# IoT based Seating Alignment detection

**Abirami Rathina** **Monashree K**

*Abstract*— **Internet of Things (IoT) is a rapidly growing network of a variety of different 'connected things.' Use of IoT in academics is like a new wave of change that has brought new opportunities and possibilities for the improvement of both teaching learning process and educational institutions' infrastructure. A sensor is a device that converts one type of energy to another. The system proposed in this paper is an advanced solution for detecting whether the chairs in the lab class were arranged properly or not. The technology behind this is Internet of Things(IoT), which is an advanced and efficient solution for connecting the things to the internet and to connect to the entire world of things in a network. This is possible by ESP8266-01[3] with the Arduino IDE and interfacing with the Ultrasonic sensor. This project is divided into two parts that involve hardware and software. The hardware part involves building the ultrasonic sensor board and software part involves written programs based on C language.**

***Keywords—Internet of Things(IoT), Arduino Uno, Ultrasonic sensors, ESP8266-01, Embedded system***

## I. INTRODUCTION

The system spreads a spurt out ultrasonic sound waves and receives the echo. The time that is taken for the ultrasonic waves to spread out and to the distance that is travelled from system to target and back to the system precisely is measured by this structure. This is generally based upon the sound waves that are reflected.[2]

While in many products like playing helicopter, cars, and even in robots, the powerful DC motors are used. The Ultrasonic Sensor is used in this project which continuously spreads out ultrasound waves rapidly without any delay. The deliberate target is hit by the ultrasonic waves and these waves travel again to the ultrasonic sensor with known velocity. The temperature, improving consistency and accuracy do not much disturb the Ultrasonic sensor. During the World War 2, the idea of RADAR evolved.

In the air traffic control, air craft navigation and marine navigation, the radar systems are essentially used. Eight major nations developed their own radar systems independently during the period 1934-1939.

They are United Kingdom, Germany, the United States, the USSR, Japan, the Netherlands, France and Italy.

Arduino is a small microcontroller board with a USB plug to connect to the computer. The Arduino board senses the environment by receiving input from a variety of sensors and can affect its surroundings by controlling speakers, motors and GS module.

## II. LITERATURE SURVEY

1. IoT for wheel alignment monitoring system

In this work, smaller and portable wheel alignment monitoring system is introduced by using communication protocol between sensors, microcontroller and mobile phone application. Thus, graphical user interface (GUI) is utilized to the system via wireless communication technology using TCP/IP Communication Protocol. The system has been tested to suit the functioning architecture system for the wheel alignment to provide the user awareness on early detection of wheel misalignment. In addition, the application has been successfully integrated with Android mobile application via TCP/IP communication protocol and view the results in smart phone in real-time.

2. A Literature Survey On Obstacle Detection And Their Movement For Automobiles

The aspects of ultrasonic distance sensors from which we would be able to find the distance of the obstacle like potholes or humps and warn the driver so that the speed is decreased . Since there us also a collaboration of ultrasonic motion sensors, if any moving obstacles are noticed like animals or people trying to cross the road suddenly, the diver can be warned about it and hence the speed can either be decreased manually or by the automobile itself by the usage of Adaptive Cruise Control (ACC), where ACC is a system which uses an ultrasonic setup to allow the vehicle to slow when approaching another vehicle or obstacle and accelerate again to the pre-setspeed.

3. Investigation Of Wi-Fi (Esp8266) Module And Application To An Audio Signal Transmission

everything is moving toward the Internet of Things (IoT). Devices employ microchips connected to the internet. A lot of work is put in place when dealing with the manual configuration of devices. With this module, many IoT projects can be performed, one including the transmission of audio signals over a great distance, even up to 1 km. The paper encompasses a scope of study on wireless transmission, knowledge on audio sensors, modulation techniques and norms and protocols, through simulation on Fritzing and finally implementation using the ESP8266 module and the audio sensor. The project encompasses a scope of study on wireless transmission, knowledge on audio sensors, modulation techniques and norms and protocols, through simulation on Fritzing and finally implementation using the ESP8266 module and the audio sensor. The project presents a design and prototype implementation of new home automation system that uses WiFi technology as a network infrastructure connecting its parts. The proposed system consists of two main components; the first part is the server (web server), which presents system core that manages, controls, and monitors users' home. Users and system administrator can locally (LAN) or remotely (internet) manage and control system code. Second part is hardware interface module, which provides appropriate interface to sensors and actuator of home automation system.

