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Self Parking Wireless Chair for Laboratory

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Abstract: Automatic systems are developed for comfort of human's. Now a day's the requirement of physical work is greatly reduced. Since the technologies are advancing and many technologies have been developed for automation and are being used in our day to day life such as self parking cars that avoids accidents and provides the safety of the humans. We aim to create a chair that tends to parallel park itself. Nowadays we observe in the places like offices, labs and meeting halls after the completion of work people does not arrange their chair in the respective places, so it's mandatory that an employee has to arrange each and every chair to their respective places. It consumes time and requires human effort. In order to overcome this issue we have developed a chair with intelligent parking capability at minimal cost. Whenever the chair is given signal to align properly it will check for obstacle and if there is no obstacle then it locates the nearby available space and automates to self park and will reach to it by responding the signal given to it by using wireless technology. The self parking chair's whole process is controlled by using ATMEGA 328 and obstacle detection is done by using ultrasonic and infrared sensors. This self parking chair will be the unique solution to the problem of arranging the chair again and again. We can easily and quickly arrange the chairs in their respective places by giving signal to the chair. Employing this system requires no human effort.

Keywords: Arduino Uno, Ultrasonic Sensor, IR Sensor, Accelerometer, Motor driver.

I. INTRODUCTION

Now a day's we observe that in places like offices, labs and many facilities after completion of work, people does not arrange their chair to the respected places, so an employee has to arrange each and every chair which consumes more time and human effort is also wasted, to overcome this problem or we can say to reduce the human effort and save time we developed a chair which will work on the basis of self parking or we can say intelligent parking. We have come up with an idea which is more practical for the time being, self-parking office chairs. With a single click on a radio frequency switch, this self parking chair will automatically tuck themselves back into their rightful positions, thus keeping your office or meeting room neat and tidy. In self parking chairs the complete automation is controlled by the controller by using wireless technology. This paper gives the overall view about the automation used in the self parking chair and the techniques employed in the proposed system of self parking chair.

II. LITERATURE SURVEY

A. Siddharth Gauda, Ashish Panchal, Yograj Kadam, Prof. Ruchika Singh: *Intelligent Self-Parking Chair*. (2018)

This project is based on the inspiration of Nissan company which produced a chair with rotating axis of 360 degree and cameras which is capturing the movement of all the activities done by the chair and gives the command for the next action. It is an article published by the Japanese company NISSAN in the year of 2016 by Nancy Owano the project says that the chairs swinging into action, self-guiding to finally park at a table in response when a person clap's. These chairs can also reverse and turn. They were named "robo thrones." Japanese car manufacturer Nissan continues its foray into the world of robotics with a series of experimental motorized chairs that finds great application in offices. Nissan said that pulled this off, in step with Okamura; the latter is a furniture maker with a portfolio that includes business-ready furniture for offices and conference rooms.

B. Abhishek lalataprajapati, Ankitpatitram Yadav, Rahatullah. R. Khan, Mohsinmashood khan, Sadiqgoussayed: *Self Parking Chair*. (2018)

This paper describes a system or a product which will reduce the human efforts and save time through the use of Anisotropic Magneto resistive (AMR) technology that provides advantages over other magnetic sensor technologies. It is an system equipped with an magnetometer for navigation and a combination of ultrasonic for obstacle detection and avoidance during navigation. To increase the accuracy of the system we have to go with high precision sensors which will help it to navigate itself and correctly calculate its co-ordinate and identifying direction towards the destination. There are different methods to complete this product but this proposed method is very much efficient as the 3-Axis digital compass is used in it.

C. Ms. Honghong Liu : Automatic Parking Vehicle System (2016)

In this paper, an RC (remote-controlled) toy car is modified by integrating the ultrasound sensors and Arduino with a high current shield to control the vehicle movements and the parking processes. Parking strategies and the corresponding algorithms are explored and programmed through Arduino. During testing, the car is capable to move to detect the imitated “roadside” environment, judge a space suitable for parking or not, and then drive to park automatically. A 3D printer is utilized for building the parts.

III. PROPOSED SYSTEM

As in the modern world everything is going automatic, we built a system which will automatically sense the start and end point location. By giving the RF interrupt to the system by clicking on a wireless switch it arrange the chair in its original destination. If any obstacle comes between the chair and parking position ultrasonic sensor will detect the obstacle and IR sensor detects human beings if present and the chair will stop until the path is made clear. As soon as the obstacle moves the chair will automatically move to its parking position. Two motors and free wheels fitted to drive the wheels at its base, themselves which direct the chair position. The chair includes Ultrasonic sensors separately fitted with a chair to automatically move in search of a minimum distance with a system, that indicates the target location (default position). Thus microcontroller being a small device yet being very useful that can work efficiently in the system connected with RF Modules and Ultrasonic Sensor. Hence a RF transmitter switch can provide control signal with wireless communication to initiate the chair. The use of this chair in this modern world is to reduce human efforts and less manpower for tidying up rows of chairs.

