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IoT based Automated Elevator System - using QR Code Functionality

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Abstract: ***Now, the coronavirus and other infectious virus has us evolving our perspective of the frictionless workplace because many of the solutions we've put in place so far have been reliant on touch technology that require navigation via touch, conference room booking screens outside of the door, uses of Lift or even biometric fingerprint scans. All of these conveniences start to look like health risks in light of the recent pandemic and other viral threats. With growing popularity of Smart Cities, there is always a demand for smart solutions for every domain. Lift is very common to us now days. The use of lift is expanding in different applications like they are used in carrying goods and carrying people vertically in tall buildings like offices, shopping malls and other skyscrapers. So we have decided to come up with a new idea which is helpful. It is tried to make it more automatic through our project. In our project we use python web application method is the method by which the lift can be controlled using mobile device. Also we applied the Internet of Things (IoT) technology to develop the smart Lift, we use an infrared sensor to sense certain characteristics of its surroundings by either emitting or detecting infrared radiation. It is also capable of measuring the heat being emitted by the objects. This smart lift application can monitor the traffic and decrease the time of the people. Based on this we could improve our living quality and health.***

Keyword: Internet of Things, IR sensor, web application, DC Motor, Node MCU

I. INTRODUCTION

The rapid development of science, technology and medical care, the life of human beings has become longer and longer. The developed countries in the world have gradually entered an aging society, especially in Japan and China. In the aging society, besides the long-term care problem, some problems caused by aging, such as Infectious disease like COVID-19, flu. Smart Lift are superior structures that permit automatic vertical transportation of products or passengers. As this system makes use of automation, it reduces the time and will increase visitor's performance in residential, business and different homes. Smart Lift system include new-age virtual protection device controls, i.e., biometrics, contact display, vacation spot dispatching & get entry to manipulate structures, which lead them to superior. Since the smart lift offer automatic functions and devour much less power. Moreover, decreased time of passengers, superior spending skills of clients in rising markets and standard development in international economies are a number of the principal using elements for the Smart lift marketplace. In spite of numerous benefits and using elements, considerable preliminary funding within side the setup of smart lift could restrict its presence, which in flip could adversely affect the worldwide marketplace growth. The international smart lift marketplace is segmented on the idea of solutions, programs and geography. Solutions phase gives unique records on exceptional devices, which can be utilized in smart lift including card primarily based totally structures, biometrics, keypad and touchpad, protection and access control systems, visitor management systems, sensors, motor drives and controllers building managements systems and many more. Historically, while the primary passenger elevators had been added within side the 1890"s, every vehicle became for my part managed via way of means of an attendant driving the vehicle. As constructing heights rose, however, so did the variety and velocity of the automobiles and it quickly emerge as not possible for the attendants to offer powerful coordination and manipulate.The utility phase makes a speciality of residential, business, industrial, institutional and others. Further, the marketplace is segmented in step with exceptional geographies. The international marketplace is intently tested via way of means of accomplishing studies throughout numerous geographies including North America, Europe, Asia Pacific and LAMEA. Automated or smart Lift employ Artificial intelligence (AI) to allow vertical transportation of commodities and passengers. Smart or related lift are more and more used in homes including hotels, residences, arenas, hospitals, sports facilities, towers, places of work and airports amongst others. These are designed a good way to limit standard power intake and manipulate passenger site visitors efficiently. Smart lift employ automation era and limit ready time via way of means of green site visitors control in business, residential and numerous different homes. Technologies integrated in those devices consist of biometrics, keypad get entry to and dispatching manipulate structures, virtual protection manipulate device and contact display manipulate amongst others. However, considerable preliminary prices of set up for smart lift restrict their use worldwide. Battery backup, alarm, door interlocks, levelling device, brake device with velocity sensor, evacuation latch and hearth place and earthquake emergency go back and lots of extra are all part of the lift manipulate device. With the advancement and innovation of

technology and changing building infrastructure these control systems are becoming all the more versatile in order to securely manage building traffic. The deployment of automation to the lift systems reduces the wait time, increases efficient management of the traffic in residential, commercial and institutional buildings. In the proposed system, python based web application are developing. Web application manage automatic lift system. The most striking feature of our proposed system is that of avoiding unnecessary stops at floors.