## III. Implementation

***Components***

- Ultrasonic sensor
- Arduino Uno
- ESP8266-01
- Jumper wire
- Breadboard
- Power supply

## IV. Hardware Description

**Ultrasonic sensor:** The transmitter in the Ultrasonic Sensor spreads ultrasonic waves in a particular direction and the timing will be started when the waves are emitted. In the air, the ultrasonic waves are spread and the waves get returned immediately once it encounters any object in its path. When the reflected wave is received, the receiver in the ultrasonic sensor stops the timing that is started by the transmitter. The distance between the intended target and the transmitter is calculated by using the formula, s=340t/2, as the velocity of ultrasonic waves is 340m/s. This is called as the time difference distance measurement principle. The known air spreading velocity, i.e. by measuring the time for the waves from the time of transmitting to the receiving of the waves after the contact with the target and the distance is calculated by using time and velocity of the waves is the principle of ultrasonic distance measurement.


Fig 1: Ultrasonic sensor

**Arduino Uno:** Arduino Uno is a microcontroller board based on the ATmega328p. It has 14 digital input output pin (of which 6 can be used as PWM output) 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the micro controller, simply connect it to a computer with a USB cable or power it with an AC to DC adopter or battery to get started.

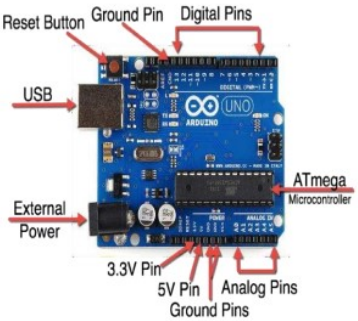


Fig 2: Arduino Uno

**ESP8266-01:** It is referred to as a standalone wireless transceiver, available at a very low price. It is used to enable the internet connection to various applications of embedded systems. It supports both the TCP/IP capability and the microcontroller access to any Wi-Fi network. It provides the solutions to meet the requirements of industries of IoT such as cost, power, performance, and design. There are different types of ESP modules designed by third-party manufacturers. They are,

- ESP8266-01 designed with 8 pins (GPIO pins -2)
- ESP8266-02 designed with 8 pins (GPIO pins -3)
- ESP8266-03 designed with 14 pins ( GPIO pins- 7)
- ESP8266-04 designed with 14 pins (GPIO pins- 7)

We are using ESP8266-01 for this project.

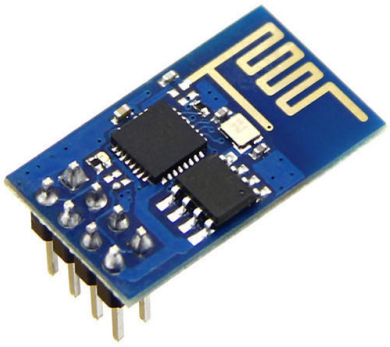

Fig 3: ESP8266-01

## V. Problem Statement

To detect whether the chairs in a row have been arranged or not, and send notifications through cloud to the server in lab.

## VI. Proposed Solution

In this technology, we make use of ultrasonic sensors which will be installed in front of each chair and when the distance is close enough, the chairs are said to be arranged.

## VII. Architecture

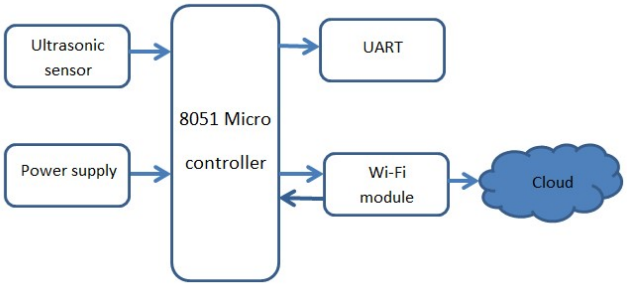


Fig 4: Block diagram

## VIII. Circuit Diagram

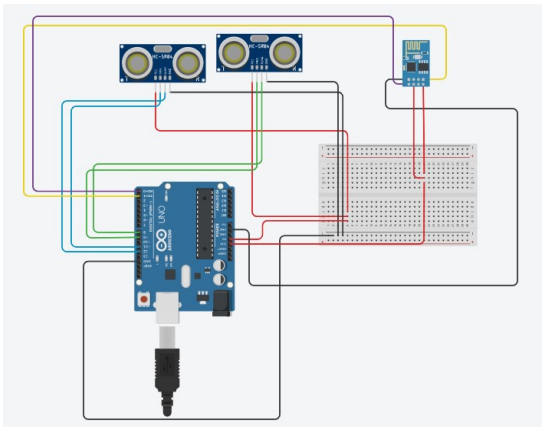

Fig 5: Circuit Diagram

## IX. Working Principle

If the distance between the chair and the ultrasonic sensor is less than or equal to 12cm, then the chair is considered to be arranged. Else it is not arranged. After determining whether the chair is arranged or not, the status is sent to the cloud database. By viewing the database, we can determine whether the chairs in a row are arranged or not.

We are using two ultrasonic sensors which will be connected to the arduino uno and the data collected is sent to the firebase database through ESP8266 -01 Wi-Fi module.