IV. BLOCK DIAGRAM OF THE PROPOSED SYSTEM

The block diagram of proposed self parking chair is shown in fig.1. It consists of transceiver for switching, actuating unit, controlling unit, and sensing unit and displaying unit. The actuating unit consists of a set of motor driver and DC gear motor, controlling unit consists of Arduino Uno with ATMEGA 328, sensing unit consists of infrared sensor, ultrasonic sensor and accelerometer and displaying unit contains LCD display.

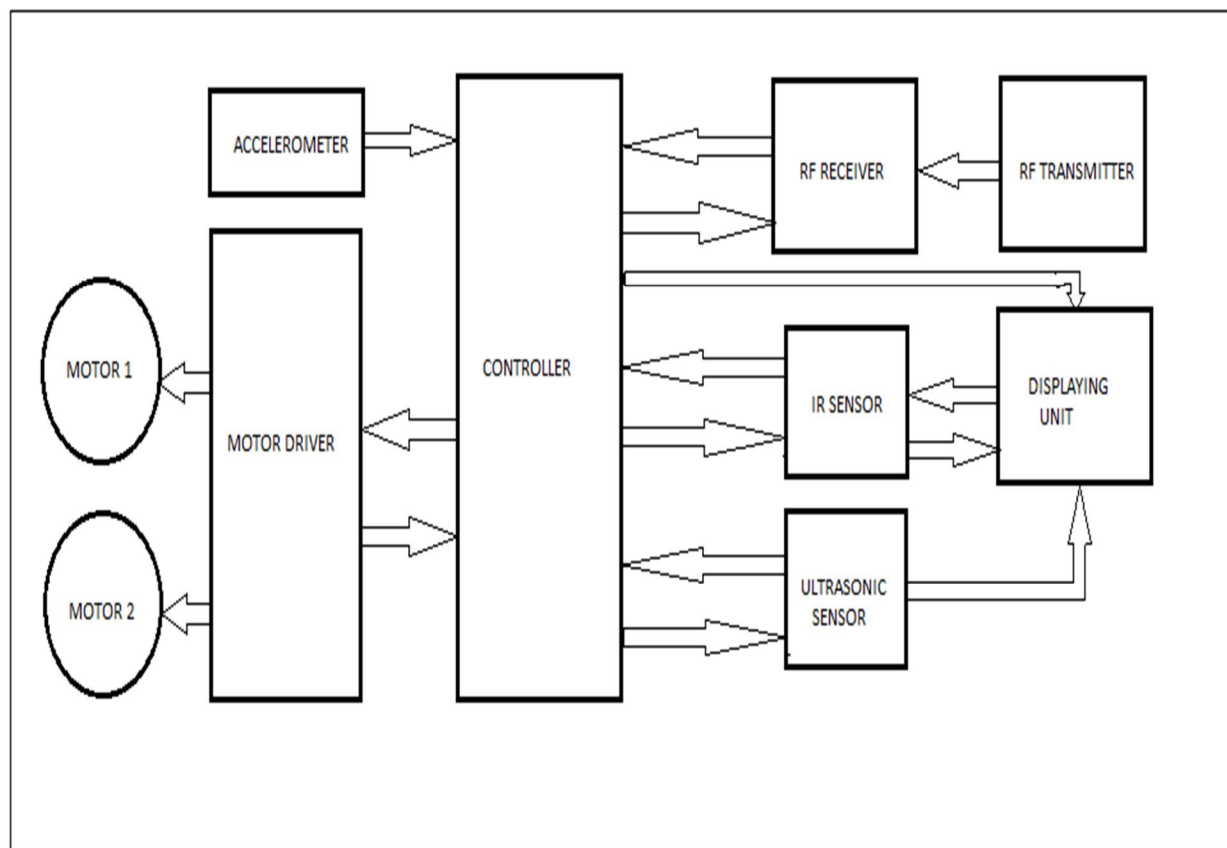


Fig.1 Block Diagram of the Proposed System

V. HARDWARE COMPONENTS

A. Ultrasonic Sensor

Ultrasonic sensor (shown in fig.2) is a very popular sensor used in many applications where measuring distance or sensing objects are required. The Ultrasonic transmitter could transmit an ultrasonic wave which travels in air and when it gets objected by any material or object it gets reflected back towards the sensor. The wave reflected back from the object is observed by the Ultrasonic receiver module. Considering the travel time and the speed of the sound the distance can be calculated. Here ultrasonic sensor is used for the purpose of obstacle detection.



