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CROWD MANAGEMENT SYSTEM USING IOT

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Abstract:- With the ever growing global population, crowding in public transport is becoming an increasing menace. Public transport systems around the world have remained largely the same over the past several decades although the population they serve has burgeoned. This paper aims to demonstrate a low cost IoT based solution to the crowding problem by using smart seats that can detect and display the seat occupancy status in real time over an internet or mobile application.

Keywords:-Crowd management system , IoT, Real-time, Sensors.

I INTRODUCTION

From the different applications mentioned until now, the detection of crowded areas has been chosen as the research topic for this thesis. This decision has been motivated by the fact that there are different researches focused on the creation of systems thought to perform in crowded areas, but they do not specify what is considered"crowded". Due to this fact, an investigation of the existent literature about the detection of crowded spaces was carried out. The findings were that it was limited, and in the existing research, the threshold to distinguish "crowded" and "not crowded" situations were arbitrarily established by the researchers. In consequence, in this project it is desired to create a method that detects if a place is crowded or not, calculating the threshold to split those situations using mobility data.

II OBJECTIVES

- To determine if the place is crowded or not using mobility data of the devices.

III LITERATURE REVIEW

Sr. no	Title	Authors	Summary	Remark
1.	A Low Cost IOT Based Crows Management System for public Transport	Vidyasagaran, S., Devi, S. R., Varma, A., Rajesh, A., & Charan, H. (2017). A low cost IoT based crowd management system for public transport. 2017 International Conference on Inventive Computing and Informatics (ICICI),1–13. https://doi.org/10.1109/icici.2017.8365342.	The study presented the management of the crowd using iot method in which the crowd is managed by Mobile application.	This paper shows the crowd management system using iot devices like mobile phones. but, which application is developed and how it works for crowd management that is not written in that.

2.	Crowd Analysis For Congestion Control Early Warning system On Foot Over Bridge	Punn, N. S., & Agarwal, S. (2019). Crowd Analysis for Congestion Control Early Warning System on Foot Over Bridge. 2019 Twelfth International Conference on Contemporary Computing (IC3), 1–13. https://doi.org/10.1109/ic3.2019.8844927	The proposed congestion control technique exhibits quite significant results on the proposed dataset made from the virtual simulation of FOB (foot over bridge) scenario.	This paper proposes a software-oriented approach, Congestion Control Early Warning System (CCEWS), for congestion control with the help of object detection and object tracking technique. Object detection is performed by following the faster R-CNN architecture in which Google inception model is used as a pre-trained CNN model and with Tt the help of proposed object tracking technique the crowd abnormality is analyzed.
3.	Vehicular Crowd Management : An IOT Based Departure Control And Navigation System	Elbery, A., Hassanein, H. S., & Zorba, N. (2020). Vehicular Crowd Management: An IoT-Based Departure Control and Navigation System. ICC 2020 - 2020 IEEE International Conference on Communications (ICC),1–20. https://doi.org/10.1109/icc40277.2020.9148635	Large sport and entertainment events such as soccer games or concerts attract an immense number of fans, most of whom use personal vehicles to get to the event. Such a large number of cars presents a “vehicular crowd” that needs to leave in an organized, timely, and safe manner after the event. This crowd manage through vdc module and navigation system and local cameras.	In this Article, The proposed system collects network information from a variety of sensory devices: connected vehicles, smartphones, and traffic cameras. Then, it fuses this data to compute the current state conditions of each road link. Based on these parameters, the VDC module determines the allowable vehicle departure rates, and the navigation module computes the system-optimum routes for drivers to take.
4.	A Privacy-Aware Crowd Management System for Smart Cities	Santana, J. R., Sanchez, L., Sotres, P., Lanza, J., Llorente, T., & Munoz, L. (2020). A Privacy-Aware Crowd Management System for	In this paper, we describe a novel system architecture for real-time crowd recognition for smart cities and smart buildings that can be easily replicated. The described	The present paper shows the implementation of the system in two buildings, an airport and a market, as well as the results of applying a set of

