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Seat Detection System Based on Internet Of Things

A.Aishwarya, P.N.Navaneetha Krishnan
Department of Electrical and ElectronicsEngineering
KCG College ofTechnology
Karapakkam,Chennai-97
aishu.annamalai@gmail.com,pnnk.95@gmail.com

Thanu James
Assistant Professor, Department of Electrical and Electronics Engineering
KCG College of Technology
Karapakkam,Chennai-97
thanu.eee@kcgcollege.com

***Abstract*—The internet of things(IoT) is defined in many different ways, and it encompasses many aspects of life from connected homes and cities to connected cars and roads, roads to devices that track an individual's behavior and use the data collected for push services. IoT wants to connect all potential objects to interact each other on the internet to provide secure and comfort life for humans. IoT makes our world as possible as connected together. Our project focuses on to design a seat detection system to identify the vacant seats in a specified location. The system uses sensors, microcontrollers, keypad algorithm and wifi module to identify the vacant seats. The microcontroller sends data to the LCD to display the availability of seats. The wifi module is connected externally to the microcontroller from which the information is transferred to the cloud storage where information is displayed through the web pages and other smartdevices.**

Index Terms - Seat Detection, IoT, Microcontroller, Wifi module, keypad algorithm

I. INTRODUCTION

Locating a particular seat in an appreciably large auditorium can be a daunting task, particularly when the hall is only partially full and people are standing. Knowledge of vacant seats will be of immense help to audiences who do not have designated seats, and for those who do, it would help to know the exact status of the pre-assigned seat (occupied/vacant). Knowledge of seat occupancy will also provide event organizers with data about present seat occupation and attendance patterns over time. The Seat sense system also helps in detection of seats in stadiums, health patterns (how long people are seated), trains, busses, churches and smart homes. The system discussed in this project is a compact system which can fit into an upholstered seat/chair.

II. PROPOSEDSOLUTION

The main objective is to design a seat detection system for an area of conceivable capacity so that the identification of vacant seats will become easier in any partially filled location. By uploading the data into cloud the availability of seats can be viewed every moment which will be displayed through the LCD. The objectives of the project are asfollows

- To design a seat detection system which is suitable for many locations like busses, trains, auditoriums, seminar halls, class rooms, stadiums, theatersetc.
- Real time access of data in theinternet
- Checking the availability of seats through the internet

III. BLOCKDIAGRAM

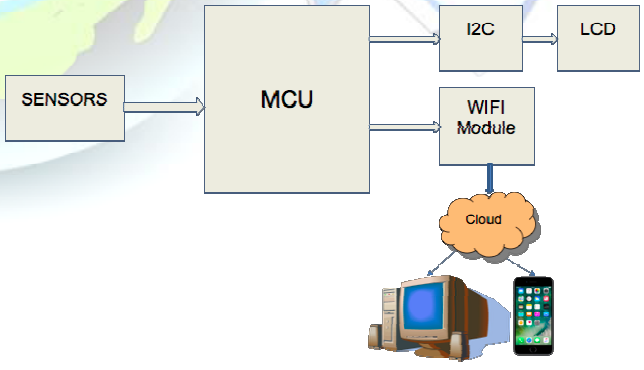

Figure 1

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1. DESCRIPTION

The figure 1 represents the block diagram. This project is implemented using pressure sensors, microcontroller, wifi module, I2C and LCD.

IV. CIRCUITDIAGRAM

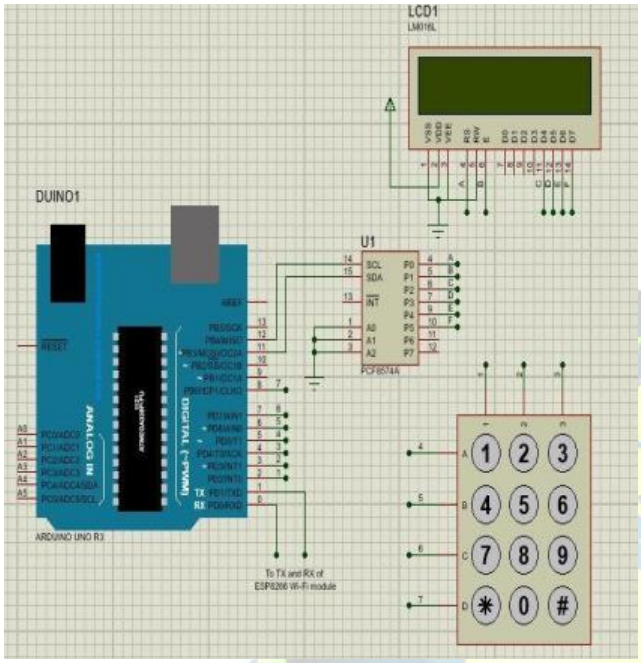

FIGURE 2: CIRCUIT DIAGRAM DESIGNED IN PROTEUS

V. COMPONENTS

1. Microcontroller

Arduinonano microcontroller has been chosen for this project. Arduino is an open source developing platform wherein the hardware and software are easy to use. The boards are capable of reading analog inputs like light on a photo resistor or a touch switch and can turn it into an output signal as per the programmers need like activating a relay, energizing a motor or uploading some data to the internet. Arduino has been a popular choice for different projects and appliances. The Arduino software is easy to use for beginners, and at the same time flexible enough for advanced users. It can be installed on any operating system like Mac, Windows and Linux. Arduino boards are very cheap yet powerful when compared to other microcontrollerplatforms.

