ABSTRACT

The goal of this project was to design and implement a voice-activated bedside control system to enhance patient care in a hospital setting. The system was designed to respond to voice commands from patients, providing assistance with common tasks such as calling for help, getting water, and adjusting the bed position. The project utilized voice recognition technology and integrated it with the hospital's existing bed control system. The report presents the details of the design, development, and implementation of the voice-activated bedside control system. The system was built using off-the-shelf components, including a voice recognition module, a microcontroller, and actuators for controlling the bed movements. The system was programmed to recognize specific voice commands such as "help", "water", "lift", "down", "stop" and respond accordingly.

INTODUCTION:

Patient care in a hospital setting is of paramount importance, and advancements in technology have opened up new possibilities to enhance patient assistance and improve their overall experience. One such technological innovation is the use of voice-activated systems that enable patients to communicate their needs and receive prompt assistance. The project presented in this report focuses on the development and implementation of a voice-activated bedside control system that responds to patient voice commands for help, water, lift, and down, triggering corresponding actions such as sounding a buzzer, filling a glass with water, or adjusting the bed position.

The use of voice recognition technology in healthcare settings has the potential to greatly enhance patient care by providing a convenient and efficient means of communication for patients who may have physical limitations or difficulty using traditional methods of interaction. The voice-activated bedside control system aims to improve patient autonomy, comfort, and satisfaction by enabling them to easily request assistance or make basic requests using their voice, without having to rely solely on physical buttons or calls for help.

LITERATURE SURVEY:

S. NO.	JOURNAL	METHODOLOGY	PROS	CONS
1.	Smart Wheelchair Cum Bed Based on Voice Recognition for Disabled Person by Dr. Maddala Seetha (2022)	This study presents a medical care bed which can do various functions like based on the voice command like rest, wake, lift etc.	User has a lot of functions to choose, user can speak in various languages.	Microphone is inbuilt in the bed thus it can be activated while on a normal conversation.
2.	Design and Development of a Voice Actuated Hospital Bed for Patient Care by Kajol H (2019)	This paper showcases a medical care bed which can move upwards, downwards and also recline and incline based on voice commands.	User can choose from various commands to operate the bed and bed incline and recline angles can be customised.	Microphone is inbuilt thus it can be activated while on a conversation. Precision of speed of motors is less.
3.	IOT Based Automatic Water Container Filler Using Arduino by	This paper explains the automatic filling of water in a container, using an ultrasonic sensor to measure the level and then	User can get the requires amount of water, i.e., the system can fill the container half,	The number of ultrasonic sensors used here are more, the same work could have been sone

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	Aashish Mishra (2020)	dispensing the water accordingly.	3/4th depending on the command given to the system.	optimally using a smaller number of ultrasonic sensors.
4.	Study of Automatic Water Dispenser by Hem Chandra Joshi (2017)	This paper contains Automatic Water Dispenser which includes a series of many functions like controlling the water level, showing the value of TDS, showing the value of temperature, and automatic ejection of water.	Multiple functions can be performed within a single system.	The LM35 sensor used here outputs data in analog format, making it prone to external p=noise and interference, also we need to convert this analog value to digital to connect it to the Arduino and further operations.
5.	Voice Controlled Robotic Vehicle by Himanshu Singh (2018)	This paper explains about the movement of various robotic arms on the basis of voice commands given to it.	Once the command has been taught to the robot, the robot executes it with high efficiency.	The robot is trained for a particular accent only, so if the accent changes the robot may not be able to read and perform.

METHODOLOGY:

The components used in this project are
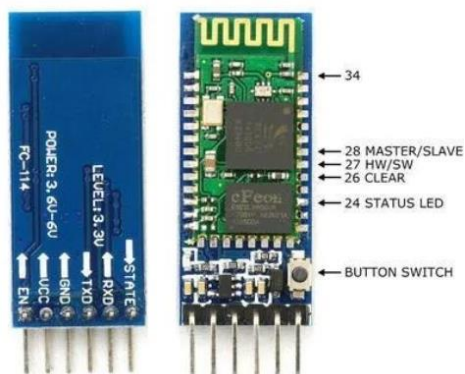
- Arduino Uno

- Servo Motor
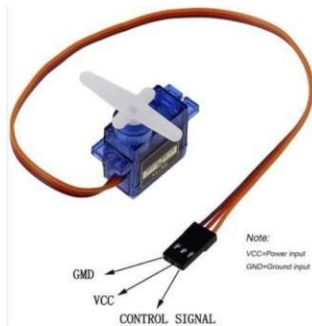
- Submersible DC Motor Pump

- Bluetooth Module HC-05

- 9V Battery
- Breadboard
- Jumper Wires
- LED
- Buzzer

The user provides a predefined voice command to the phone (ex. Lift, down, water). The phone converts the speech to text and sends it to the Bluetooth module. The Bluetooth module which is connected to the Arduino receives the message and sends It to Arduino Uno. The microcontroller identifies the received command. The microcontroller gives command to servo-motor or water pump or led and buzzer based on the received command if the command matches with the predefined commands. The servo motor rotates up or down if the command is "Lift" or "Down". The water pump pumps water in a cup for 5 seconds if command is "Water". The LED and buzzer turn on if the command is "Help". The LED and buzzer turn off if the command is "Stop".