	and Smart Buildings	Smart Cities and Smart Buildings. IEEE Access, 8, 135394–135405. https://doi.org/10.1109/access.2020.3010609	system proposes a privacy-aware platform that enables the application of artificial intelligence mechanisms to assess crowds' behavior in buildings employing sensed Wi-Fi traces.	classification algorithms to provide crowd management information. Here wifi traces technology used for this purpose but in case electricity failure occurs then its fail then this problem can be solved.
5.	A review on technological advancement in crowd management system	Sharma D, Bhondekar AP, Shukla AK, Ghanshyam C (2016) A review on technological advancements in crowd management. J Ambient Intell Humaniz Comput:1–11. https://doi.org/10.1007/s12652-016-0432-x	The study discussed the crowd modelling aspects during the planning of crowded scenarios, and the technological advancements in crowd data acquisition techniques(based on vision, wireless/ Radio frequency (RF) and web/Social-Media data mining technologies) during execution of crowded events.	The study represents a broad, but not Exhaustive overview of the recent technological Advancements in the area of crowd planning and monitoring techniques for an effective crowd management system.
6.	One M2M Architecture Based IOT Framework For Mobile Crowd Sensing In Smart Cities	Datta, S. K., Ferreira da Costa, R. P., Bonnet, C., & Harri, J. (2016). oneM2M architecture based IoT framework for mobile crowd sensing in smart cities. 2016 European Conference on Networks and Communications (EuCNC), 1–30. https://doi.org/10.1109/eucnc.2016.7561026	The Paper shows The futuristic smart cities must have the capabilities to withstand the growing challenges on the urban infrastructure in terms of public safety, resource management, co-operative mobility management and more. To tackle these challenges, the cities are increasingly using next generation information and communication technologies (ICT). A plethora of the ICT based innovations are taking place on a wide range of domains - (i) cloud and mobile edge computing, (ii) sensing and actuation, (iii) low power communication, (iv) mobile crowd sensing and (v) big data analysis. These can be united under the umbrella of IoT and Machine-to-Machine Communications	Mobile application development framework making crowd sensing applications context aware and a data driven approach for co-operative crowd sensing that creates actionable intelligence from raw data and deployment capabilities at cloud and edge computing platforms.

7.	A Survey On Mobile Crowd-Sensing And its Application In IOT Era	Abualsaud, K., Elfouly, T. M., Khattab, T., Yaacoub, E., Ismail, L. S., Ahmed, M. H., & Guizani, M. (2019). A Survey on Mobile Crowd-Sensing and Its Applications in the IoT Era. IEEE Access, 7, 3855–3881. https://doi.org/10.1109/access.2018.2885918	Mobile crowd-sensing (MCS) is a new sensing paradigm that takes advantage of the extensive use of mobile phones that collect data efficiently and enable several significant applications. MCS paves the way to explore new monitoring applications in different fields such as social networks, lifestyle, healthcare, green applications, and intelligent transportation systems. Hence, MCS applications make use of sensing and wireless communication capabilities provided by billions of smart mobile devices, e.g., Android and iOS-based mobile devices.	The aim of this paper is to identify and explore the new paradigm of MCS that is using smartphone for capturing and sharing the sensed data between many nodes.
8.	Priority based and secured traffic management system for emergency vehicle using IoT	Chowdhury, A. (2016). Priority based and secured traffic management system for emergency vehicle using IoT. 2016 International Conference onEngineering & MIS (ICEMIS), 1–60. https://doi.org/10.1109/icemis.2016.7745309	Intelligent Traffic System (ITS) is one of the most recent research topics in the Internet of Things (IoT). The ever increasing number of vehicles in modern cities it creates heavy traffic congestion. To reduce the traffic congestion, a number of research have already been done to provide a clear pathway to the emergency vehicles in the urban area. However, they often fail to meet the target travel time of an emergency vehicle set by the Department of Treasury and Finances Budget and Financial Management Guidance (BFMG). To address this issue directly, an innovative ITS system considering the priorities of emergency vehicles based on the type of an incident and a method for detecting and responding to the hacking of traffic signals have been proposed in this paper.	The mentioned system contain in the articles contain a number of smart devices those can communicate with traffic infrastructure eg. traffic signal.but the drawback is it is easily hacked by hackers so improve the security terms in that system is necessary.