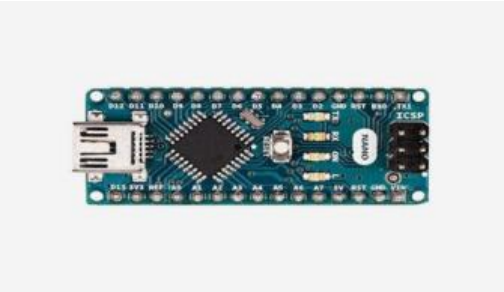

Figure 3 – Arduinonano microcontroller

2. Wi-FiModule

The ESP8266-01 is the Wi-Fi module used for this project. The ESP8266-01 is the smallest ESP8266 module and only has 8 pins. Of these VCC, GND, RST (reset) and CH_PD (chip select) are not I/O pins but are needed the operation of the module. This leaves GPIO0, GPIO2, TX and RX available as possible I/O pins, but even these have pre-assigned functions. The GPIO0 and GPIO2 determine what mode the module starts up in and the TX/RX pins are used to program the module and for Serial I/O, commonly used for debugging. GPIO0 and GPIO2 need to have pull-up resistors connected to ensure the module starts up correctly.

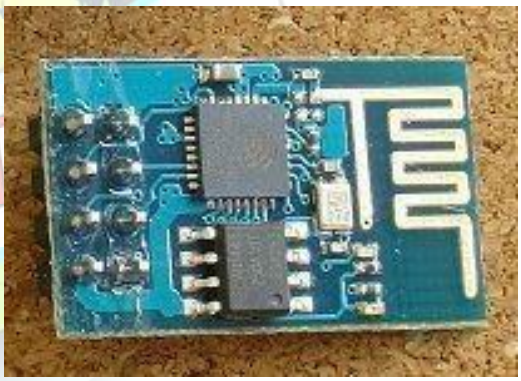

Figure 4 – ESP8266-01 Wi-Fi Module

3. Sensors

The sensor which is used in this project is a pressure sensor which in turn is a force sensing resistor. A force sensing resistor is a material whose resistance changes when a force or pressure is applied. The technology of force-sensing resistors was invented and patented in 1977 by Franklin Eventoff. In 1985 Eventoff founded Interlink Electronics, a company based on his force-sensing-resistor (FSR). In 1987, Eventoff was the recipient of the prestigious international IR 100 award for the development of the FSR. In 2001 Eventoff founded a new company, Sensitronics, which has become the

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leader in developing force-sensing resistor technology worldwide.

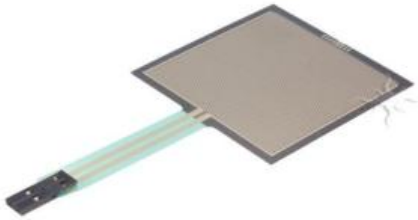

Figure 5 – Pressure sensor (FSR)

4. Liquid CrystalDisplay

The LCD used in this project is LM016L. The Hitachi HD44780 LCD controller is an alphanumeric dot matrix liquid crystal display (LCD) controller developed by Hitachi that was commonly used during the MCS-51 era. It was made commercially available around year 1987.The character set of the controller includes ASCII characters, Japanese Kana characters, and some symbols in two 28 character lines. Using an extension driver, the device can display up to 80 characters. Common sizes are one row of eight characters (8x1), and 16×2, 20×2 and 20×4 formats. Larger custom sizes are made with 32, 40 and 80 characters and with 1, 2, 4 or 8 lines. The most commonly manufactured larger configuration is 40x4 characters, which requires two individually addressable HD44780 controllers with expansion chips as a single HD44780 chip can only address up to 80 characters. A common smaller size is 16×2, and this size is readily available as surplus stock for hobbyist and prototyping work.

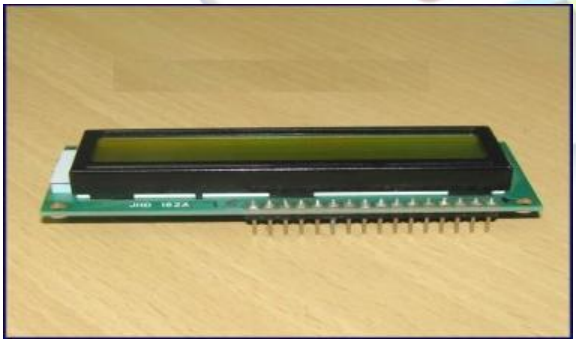

Figure 4: (16x2) LCD

5. I2C

The I2C is the Inter Integrated Circuit. It is typically used for attaching lower-speed peripheral ICs to processor and microcontrollers in short-distance, intra-board communication. I2C uses only two bidirectional open-drain lines, Serial Data Line (SDA) and Serial Clock Line (SCL), pulled up with resistors.

