Real-time/Field-Based Research Project Report
On
Voice enabled Smart chair

A dissertation submitted to the Jawaharlal Nehru Technological University, Hyderabad in partial fulfilment of the requirement for the award of degree of

BACHELOR OF TECHNOLOGY IN INFORMATION TECHNOLOGY

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Department of Information Technology

CVR COLLEGE OF ENGINEERING

(An UGC Autonomous Institution, Affiliated to JNTUH, Accredited by NBA, and NAAC)

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Ranga Reddy (Dist.) - 501510, Telangana State.

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DEPARTMENT OF INFORMATION TECHNOLOGY

CERTIFICATE

This is to certify that the project work entitled **"Voice enabled Smart chair"** is being submitted by **T.Chidwila(22B81A1271) , V.Ujwala(22B81A12C2), D.Vaishnavi (22B81A12C3)** in partial fulfilment of the requirement for the award of the degree of **Bachelor of Technology and Engineering** in **Information Technology,** during the academic year 2023-2024.

Professor-in-charge RFP **Professor and Head, IT**

(Dr.Bipin Bihari Jayasingh)

DECLARATION

We hereby declare that this project report titled "**Voice enabled Smart chair**" submitted to the Department of Information Technology and Engineering, CVR College of Engineering, is a record of original work done by us. The information and data given in the report is authentic to the best of our knowledge. This RFP report is not submitted to any other university or institution for the award of any degree or diploma or published at any time before.

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1.Abstract

The Internet of Things (IoT) encompasses a network of physical devices embedded with sensors, software, and actuators to detect signals and execute necessary actions, facilitated by electronic components and network connectivity for data exchange with other connected devices. These devices, often referred to as smart devices, operate remotely and can transmit data to cloud platforms or databases. The IoT concept finds application across diverse domains including residential, commercial, educational, healthcare, and national security sectors. This project details the development and deployment of a voice-controlled smart chair leveraging IoT technology to enhance user comfort and optimize space utilization. By integrating sensors, actuators, and IoT connectivity, the smart chair responds to voice commands by moving a predetermined distance. The system incorporates voice detection sensors and IoT communication for seamless real-time data exchange and control. This

innovative solution offers enhanced convenience, efficiency, and adaptability across various settings such as offices, residences, and public seating areas.

2. Introduction

2.1 Motivation

The motivation behind the development of the voice-controlled smart chair leveraging IoT technology stems from a desire to enhance user comfort, efficiency, and adaptability across various environments. Recognizing the transformative potential of IoT in connecting and empowering everyday objects, the project seeks to revolutionize traditional seating solutions by integrating advanced sensors, actuators, and real-time data exchange capabilities. By enabling users to interact with the chair through voice commands, the system not only offers a hands-free and intuitive interface but also facilitates personalized adjustments tailored to individual preferences. Moreover, by optimizing space utilization and streamlining user experience, the smart chair addresses practical needs in settings ranging from offices and residences to public seating areas. Ultimately, the project embodies a commitment to harnessing cutting-edge technology to create innovative solutions that enhance convenience and improve quality of life for users across diverse domains.

2.2 Problem Statement

The problem statement for the voice-controlled smart chair leveraging IoT technology revolves around addressing the limitations and inefficiencies of traditional seating solutions in various environments. Despite advancements in technology, many chairs lack adaptability and user customization, leading to discomfort and suboptimal usage of space. Additionally, conventional methods of chair adjustment often require manual intervention, which can be cumbersome and time-consuming. This project aims to tackle these challenges by developing a smart chair that seamlessly integrates IoT technology, enabling users to interact with the chair through voice commands for personalized adjustments. By doing so, the project seeks to enhance user comfort, improve efficiency, and optimize space utilization in settings such as

offices, residences, and public seating areas. Furthermore, the project aims to overcome technical hurdles related to sensor integration, actuator control, and real-time data exchange to ensure the reliability and scalability of the smart chair system. Through this initiative, the project endeavours to set a new standard for intelligent seating solutions that prioritize user experience and adaptability in the era of IoT connectivity.

