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DESIGN OF INTELLIGENT AMBULANCE AND TRAFFIC CONTROL USING ARDUINO

[1]Mr.K.NAGA DASHARATH, [2]A.DIVYA, [3]B.TEJASWINI, [4]D.SRIJA

[1]Assistant Professor, Department of Electronics and Communication Engineering, Malla Reddy Engineering College For Women, Maisammaguda, Dhulapally Kompally, Medchal Rd, M, Secunderabad, Telangana.

[2,3,4]Student, Department of Electronics and Communication Engineering,MALLA REDDY ENGINEERING COLLEGE FOR WOMEN, Maisammaguda, Dhulapally Kompally, Medchal Rd, M, Secunderabad, Telangana.

ABSTRACT __Traffic congestion significantly impacts the transportation system in the country, particularly during emergencies at busy intersections.To address this issue, a congestion control system has been developed.This system activites when it detects a sign from an ambulance using radio freqency transmission and employs a microcontroller to revert to the normal traffic sequence after the emergency mode is initiated.By allowing other vehicles to clear the way for emergency responders, this system aims to alleviate the common problems faced at traffic light junctions.The project successfully implements wireless communication via RF trasmission within the traffic light control system for ambulances.Its primary goal is to automatically manage traffic signals in response to emergency situations.Future enhancements could focus on effectively managing real traffic congestion,thereby advancing existing traffic light technology.The current traffic control systems often have limitations due to their reliance on fixted timing methods.

I.INTRODUCTION

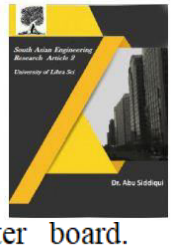
A. Introduction This project aims in designing a system which is capable of identifying the emergency situation in an ambulance and automatically controls the traffic at the signal point. This helps in decreasing the death rate which occurs mostly due to traffic congestion in emergency situation. The purpose of this project is to overcome the defaults in the normal traffic controlling system and to design a unique traffic controlling system to enter the KEYS which overcomes the problem of heavy traffic in the popular cities for AMBULANCE. And main objective of this project is to control the traffic, whenever any time any AMBULANCE is coming in that way by using RF TRANSMITTER

section to send the message to that RF receiver. RF receiver will receive the information given to the microcontroller, in that particular way green light will be ON for clearing the traffic and remaining other ways stopped by indicating red light. . The same procedure will be followed by all four sides of the road. The signaling from all the four sides will be taken into consideration. The Microcontroller is programmed using Embedded C language which provides effective environment in performing the particular task.

II.LITERATURE SURVEY

J. Osborne, "Internet of things and cloud computing," Internet of Things and Data Analytics Handbook, pp. 683-698, 2017.

Cloud and IOT are emerged with every human life. The IoT is the most important concept in Internet for providing a collective global IT platform to combine seamless networks and networked things. Cloud computing provides backend solution for processing huge data streams and computations while facing the challenges of connecting everything with seamless network. However, integrating cloud computing and IOT is not possible without any interference or issues. In this paper we provide the overall review about various cloud computing dominating fields in IoT and discussion about challenges and possible solutions for Future Internet (IF) under cloud computing. IoT means any device with any kind of built-in-sensors with the ability to collect and transfer data over a network without any interference. The emerged technology in the object helps them to interact with both internal and external environment. The IOT is a technology that allows us to add a device to an internal object that can measure environmental parameters, generate associated data and transmit them through a communications network. The Internet of Things (IoT) is the most important concept of Future Internet for providing a common global IT Platform to combine seamless networks and networked things. In the Future Internet, people will be connected related to anything, anyone, anytime, and anywhere, and properly using any service and any network [2], Additionally, the Internet of Things approaches the communication, computing, convergence, collections, content, and connectivity between things and people [3][4]. While facing the challenges of everything that is connected with seamless networks in the



future, the Cloud Computing is regarded as the backend solution for processing huge data streams and computations [5]. Cloud technologies can provide a flexible, efficient, scalable, and virtual data centre for context-aware computing and online service for enabling Internet of Things [6][7]. The IoT and Cloud computing are both rapidly developing services, and have their own unique characteristics. And the below table-1 describes the difference between IOT and Cloud Computing.

M. Maksimovi_c, V. Vujovi_c, N. Davidovi_c, V. Milo_sevi_c, and B. Peri_si_c, "Raspberry Pi as internet of things hardware: performances and constraints,» design issues, vol. 3, no. 8, 2014.