## X. Result

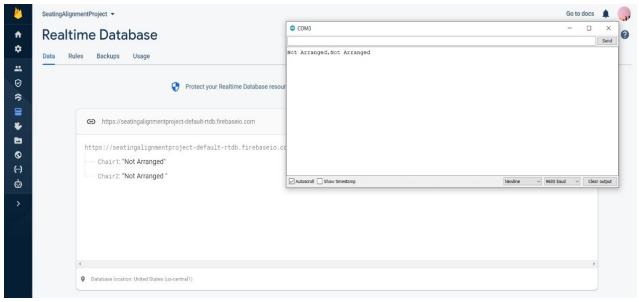


Fig 6: Output 1

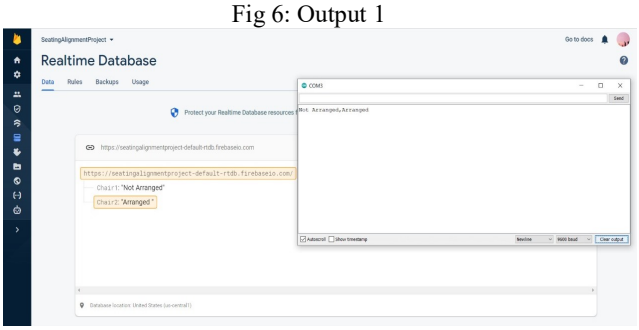


Fig 7: Output 2

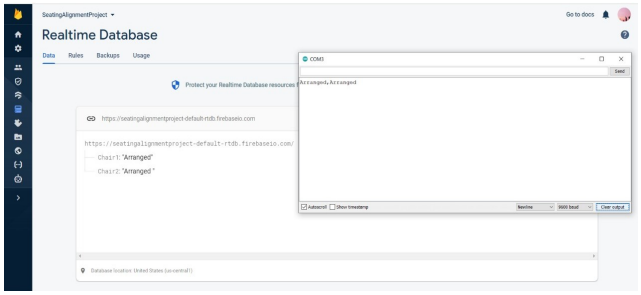


Fig 8: Output 3

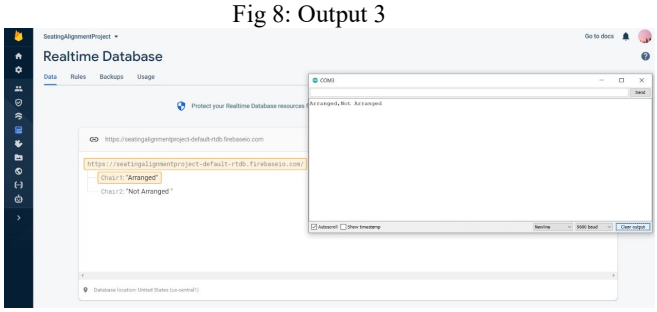


Fig 9: Output 4

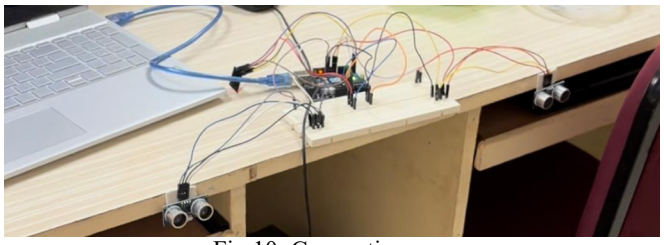

Fig 10: Connection

## XI. Conclusion

Therefore, by using our proposed system we can ensure whether the chairs have been arranged properly in any classroom setup. By making sure that the chairs have been arranged properly we can maintain a neat and organized environment.

## References


[1] https://www.researchgate.net/profile/Muhammad-Yasir-5/publication/345896193_A_Survey_on_Role_of_Internet_of_Things_in_Education/links/5fb11b8b92851cf24cd29ba7/A-Survey-on-Role-of-Internet-of-Things-in-Education.pdf

[2] https://d1wqtxts1xzle7.cloudfront.net/64076054/OBJECT%20DETECTION%20USING%20ULTRASONIC%20SENSOR-with-cover-page-v2.pdf?Expires=1654419711&Signature=QdAWbzIIme7Ljf7Ksu5JbX0Ag11FeNDMWGUEUfq50hF6U~aS2f-wFHqYjFRRofsqY~APkkm6Mui3hfHAsNMi45tCPCwRA0cehaSIq4qNbGl4sZDVImPdwLrsiSNFTJncD1V2470q8gTBfnw4RkNJMUlwPoQMhr1euq4IJnepDlnmbSBDkNIyJfE4XEIycDQyxv9gGuH6KRjYkwa-FX-TJv15-zvU91gMl7TBgLhzQyYE6Gbu4XDSIfTliMJU5XBEKGK62WWW0iTuGtYbJj1vp4~uG~en6JuqElg2XTuqLwyo5RsaIV-ZDM8oM4qhhQ67nAKXABQRjgZrafuoeTwCdg__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA

[3] https://www.elprocus.com/esp8266-wi-fi-module/