2.3 Project Objectives

The objectives of the voice-controlled smart chair project leveraging IoT technology encompass several key areas aimed at achieving its overarching goals of enhancing user comfort and optimizing space utilization. These objectives include:

- **Develop a Voice-Controlled Interface:** Design and implement a robust voice recognition system that accurately interprets user commands to adjust the chair's position and settings. This involves integrating voice detection sensors and implementing algorithms for natural language processing to enable seamless interaction with the chair.
- **Implement IoT Connectivity:** Establish reliable communication between the smart chair and other connected devices or platforms using IoT protocols. This includes integrating wireless connectivity modules and developing data exchange mechanisms to facilitate real-time interaction and data sharing.
- **Integrate Sensors and Actuators:** Incorporate a variety of sensors (e.g., proximity sensors, pressure sensors) to collect relevant data about the user and the chair's environment. Likewise, integrate actuators (e.g., motors, pneumatic systems) to enable precise movement and adjustment of the chair in response to user commands.
- **Ensure User Comfort and Ergonomics:** Implement intelligent algorithms to adjust the chair's position and settings in a way that maximizes user comfort and promotes ergonomic support. This involves considering factors such as posture, pressure points, and user preferences to deliver a personalized seating experience.
- **Optimize Space Utilization:** Develop algorithms and mechanisms to optimize the arrangement of chairs in each space, considering factors such as available area, user preferences, and traffic flow. This includes dynamically adjusting the position and orientation of chairs to accommodate changing usage patterns and maximize space efficiency.
- **Test and Validate Performance:** Conduct thorough testing and validation procedures to ensure the reliability, accuracy, and safety of the smart chair system. This involves testing the functionality of individual components, as well as assessing the overall

performance and user experience through simulated scenarios and real-world usage trials.

By addressing these objectives, the project aims to deliver a voice-controlled smart chair solution that offers enhanced convenience, efficiency, and adaptability across various settings, ultimately improving the quality of life for users.

3.Literature Review

Existing Work

In the existing system, there are lot of things dependent on IoT.While the specified project is based on the references of the following:

- **Smart Home Furniture**: Various companies and research groups have explored the integration of IoT technology into home furniture to enhance functionality and convenience. This includes smart beds that adjust firmness based on user preferences, smart desks that adjust height for ergonomic purposes, and smart sofas that include built-in speakers and charging ports.
- **Voice-Controlled Devices**: Voice-controlled devices have become increasingly popular, with virtual assistants like Amazon Alexa, Google Assistant, and Apple Siri being integrated into various products. These devices allow users to control smart home devices, play music, get weather updates, and perform other tasks using voice commands.

4.Requirement Analysis

4.1 Software Requirements

- **ARDUINO IDE 2.3.2-**

  Arduino IDE 2.3.2 is the latest version of the Arduino Integrated Development Environment, released to provide an improved experience for Arduino users. It likely includes bug fixes, performance enhancements, and possibly new features to make programming Arduino boards easier and more efficient.