II. RELATED WORK

Ansari, I.S. [1] propose a Wireless ad-hoc sensor networks are those that comprise of entities (sensor nodes) that can connect, communicate and coordinate with each other with neither a centralized server no many pre-existing infrastructure. Evaluating the performance of Mobile ad-hoc wireless networks is important because it allows determining the types of applications that can be supported on such networks. BER (Bit Error Rate) of an average multi-hop route directly affects the ability of an ad hoc wireless network to support applications requiring a specific BER, for a given no de-transmission power and node spatial density. Given this feature, destination node can estimate stability of routes and can select the best and more stable route. Therefore we can reduce the delay and jitter of sending data packets. Furtado, H.; Trobec, [7], propose the network performance metrics evaluated in these studies are usually network layer related parameters such as packet delivery ratio, average end-to-end delay, and average hop count, and control packet overhead. Such Wireless sensor networks have been successfully deployed and have numerous applications in several fields such as Medicine. Zhi Sun, Pu Wang, Mehmet C. Vuran, Mznah A. Al-Rodhaan, AbdullahM. Al-Dhelaan, and Ian F. Akyildiz, [8] propose a typical wireless node is equipped with at least one sensor that could be as simple as a small thermistor or as complicated as miniature video capturing system; Military.

Shibata, Y.Sato, Y.Ogasawara, N. and Chiba, G. [9] propose the security checkpoints are set up on the international roads where all vehicle traffic is stopped to detect and apprehend illegal aliens, drugs, and other illegal activity. Each border troop watches and controls a specific section of the border. The troops patrol the border according to predetermined route and time interval. Under the conventional border patrol system, even modest-sized areas require extensive human resources if manual patrolling is considered alone; Environment monitoring. Chowdhury, M.U.; Perera, D.; Pham, T. [2] propose another application of wireless sensor networks is our elevator system. As our proposed elevator system communicates in a multi-hop manner, this means that every node (floor) can only communicate with its adjacent nodes (floors) only. All nodes are capable of being informed of each other‟s traffic through this technique of wireless multi-hop communication. The challenge in ad-hoc networks are the development of dynamic routing protocols that can efficiently finds routes between two communicating nodes. The routing protocols must be able to keep up with the high degree of node mobility, which effects rapid and unpredictable topology changes.

Daniel M. Munoz; Carlos H. Llanos[3] Propose the two basic algorithms that make the decision to stop the elevator car at a particular floor, called the dispatching algorithms, are (a) Based on the current direction of the elevator. (b) Based on the time of request from each floor. On the other hand, in the time-based approach, the requests are stored in a queue and ordered according to their time of arrival. Jianchang Liu; Yiyang Liu; [4] revolve around the objectives of either minimizing the consumption of power or minimizing the average waiting time for passengers. In the first approach, if the elevator is currently moving in a certain direction, it will stop at floors in its way that have requests in that direction only and will change direction once it serves them and if there are requests in the opposite direction. Yashaswini Jogi[10] develop a Wireless Sensor Networks to Implement Smart Elevator System. Smart elevator system utilizes a wireless multi-hop ad-hoc sensor network and will be simulated and prototyped depicting a building comprising of five floors. We emulate each floor using a single laptop to ease simulation and implement a graphical view of the system at work.

III. PROPOSED SYSTEM

In present lift systems, we have to touch lift's button to select the floor. Lift buttons and side rails are a potential risk if your hands become contaminated and you touch your face. In our system passengers can enter their destinations through their own mobile devices. We propose a system which having web application to reduce manual work. In this system we use Firebase cloud for mange the web application database. We use another three most important devices NodeMCU, Motor and IR sensor. The description of the system is as follows:

A. Python Web Application

This web application monitor the whole system which manually worked, for example lift buttons. Buttons are used for floor selection, lift dower on and off. This web application having Graphical User Interface so user can easily handle that application.