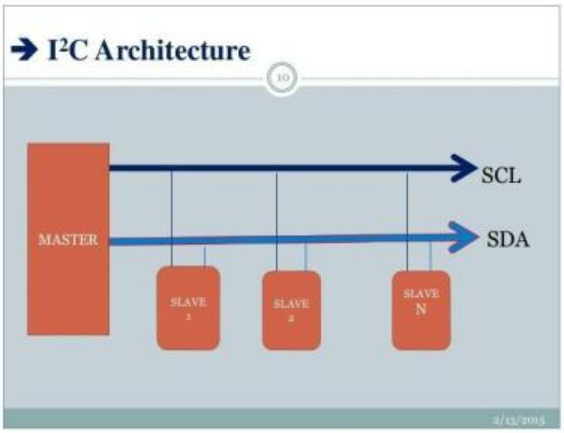

Figure 6 – I2C Architecture

6. IOTTechnology

The internet of things is the inter networking of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators and network connectivity which enables these objects to collect and exchange data. The term "Internet of things" was coined by Peter T. Lewis in a 1985 speech given at a U.S Federal Communications Commission (FCC) supported wireless session at the Congressional Black Caucus 15th Legislative Weekend Conference. In his speech he stated that "The Internet of Things (IOT), is the integration of people, processes and technology with connectable devices and sensors to enable remote monitoring, status, manipulation and evaluation of trends of such devices. The ability to network embedded devices with limited CPU, memory and power resources means that IoT finds applications in nearly everyfield.

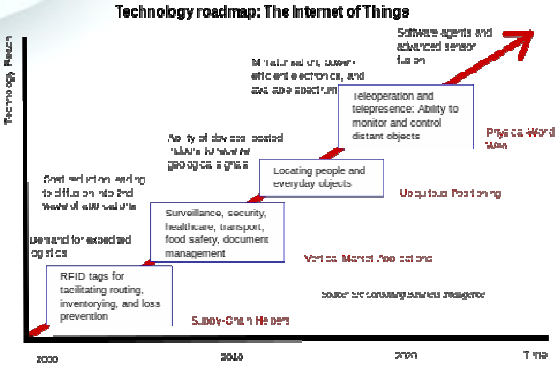

Figure 7 – IOT Technology

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VI. SIMULATIONRESULTS

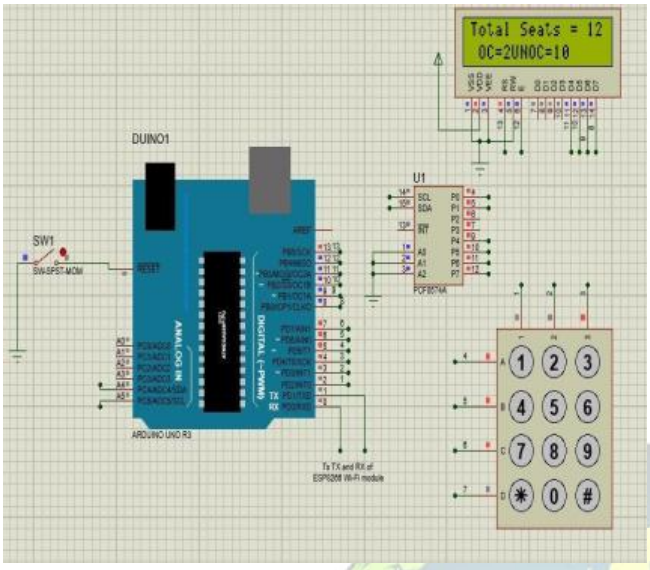

FIGURE 8 – SIMULATED RESULT IN PROTEUS

Thus the simulated result through Proteus software is shown above in the figure 8. Thus when a person occupies a seat, the pressure sensor senses the pressure/weight and transmits the data to the microcontroller which will send the status of the seat whether it is occupied or vacant is being sent to cloud and through cloud storage it has been displayed in web pages and other smart devices using the internet of things technology and it is also been display through LCD. This helps a person to quickly and easily identify the vacant seats in any specified location.

VII. CONCLUSION

This project uses only simple components and it is more reliable. Less power consuming microcontroller is used and moreover it does not use any expensive ICs or circuits, so in case if any problem occurs it will be easy to replace. It is very useful and has an efficient purpose in seminar halls, auditoriums and other areas of conceivable capacity. It helps us to identify the vacant seats easily and quickly. It not only displays the status of the seats in that particular area or location but also displays the status of seats in web-pages and smart devices using the internet of things technology which becomes easier for a person to check the availability or the status of the seats. The data in the cloud provides the details of the status of the seats. Hence this project serves as an efficient tool for detection ofseats.

VIII. REFERENCES

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