The Internet of Things (IoT) ideology can be looked as a highly dynamic and radically distributed networked system composed of a very large number of identifiable smart objects. These objects are able to communicate and to interact among themselves, with end-users or other entities in the network. Entering the era of Internet of Things, the use of small, cheap and flexible computer hardware that allow end-user programming become present. One of them, considered in this paper, is the Raspberry Pi, fully customizable and programmable small computer board. Comparative analysis of its key elements and performances with some of current existing IoT prototype platforms have shown that despite few disadvantages, the Raspberry Pi remains an inexpensive computer with its very successfully usage in diverse range of research applications in IoT vision. The Internet of Things – IoT, can be looked as a highly dynamic and radically distributed networked system. In other words, it is a system composed of a very large number of smart objects which are identifiable, able to communicate and to interact, either among themselves, building networks of interconnected objects, or with end-users or other entities in the network [1]. The presence of smart devices able to sense physical phenomena and translate them into a stream of information data, as well as the presence of devices able to trigger actions, maximizes safety, security, comfort, convenience and energy-savings [1, 2]. Since IoT systems will be designed, managed and used by multiple stakeholders, driven by different business models and various interests, these systems should [3]: • allow new applications to be built on top of existing systems, • allow new systems to be deployed in parallel with existing

systems, • allow an adequate level of interoperability, so that innovative and competitive cross-domain systems and applications can be developed. Mirjana Maksimović, Vladimir Vujović and Nikola Davidović are with the Faculty of Electrical Engineering, University of East Sarajevo, Vuka Karadžića 30, 71123 Istočno Sarajevo, Bosnia and Herzegovina (e-mail: mirjana@etf.unssa.rs.ba, vladimir_vujovich@yahoo.com, nikola.davidovic@gmail.com). Vladimir Milošević and Branko Perišić are with the Faculty of Technical Sciences, University of Novi Sad, Trg Dositeja Obradovića 6, 21000 Novi Sad, Serbia (e-mail: tlk_milos@uns.ac.rs, perisic@uns.ac.rs). Emerging trends of user programming give the opportunity to non-professional end-users of making additions to products, according to their specific needs. There are hundreds of products available today that allow end-user programming. Using inexpensive hardware and open source software, it is possible to programmatically control many devices in such a way that own solution meets user needs. Moreover, providing techniques to end-users and the possibility to shape products according to their needs is beneficial for both users and product developers. In this work, one of prototype platforms which enable end-user programming will be considered. An emphasis will be on Raspberry Pi computer board making a comparative study of its performances and constraints with current popular prototyping platforms [2]. The main goal of this research is to define and present advantages and disadvantages of Raspberry Pi and abilities of its usage in the development of the next generation of IoT. The rest of this paper is organized as follows. The description of Raspberry Pi, its core components, and detail comparison with other available IoT platforms are presented in Section 2. The last section provides conclusion remarks summarizing Raspberry Pi's advantages and disadvantages as IoT hardware.

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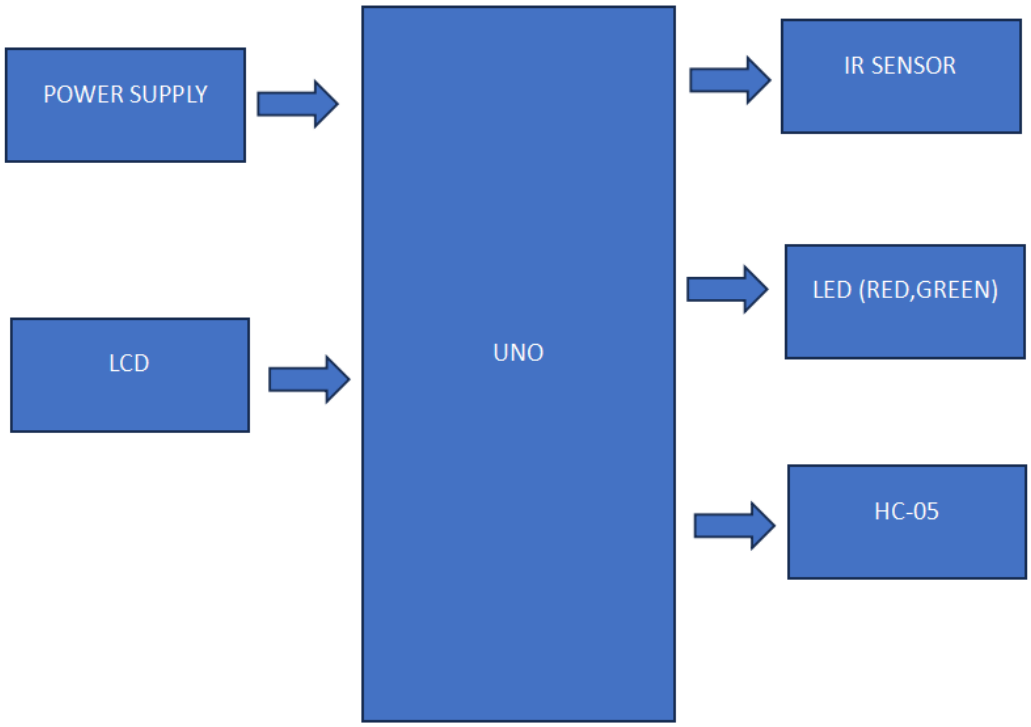
Block diagram