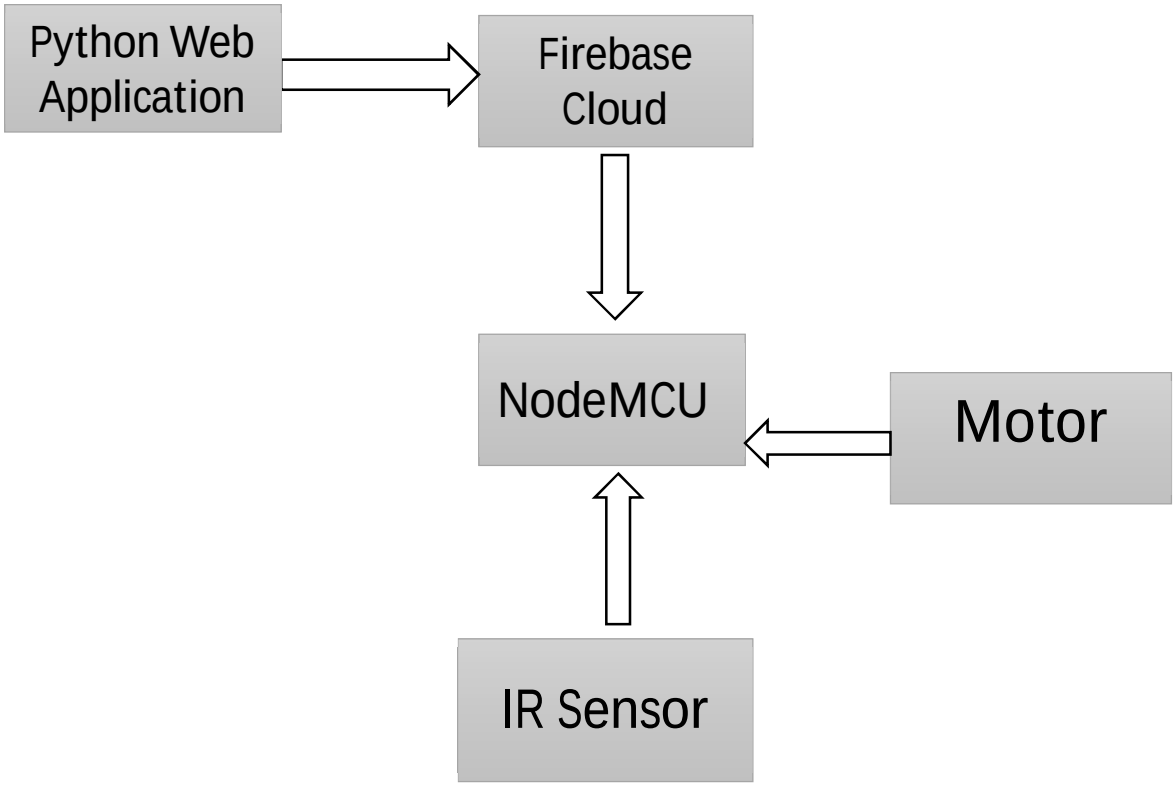

Fig. Architecture of proposed system

B. IR Sensors

They are now used in a variety of IoT projects, especially in Healthcare as they make monitoring of blood flow and blood pressure simple. They are even used in a wide array of regular smart devices such as smart watches and smartphones as well. Other common use includes home appliances & remote control, breath analysis, Infrared vision (i.e. visualize heat leaks in electronics, monitor blood flow, art historians to see under layers of paint), wearable electronics, optical communication, non-contact based temperature measurements, automotive blind-angle detection. In our system we are using an infrared sensor to sense certain characteristics of its surroundings by either emitting or detecting infrared radiation. IR sensor is used here to detect the lift on all floors. Each floor should have different IR sensor.

C. ***NodeMCU***

In our system we use NodeMCU. Since NodeMCU is an open-source platform, its hardware design is open for edit/modify/build. NodeMCU Dev Kit/board consist of ESP8266 Wi-Fi enabled chip. The ESP8266 is a low-cost Wi-Fi chip developed by Expressive Systems with TCP/IP protocol. NodeMCU Dev Kit has Arduino like Analog (i.e. A0) and Digital (D0-D8) pins on its board. It supports serial communication protocols i.e. UART, SPI, I2C, etc. Using such serial protocols we can connect it with serial devices like I2C enabled LCD display, Magnetometer HMC5883, MPU-6050 Gyro meter + Accelerometer, RTC chips, GPS modules, touch screen displays, SD cards, etc.

D. ***DC Motor***

The development of technology has brought many changes to the electric engines, increasing their performance and reducing power consumption and size. Electronic adjustments, introduced in the lifts since the 60s of the last century, have greatly increased the ride comfort by allowing the installation of faster and more comfortable lifts. Lifts used the expensive Ward-Leonard system (asynchronous motor connected to the power supply, mechanically coupled to a dynamo supplying DC to the motor connected to the winch or gearless motor). The speed control was achieved by varying the dynamo voltage. The first controllers provided for the variation via resistors which progressively varied the voltage armature of the d.c. motor, causing the

consequent and proportional speed control. This system, conceptually simple but with a very complex and expensive application, offered an excellent ride comfort even at high speed. When a current-carrying conductor is placed in a magnetic field, it experiences a torque and has a tendency to move. In other words, when a magnetic field and an electric field interact, a mechanical force is produced. The DC motor or direct current motor works on that principle. In the DC motor,

$$T = KI \text{ and } E = K\omega$$

Where, the supply voltage E and current I is given to the electrical port or the input port and we derive the mechanical output i.e. torque T and speed ω from the mechanical port or output port. Parameter K relates the input and output port variables of the direct current motor**.**

E. Firebase Cloud

The Firebase Real-time Database, which automatically synchronizes that data across devices. We build an Android app that stores data in the Firebase Real-time Database. Firebase has a free level of usage. We uses services of this cloud it is less than the limits specified in the Firebase free plan there is no charge for using Firebase. Setup Firebase Data Synchronization in Real Time with Just A Few Lines of Code. Build Fast For Any Device. For Mobile or Web Apps. So we are using firebase cloud to store data.