9.	IoT-based Positive Emotional Contagion for Crowd Evacuation	Zhang, G., Lu, D., & Liu, H. (2020). IoT-based Positive Emotional Contagion for Crowd Evacuation. IEEE Internet of Things Journal,1. https://doi.org/10.1109/jiot.2020.3009715	In emergency evacuations, crowds often become congested and stampeded because of extreme panic, resulting in injuries and fatalities. Safety officers can spread positive emotions and reduce crowd panic by issuing information or appeasement, which is an effective way to ensure evacuation safety. However, how to deploy safety officers appropriately and maximize positive emotional contagion to cover the largest number of chaotic individuals is still a challenging problem. To solve this problem, we propose anIoT-based positive emotional contagion (IoT-PEC) method for crowd evacuation.	in this article implement a simulation system for crowd evacuation to visualize the results of positive emotion contagion. The proposed method can provide guidance for emergency response management.
10.	A Feedback Control-Based Crowd Dynamics Management in IoT System	Kawamoto, Y., Yamada, N., Nishiyama, H., Kato, N., Shimizu, Y., & Zheng, Y. (2017) . A Feedback Control-Based Crowd Dynamics Management in IoT System. IEEE Internet of Things Journal, 4(5), 1466–1476. https://doi.org/10.1109/jiot.2017.2724642	The paper proposed, The development of technologies related to the Internet of Things (IoT) provides a new perspective on applications pertaining to smart cities. Smart city applications focus on resolving issues facing people in everyday life, and have attracted a considerable amount of research interest. The typical issue encountered in such places of daily use, such as stations, shopping malls, and stadiums is crowd dynamics management	The objective of this paper is to present the proof-of-concept of control effectiveness of crowd dynamics management.
11.	UAV-Based IoT Platform: A Crowd Surveillance Use Case	Motlagh, N. H., Bagaa, M., & Taleb, T. (2017). UAV-Based IoT Platform: A Crowd Surveillance Use Case. IEEE Communications Magazine, 55(2), 128–134.	Unmanned aerial vehicles are gaining a lot of popularity among an ever growing community of amateurs as well as service providers. Emerging technologies, such as LTE 4G/5G networks and	We study the offloading of video data processing to a MEC node compared to the local processing of video data onboard UAVs. For this, we developed a testbed consisting of a local

		https://doi.org/10.1109/mcom.2017.1600587cm	mobile edge computing, will widen the use case scenarios of UAVs. In this article, we discuss the potential of UAVs, equipped with IoT devices, in delivering IoT services from great heights. A high-level view of a UAV-based integrative IoT platform for the delivery of IoT services from large height, along with the overall system orchestrator, is presented in this article.	processing node and one MEC node. To perform face recognition, the Local Binary Pattern Histogram method from the Open Source Computer Vision is used. The obtained results demonstrate the efficiency of the MEC-based offloading approach in saving the scarce energy of UAVs, reducing the processing time of recognition, and promptly detecting suspicious persons.
12.	Simultaneous Information and Energy Flow for IoT Relay Systems with Crowd Harvesting	Guo, W., Zhou, S., Chen, Y., Wang, S., Chu, X., & Niu, Z. (2016). Simultaneous Information and Energy Flow for IoT Relay Systems with Crowd Harvesting. IEEE Communications Magazine, 54(11), 143–149. https://doi.org/10.1109/mcom.2016.1500649cm	in this article shows the improvement in the energy efficiency of information transfer between small devices, we review state-of-the-art research in simultaneous wireless energy and information transfer, especially for relay-based IoT systems. In particular, we analyze simultaneous information and energy transfer from the source node, and the design of time-switching and power-splitting operation modes, as well as the associated optimization algorithms. We also investigate the potential of crowd energy harvesting from transmission nodes that belong to multiple radio networks. The combination of source and crowd energy harvesting can greatly reduce the use of battery power and increase the availability and reliability for relaying.	The study the represent crowd harvesting using iot device(real time devices) e.g radio devices instead of that they can use traffic sensors and other things for improvement.
13.	Crowd Management :	Boukerche, A., & Coutinho, R. W. L. (2019). Crowd Management:	The paper proposed, Governmental, scientific, and industrial initiatives are	It represents smart crowd management but they can use real time devices to

	The Overlooked Component of Smart Transportation Systems	The Overlooked Component of Smart Transportation Systems. IEEE Communications Magazine, 57(4), 48–53. https://doi.org/10.1109/mcom.2019.1800641	developing a new era of smart transportation systems, ambitiously aimed at overcoming the limitations of current transportation infrastructures. These initiatives are designed to cooperate safer, efficient, eco-friendly, and enjoyable transportation for people and goods in large urban areas. However, current research on smart transportation systems has neglected a fundamental building block: smart crowd management. In a smart transportation system, the smart crowd management component will be demanded for identifying and controlling the congestion that can occur during commutes and routine travel	enhance.
14.	Automated Crowd Management in Bus Transport Service	Meghana, A. V., Sarode, V., Tambade, D., Marathe, A., & Charniya, N. (2020). Automated Crowd Management in Bus Transport Service. 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC), 15–45. https://doi.org/10.1109/icesc48915.2020.9155692	This paper presents an Automated Crowd Management System using the algorithms of Machine Learning and IoT Technologies.	The proposed system has an accuracy of 93.09% and the time required to transmitting the crowd density to the bus stop is just a few seconds. This thus, provides commuters with a safe journey and helps them know about the live crowd density in a particular bus and help them plan accordingly as to which bus to board or look for an alternative mode of transport.

