016, Vol. 6, Issue 6, ISSN: 2277 128X.
13. . DharmaReddy, A. RajeshwarRao, Dr. Syed Musthak Ahmed, "An Intelligent Parking Guidance and Information System by using image processing technique," IJARCCCE, 2013, Vol. 2, Issue 10, ISSN: 2319-5940.
14. Frederick Hayes-Roth, "Rule-Based Systems," Communications of the ACM, Vol. 28, Issue 9, pp.921-932.
15. A. Diyanat, A.N. Avanak, S. Sodagari, "Optimum Parameter Estimation for Non-Local Means Image De- Noising Using Corner Information," IEEE, 2008, pp. 861-863.
16. J. Malik, P. Perona, "Scale Space and Edge Detection Using Anisotropic Diffusion," IEEE, 1990, Vol. 12, pp. 629-639.
17. F. Kruggel, X. Descombes, D.Y. Von Cramon, "Spatio-temporal fMRI analysis using Markov random fields," IEEE, 1998, Vol. 17, ISSN: 0278-0062.
18. J.S. Sahambi, C.S. Anand, "MRI Denoising Using Bilateral Filter in Redundant Wavelet Domain," IEEE, 2008, DOI: 10.1109, ISSN: 2159-3442.
19. A.J. Den Dekker, J. Sijbers, D. Van Dyck, P. Scheunders, "Maximum-Likelihood Estimation of Rician Distribution Parameters," IEEE, 1998, Vol. 17, pp. 357-361, ISSN: 0278-0062.
20. Mr. G. T. Sutar, Prof. Mr. A.V. Shah, "Number Plate Recognition Using an Improved Segmentation," IJRSET, May 2014, Vol. 3.
21. Y.-T. Tsai, H.-C. Shih, and C.-L. Huang, "Multiple human objects tracking in crowded scenes," IEEE, 2006, Vol. 3, pp. 51-54.
22. H. K. Galoogahi, "Tracking groups of people in presence of occlusion," IEEE, 2010, pp. 438-443.
23. Sriram Sudarsanam, James Mathew, Swapnesh Panigrahi, Julien Fade, Mehdi Alouini, Hema Ramachandran, "Real-time quadrature lock-in discrimination imaging through scattering media," Optics (physics.optics), Cornell University, November 2015, arXiv:1511.03390.
24. S. Johnsen and A. Tews, "Real-time object tracking and classification using a static camera," IEEE, 2009, DOI: 10.1.1.576.7164.
25. Tomas Fabian, "An Algorithm for Parking Lot Occupation Detection," IEEE, 2008, DOI: 10.1109/CISIM.2008.53.
26. M.A.R. Sarkar, A.A. Rokoni, M.O. Reza, M.F. Ismail, "Smart Parking system with image processing facility," IJISA, 2012, vol. 3, pp. 41-47.
27. Faycal Bensaali, Xiaojun Zhai, Reza Sotudeh, "Real-Time Optical Character Recognition on Field Programmable Gate Array for Automatic Number Plate Recognition System," IEEE, 2013, Vol. 7, pp. 337-344.
28. Tooraj Rajabioun, Petros A. "Ioannou On-Street and Off-Street Parking Availability Prediction Using Multivariate Spatiotemporal Models," IEEE, 2015, Vol. 16, Issue. 5.
29. S. J. McKenna, H. Wechsler, A. Rosenfeld, S. Jabri, Z. Duric, "Tracking groups of people," 2000, Vol. 80, pp. 42-56.
30. R. Girshick, J. Malik, T. Darrell, F. Iandola, "Deformable Part Models are Convolutional Neural Networks," 2014, CVPR, arXiv:1409.5403.
31. Pletl Szilveszter, Gálfí Csongor, "Parking surveillance and number plate recognition application," 2010, IEEE.

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