Fig.2 Ultrasonic Sensor

B. IR Sensor

An infrared sensor (shown in fig.3) is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor not only measures the heat of the object but also the motion of the object. This type of sensors could measure infrared radiations only, rather than emitting it hence called as a passive IR sensor. IR sensor is used here for the purpose of detecting human beings.



Fig.3 IR Sensor

C. Battery

The battery used here is lead acid battery since they are rechargeable. Lead acid battery uses sponge lead and lead peroxide for the conversion of the chemical energy into electrical power.

D. Accelerometer

ADXL335 (shown in fig.4) is a 3 axis accelerometer with on board voltage regulator IC and signal conditioned Analog voltage output. The module is made up of ADXL335 from the analog devices. The accelerometer can measure the acceleration with a minimum full scale range of ± 3 g (gravity). It can also measure the static acceleration of gravity in tilt sensing applications, dynamic acceleration resulting from motion, shock, or vibration and also in many other applications.



Fig.4 Accelerometer

E. L293D Driver

A motor driver is a small current amplifier whose function is to take a low-current control signal as input and then turn it into a higher-current signal that can drive a motor. The L293D is an efficient motor driver which can drive 2 DC motors simultaneously. Microcontrollers operate at low voltages and require a small amount of current to operate whereas the motors require a relatively higher voltages and current. The current cannot be supplied to the motors from the microcontroller, so motor drivers are used.

F. Arduino Uno with ATMEGA 328

The Arduino Uno is a microcontroller board based on the ATmega328 (shown in fig.5). Arduino is an open-source, prototyping platform. The Arduino Uno differs from all the other preceding boards that it does not use the FTDI USB-to-serial driver chip. Instead, it features the ATMEGA microcontroller chip programmed as a USB-to-serial converter. It contains everything needed to support the microcontroller.



Fig.5 Arduino Uno with ATMEGA 328

VI. HARDWARE MODEL OF THE PROJECT

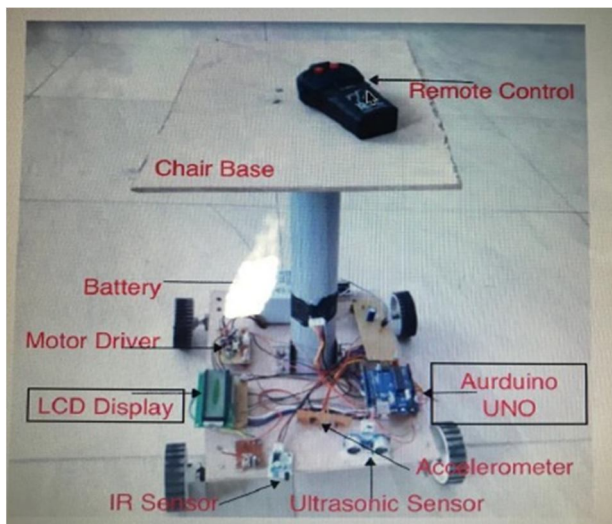


Fig .6 Hardware Model of the Project

VII. OUTPUT

When the remote is operated to ON position the chair analyses the space in all directions with the help of sensors, then chair check for clearance in its path and if it detects any obstacle or the human in the nearest surroundings then the LCD displays 'HUMAN FOUND' and the chair does not move further. The chair, then moves in the different direction to park itself in parallel with the table. Distance from the table is displayed until the chair is parked in its respective position. Table1. Shows the input and output status of the self parking chair when the circuit is initiated.

Table 1: Output and Input Status of the Self Parking Chair

Status	Output operation status
ON	Chair moves to the destination
Error Or Obstacle	Led displays HUMAN FOUND
NO obstacle	It will proceed and locate

VIII. CONCLUSION

The designed low cost self parking chair is based on the wireless automation system. The proposed system detects the obstacle and waits for obstacle clearance to move to its desired position. In this chair we will be using RF input to provide interrupt signal, which will feed data to the ATMEGA 328 microcontroller on the Arduino Uno that will control its motors. This system can be enhanced in such a way that if it detects any obstacle it can alter the position by itself towards the path to reach the destination without waiting for obstacle clearance by using image processing technique. This system automatically arrange the shuffled chairs to their respective position with the 360 degree rotation in certain situations. By employing this automation, the chair arrangement can be done in different patterns as per the requirement through programming and can perform a smooth and efficient parking behaviour according to the relative positions of the chair and the parking space. If obstacle is predicted it is programmed only to display as “HUMAN FOUND” it will not mention what type of object it is. The proposed system has the greatest advantage of being less expensive so that it is affordable to the firms of all level .Since the system is simple monitoring of system operation is quite easy. The self parking chair finds it difficult to rotate 360 degree for locating its parking position in certain situations, so it may be considered for future work. This system leads to the development of automation in furniture and will be included in the robotics.

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