III.PROPOSED SYSTEM

The **Intelligent Ambulance and Traffic Control System** is designed to ensure rapid and smooth movement of ambulances through congested traffic by using Arduino-based automation and real-time traffic management techniques. The system aims to reduce the response time during emergencies by dynamically adjusting traffic signals and prioritizing ambulance movement, leading to more efficient healthcare services in critical situations.

1. Real-time Ambulance Detection:

The system employs a GPS module integrated with the Arduino microcontroller installed in ambulances. This module continuously tracks the location of the ambulance and communicates the data to nearby traffic control systems. When the ambulance approaches a traffic signal, the system automatically detects its proximity and prioritizes its movement by controlling the traffic lights in real-time.

2. Dynamic Traffic Signal Control:

The Arduino-based traffic control unit is connected to traffic lights at various intersections. When an ambulance is detected, the system dynamically changes the traffic signal to green in the direction of the ambulance, ensuring that it moves smoothly through traffic intersections. At the same time, it switches the signals in other directions to red, stopping other vehicles and giving the ambulance the right of way.

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3. IoT-based Communication:

To enhance coordination, the system uses an IoT communication module that allows real-time updates about the ambulance's location and the status of traffic signals. Data from the ambulance's GPS module is transmitted to a central cloud platform, where it is processed and used to optimize traffic flow across multiple intersections. This ensures that the ambulance follows the most efficient route to the hospital, bypassing congested areas.

4. Priority-based Lane Clearance:

The system also includes lane clearance functionality. By broadcasting an emergency signal, the system alerts vehicles near the ambulance, prompting them to move to the sides and clear a path for the ambulance. The traffic lights at intersections will remain green until the ambulance passes through, after which normal traffic control is restored.

5. Emergency Route Optimization:

The system provides real-time route optimization for ambulances by integrating with traffic monitoring systems that assess current traffic conditions. The Arduino microcontroller processes this data and suggests the fastest possible route to the hospital, taking into account traffic congestion, roadblocks, or accidents. This functionality helps ambulances avoid unnecessary delays and ensures that patients receive medical care promptly.

6. Traffic Control for Multiple Intersections:

In cases where the ambulance needs to pass through multiple intersections, the system coordinates with traffic control units at each intersection. As the ambulance progresses along its route, the system continuously updates the traffic signals ahead, ensuring a seamless and uninterrupted journey. This minimizes delays caused by traffic lights and maximizes the efficiency of the emergency response.

7. Central Monitoring and Alert System:

A central monitoring unit is established at the traffic control center, where the movements of ambulances are tracked in real-time. In case of any technical malfunction or if the ambulance deviates from its route, the system sends alerts to the monitoring unit, allowing authorities to take immediate corrective action. This ensures that the system operates smoothly, even in unexpected scenarios.

8. Scalability and Future Enhancements:

The system is designed to be scalable, allowing for the integration of additional vehicles, such as fire trucks or police cars, into the priority-based traffic management system. Future enhancements may include the use of artificial intelligence (AI) to predict traffic patterns and provide more accurate real-time traffic control, as well as integration with autonomous vehicle technology for fully automated emergency responses.

The **Intelligent Ambulance and Traffic Control System** leverages Arduino

technology and real-time communication to optimize the movement of ambulances in congested urban areas. By prioritizing emergency vehicles and managing traffic signals dynamically, the system ensures that medical aid reaches patients as quickly as possible, ultimately saving lives during critical situations.

IV.CONCLUSION

The Integrating of all hardware components has been carefully developed to ensure optimal functonality. Each modules has been thoughtfully placed, enhancing the overall performance of the system.Addionally , the use of advanced integrated circuits has leveraged current technological advancements, contributing to the project's successful implementation. Consequently, the system has been effectively designed and tested.

V.REFERENCES

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