IV. FUTURE WORK

The smart lift or elevators gained industrial attention as all the leading elevator manufacturers have entered this market. Increasing land cost and growing popularity of high-rise buildings in densely populated countries accelerated the growth of the market. The launch of elevator systems integrated with techniques and touch less technology has revolutionized the overall smart elevator system. Other issues such as those related to security of wireless ad-hoc network of sensors, failure of nodes, information update delays in case of high-rise buildings, enabling emergency or manual interruption and controls etc. also need to be researched and analysed in order to come up with a completely robust and applicable solution of the smart lift system.

V. CONCLUSION

Smart lift plays an increasingly significant role in today's smart buildings. ESP8266 is the most popular controller to build IoT based applications as it has inbuilt support for Wi-Fi to connect to internet. Internet of Things (IoT) is a recent development in area of technology and can be used with the different python web applications to make them more reliable and smart in nature. Smart lift system is helpful to avoid physical contact with lift interface and other elements.

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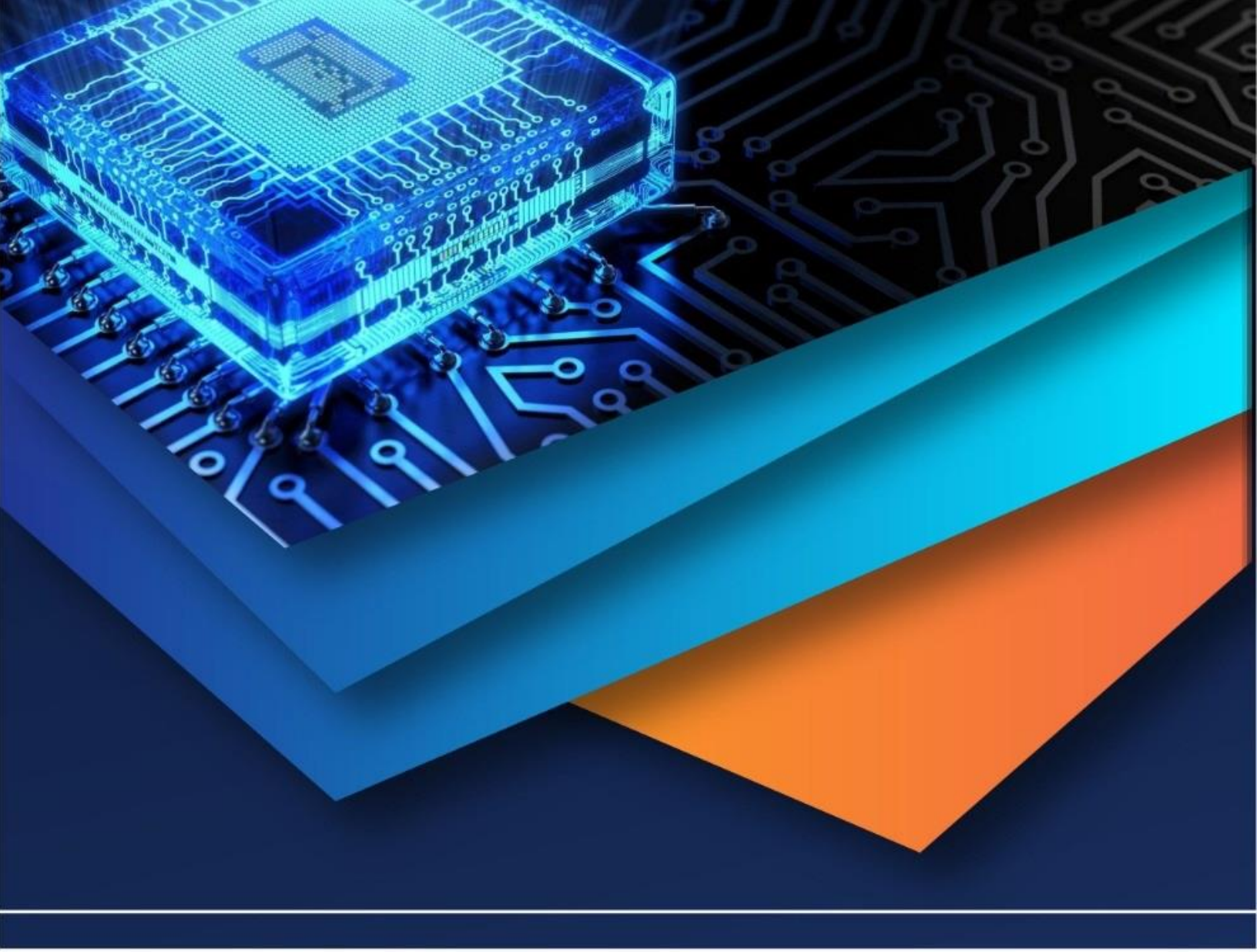

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