Results:

Our model executes the five commands at present, they are:

WATER, LIFT, DOWN, HELP, STOP

When the users say "LIFT" or "DOWN", the Bluetooth module converts the voice signal to text and then the ARDUINO reads the message and then it sends commands to the servo motor, and the servo motor lifts/ the bed or lowers the bed, according to the signal.

When the users say "WATER" the Bluetooth module converts the voice signal to text and then the ARDUINO reads the message and then it sends commands to the DC motor pump. The DC motor pump turns ON for five seconds which is enough to fill a drinking cup and then automatically turns off.

When the user says "HELP" the Bluetooth module converts the voice signal to text and then the ARDUINO reads the message and then it sends commands to the LED and buzzer. The LED and Buzzer will turn ON.

When the user says "HELP" the Bluetooth module converts the voice signal to text and then the ARDUINO reads the message and then it sends the command to the LED and buzzer. The LED and Buzzer will turn OFF.

The papers published previously performs the functions with the help of a microphone/buttons, but our project executes the commands given to the phone, which is more convenient and easier for patients and avoids unnecessary operations during normal conversations.

Our project has all the necessary functions required by a patient under a single setup, whereas other projects have separate systems to perform each function.
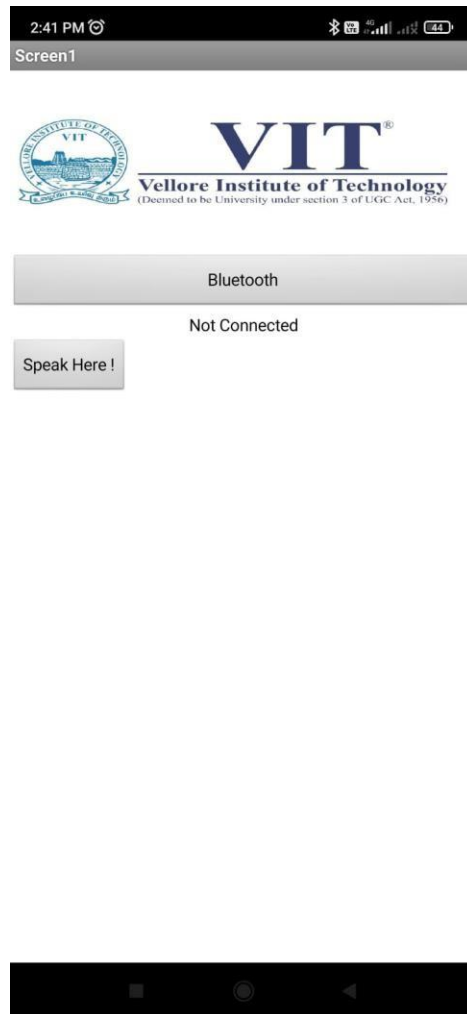
Fig-1 Hardware setup

Fig-2 Custom made app

We have to connect to the Bluetooth via the Bluetooth button and speak after pressing the Speak Here! Button. The words that's we are speaking will be converted to text by google and will be displayed in the app itself.

Working video Drive Link:
https://drive.google.com/file/d/1CKNECpim1cBOz5mUsWwxDT3mh7-w8occ/view?usp=sharing

Conclusion and Future Works:

The shown system is only a prototype. The system that was created has all the basic working mechanisms and principles executed in a small scale. It can be extended and integrated to be built in a real hospital setup, so that this work can be used practically. Adding functionalities like controlling the room temperature, light setup can be added with very little effort. Integrating various mechanisms present in home automation system also can be added in this system with very little effort.

Thus, the project was designed and executed within the stipulated time given within the course period and the working was successfully demonstrated.

References:

[1] Design and development Intelligent Medical Care Bed Using Voice Recognition by Moeid M Elsokah (2022)

[2] Next Generation of Medical Care Bed with Internet of Things Solutions by Moeid M. Elsokah (2019)

[3] Noval Automatic Water Dispenser and Sanitizer with infrared human temperature sensor using Arduino by A.Arul Edwin Raj (2021).

[4] A Project Report smart water dispenser using rfid reader by Dadi Tirumala Tarun (2020).

[5] Voice Controlled Home Automation System by Inam Ullah Khan (2017)

Website Links:

[1] https://ieeexplore.ieee.org/document/9837521

[2] https://ieeexplore.ieee.org/document/8717204

[3] https://www.ijirt.org/Article?manuscript=150491

[4]

https://www.academia.edu/42654070/A_Project_Report_SMART_WATER_DISPENSER_USING_RFID_READER

[5]

https://www.researchgate.net/publication/317386416_Voice_Controlled_Home_Automation_System