- **ARDUINO BLUECONTROL APP-**

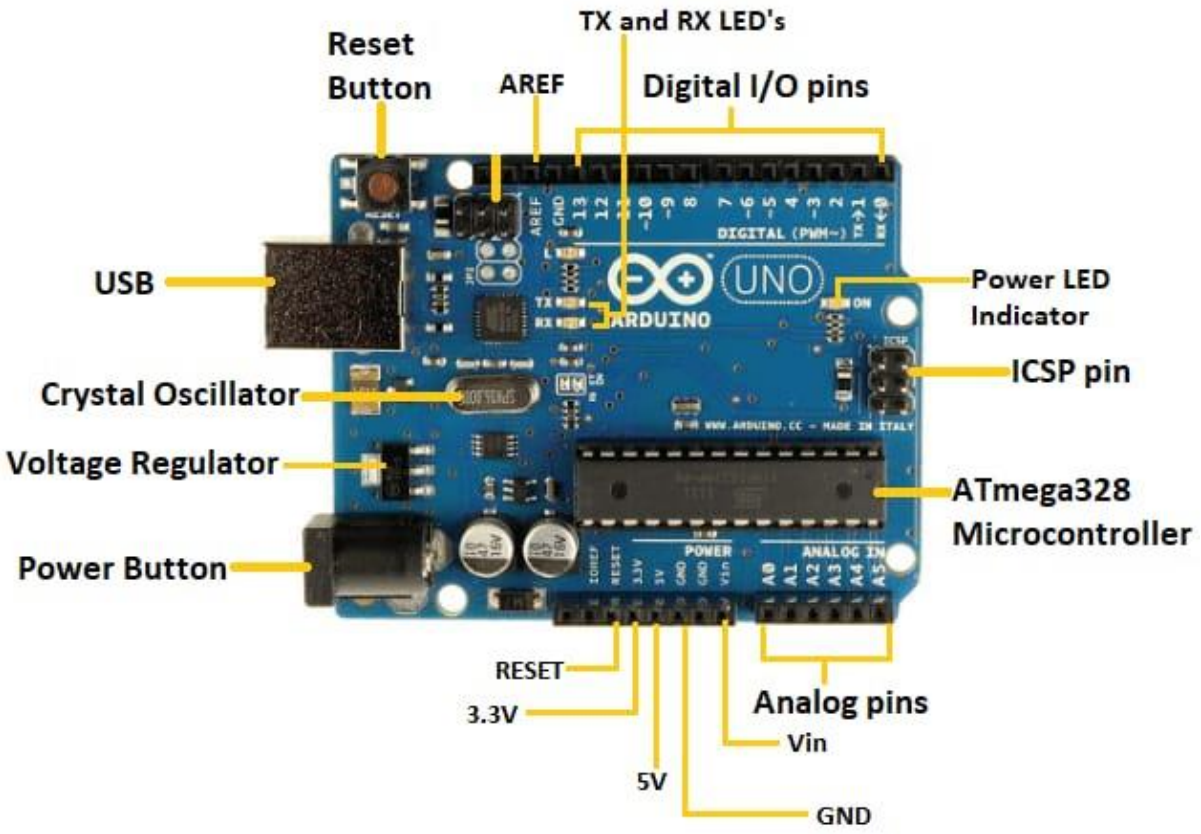
  The "Arduino BlueControl" app is an Android application designed to communicate with Arduino microcontroller-based projects via Bluetooth. This app

allows users to send and receive data wirelessly between their Android device and an Arduino board equipped with a Bluetooth module.

4.2 Hardware Requirements

1. Arduino UNO

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 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 microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.



2. Gear Motor

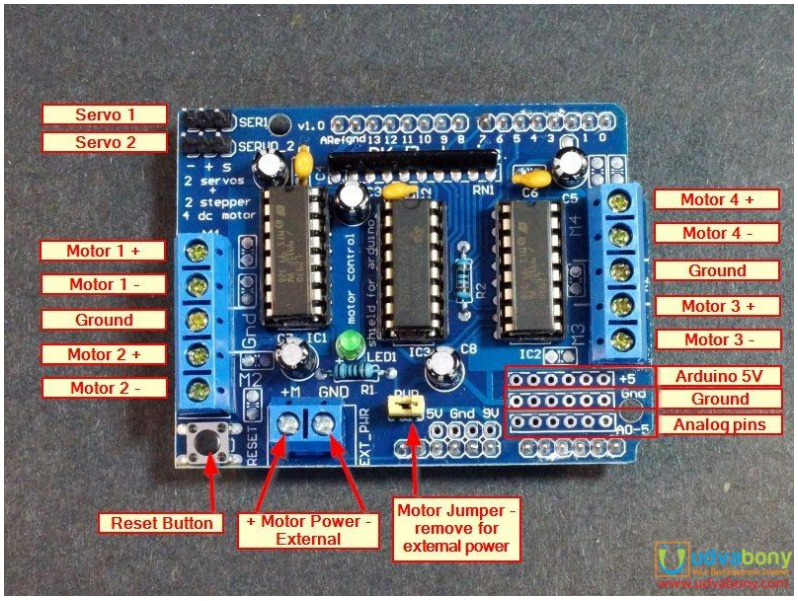
A gear motor is a type of electric motor combined with a gearbox (also known as a gear train or gear reducer) to achieve specific torque and speed requirements for various applications. The integration of gears with the motor allows for the transformation of the motor's high-speed, low-torque output into low-speed, high-torque output, or vice versa, depending on the gear ratio.