15.	Smart Crowd Control Management System For Light Rail Transit (LRT) 1	Goh, M. L. I., & Goh, J. E. E. (2019). Smart Crowd Control Management System For Light Rail Transit (LRT) 1. 2019 International Conference on Computational Intelligence and Knowledge Economy (ICCIKE), 1–29. https://doi.org/10.1109/iccike47802.2019.9004316 .	this study presents the integration of embedded system and different software applications to manage the crowd of all LRT1 stations platforms and trains intelligently	The developed system proves to be functionally acceptable in terms of suitability and accuracy, and highly functional in terms of security. Thus, the overall system is functionally acceptable as perceived by the respondents as manifested by the mean rating of 3.28
16.	A low cost IoT based crowd management system for public transport	Vidyasagaran, S., Devi, S. R., Varma, A., Rajesh, A., & Charan, H. (2017). A low cost IoT based crowd management system for public transport. 2017 International Conference on Inventive Computing and Informatics (ICICI), 15–55. https://doi.org/10.1109/icici.2017.8365342	This paper aims to demonstrate a low cost IoT based solution to the crowding problem by using smart seats that can detect and display the seat occupancy status in real time over an internet or mobile application.	The paper did not have any specified new techniques. this article totally depends on the mobile application.
17.	Demystifying the Crowd Intelligence in Last Mile Parcel Delivery for Smart Cities	Wang, F., Wang, F., Ma, X., & Liu, J. (2019). Demystifying the Crowd Intelligence in Last Mile Parcel Delivery for Smart Cities. IEEE Network, 33(2), 23–29. https://doi.org/10.1109/mnet.2019.1800228	The paper proposed,Advances in the Internet of Things, however, have enabled vehicle information to be readily accessible anytime anywhere, forming an Internet of Vehicles (IoV), which further enables intelligent vehicle scheduling and management	In this article, we seek novel solutions to improve the last mile parcel delivery with crowd intelligence
18.	Application of Cognitive Computing for Smart Crowd Management	Varghese, E. B., & Thampi, S. M. (2020). Application of Cognitive Computing for Smart Crowd Management. IT Professional, 22(4), 43–50. https://doi.org/10.1109/mitp.2020.2985974	This article discusses the human cognition capability and its application for smart crowd management..	The paper shows crowd management using a camera but instead of a camera we can use mobile application, radio technology and ITS technology, etc.

19.	Smart Waste Management System Using IOT.	Santana, J. R., Sanchez, L., Sotres, P., Lanza, J., Llorente, T., & Munoz, L. (2020). A Privacy-Aware Crowd Management System for Smart Cities and Smart Buildings. IEEE Access, 8, 135394–135405. https://doi.org/10.1109/access.2020.3010609	The described system proposes a privacy-aware platform that enables the application of artificial intelligence mechanisms to assess crowds' behavior in buildings employing sensed Wi-Fi traces.	This article give privacy used in mobile application .which technology used for privacy they not be specified in it.
20.	SCEM: Smart & effective crowd management with a novel scheme of big data analytics	Awaghad, S. (2016). SCEM: Smart & effective crowd management with a novel scheme of big data analytics. 2016 IEEE International Conference on Big Data (Big Data), 55–60. https://doi.org/10.1109/bigdata.2016.7840822	The proposed paper presents a novel scheme that can perform a precise extraction of knowledge from the complex and massive streaming of live data of the scene from the crowded place.	The prime contribution of the proposed system is to perform enough processing over the raw and unstructured distributed data from multiple locations so that processing over distributed storage and mining can be done with lesser processing time and higher degree of accuracy.

IV CONCLUSION

Traffic consumed by an app-based crowd management system.

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Hypothesis

1.traffic consumed by an app-based crowd management system.

2.server side application connected to IP cameras detects crowd level in crowd area.