3. Robot Wheel

For an easy movement of the chair robot wheels are best option to opt. They facilitate the movement of chair with ease. They are more than mere tools for locomotion; they embody the intricate relationship between design, functionality, and the environment.

4.Motor Driver(L293D)

The L293D is a popular integrated circuit (IC) motor driver commonly used in robotics and automation projects to control the direction and speed of DC motors. It is a dual H-bridge motor driver, which means it can control two DC motors independently. It provides bidirectional control, allowing motors to be driven forward, reverse, or stopped.



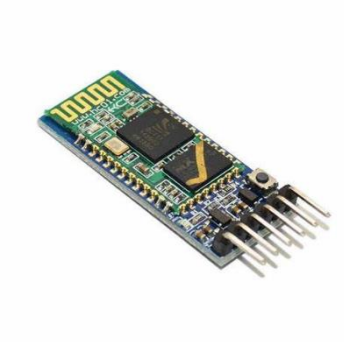
5. Ultrasonic Sensor

An ultrasonic sensor is a device that uses ultrasonic sound waves to detect the distance to an object or surface.

- Ultrasonic sensors work based on the principle of echolocation, like how bats navigate and detect objects. They emit high-frequency sound waves (ultrasonic pulses) and measure the time it takes for the sound waves to reflect off an object and return to the sensor.
- By calculating the time delay between emission and reception of the sound waves, the sensor can determine the distance to the object using the speed of sound in air (approximately 343 meters per second at room temperature).

6. Bluetooth Module

Bluetooth Communication is a 2.4GHz frequency-based RF Communication with a range of approximately 10 meters. It is one of the most popular and most frequently used low range communication for data transfer, audio systems, handsfree, computer peripherals etc.



7.Li-ion Battery and holder

A lithium-ion (Li-ion) battery is a type of rechargeable battery that uses lithium ions as the primary component of its electrochemical reaction. These batteries have revolutionized portable electronics and transportation by providing lightweight, high-energy-density power sources for a wide range of applications. Ongoing research and development efforts aim to improve their performance, safety, and cost-effectiveness for future energy storage needs.

5. User Requirements

- **Voice Control Interface**: Users should be able to interact with the smart chair using voice commands. The system should accurately recognize and respond to a predefined set of voice commands for controlling the chair's movement and functionalities.
- **Ease of Use**: The smart chair should be easy and intuitive to use, even for individuals with limited technical knowledge or physical abilities. The voice control interface should be user-friendly and accessible to all users.
- **Comfort and Ergonomics**: Users expect the smart chair to provide comfort and ergonomic support for prolonged sitting periods. The chair's design should prioritize user comfort, with adjustable seating positions and cushioning materials to accommodate individual preferences.
- **Durability and Maintenance**: Users expect the smart chair to be durable and require minimal maintenance over its lifespan. The system should use high-quality materials

and components that withstand wear and tear, with easy access for cleaning and servicing if needed.

- **Affordability**: Users may consider the cost of the smart chair and its associated components when making purchasing decisions. The system should offer good value for money, with competitive pricing and options for different budget ranges.

6.OUR PROGRESS

6.1 Source code

```
void voicecontrol() {

//gets the serial communication values and puts them into the char variable.
  if (Serial.available() > 0) {
    value = Serial.read();
    Serial.println(value);

//If the char value is "^", the car moves forward.
    if (value == '^') {
      forward();

//If the char value is "-", the car moves backward.
    } else if (value == '-') {
      backward();

//If the char value is "<", the car moves left.
    } else if (value == '<') {
      L = leftsee();
      servo.write(spoint);
      if (L >= 10 ) {
        left();
        delay(500);
        Stop();
      } else if (L < 10) {
        Stop();
      }

```

```
//If the char value is ">", the car moves right.
    } else if (value == '>') {
      R = rightsee();
      servo.write(spoint);
      if (R >= 10 ) {
        right();
        delay(500);
        Stop();
      } else if (R < 10) {
        Stop();
      }

//If the char value is "*", the car is stopped.
    } else if (value == '*') {
      Stop();
    }
  }
}
```

This is just a reference code.