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HAND MOVEMENTS BASED WHEEL CHAIR CONTROL WITH WIRELESS DEVICE SWITCHING AND VOICE ANNOUNCEMENT USING LORA TECHNOLOGY

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***Abstract*— The Future robots should interact with humans in a natural way. That is why we are particularly interested in gestural interfaces based on hand movements. The aim of this research was to present a reliable tool for human-computer interface based on three-dimensional hand interfaces, which can be sufficiently interpreted and used to control the movement of a remote robot. In this documentation, we discuss the development of a new architecture for a smart wheelchair that works with a wireless hand gesture instead of the conventional hand gesture method. Unlike other previous ones, this project also has an emergency call system GSM and; to warn the concerned persons or family,**

if it is necessary for the person, the person himself about the alarm switch or if an edge or a step is suddenly discovered while moving backwards, saving the chair from accidents.

The movement of the wheelchair is controlled by Arduino mega. People with physical disabilities can control the system wireless using hand gestures from a distance of several meters and are allowed to use a wheelchair without the help of other people. And with the help of a wireless device connection, they can control the home appliances like Fans and lights with the push of buttons.

Keywords*— *Gesture, Wheelchair, Dc Motor, Arduino, HCSR04, APR33A module.

I. INTRODUCTION

Physically disabled and partially paralyzed people always find it difficult to navigate their environment or home without someone's help. Often after paralysis or physical disability, the most common form of mobility for such people is a wheelchair. But navigating from one place to another every time without someone's help can be frustrating for a person. With the current developments in the field of robotics, embedded systems and artificial intelligence, a successful project has been developed to solve this problem easily and at a very low cost. The wheelchair can be controlled simply by giving manual movement instructions while sitting on it.

The chair can be operated using the manual movement method with instructions as needed. This project improves on this work by developing a wireless mechanism for motion control. This robot is mainly divided into two practical parts: 1. Transmitter - gesture device. 2. Receiver - robot. They can be used to express commands. So, it seems appropriate that human-robot interfaces include hand gesture recognition capabilities. For example, we would like to be able to give simple commands to personal robots with hand gestures.

Hand gesture recognition requires both hand and gesture recognition. After detection, the chair automatically moves forward, and on two such consecutive edge detection's, the wheelchair signals the family or certain people whose numbers are already stored in the emergency call module. The concept creates a voice-instructions and device-switching system using a GSM device.

This method is useful for people with limited mobility. Wireless device communication between user and number via text message and email. The system uses relays to switch devices and speech recognition to detect voice messages and the micro-controller. Both are programmed to deliver certain recommendations. The micro-controller communicates with the input and output values of the modules. This method accepts input. Value takes voice instructions for another person. With the GSM modem, an alert text is sent to the mobile phone via SMS and Email.

II. EXISTING PROTOTYPE

An intelligent control algorithm to drive a wheelchair is by using a joystick. It was a self-regulating system which enabled people to take care of themself by themselves, but operating it is a bit robust. Joystick control for powered wheelchairs is the commercially available one for the users.

This allows the system to avoid the unforeseen obstacles when a prescribed trajectory of the wheelchair must be followed by the system driven by a disabled person and consequently ensures his or her safety.

DISADVANTAGES

- It is robust to operate for the user, resulting in repetitive strain of shoulders.
- The joystick moves the powered wheelchair in the direction only that the user points in.Therefore the prototype should be driven carefully by the user.
- Typically the fastness depends on how typically the joystick is pushed.
- Any unforeseen obstacles can be avoided if and only if a predefined trajectory of the wheel chair is followed by the person.

The brakes will be applied to stop the wheelchair if and only if the joystick is released

III. PROPOSED PROTOTYPE

We are designing this prototype. by using the present-day automation.

We are using hand gestures to control wheel chair directions

We are using the LORA Technology, for controlling home appliances. And we use the same hand gestures for voice announcements by simply mode changing.

We are using the GSM module for the emergency alerts (or) SMS By SOS key.

Including the new buzzer system for detecting the obstacles. At the same time the wheelchair motors also stop working whenever any obstacle is detected.

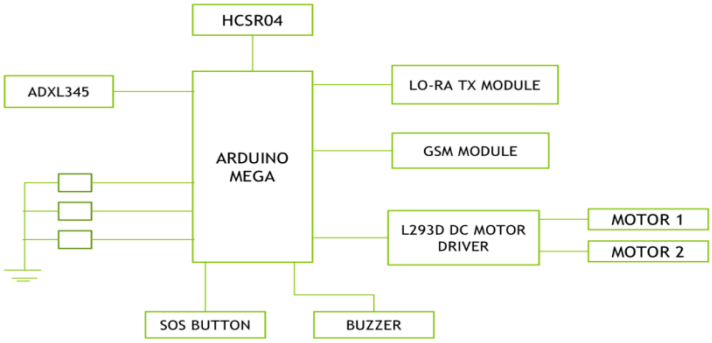


Figure 1: Block Diagram Of Transimitter

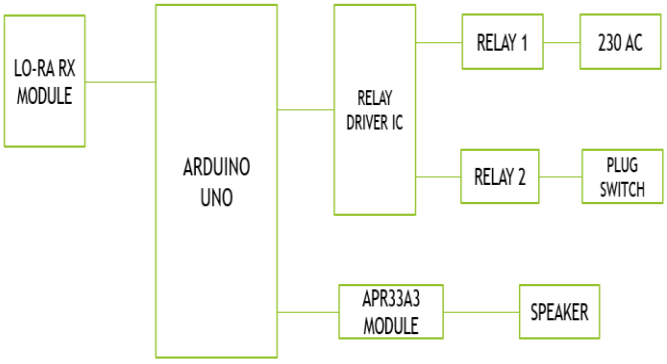


Figure 2: Block Diagram of Receiver

ADVANTAGES

- This prototype overcomes the problems mentioned above.
- This can be driven by the person without any hardship, not at all robust to operate.
- Any obstacles can be avoided without the involvement of the user, therefore the accidents can be avoided.
- In addition to The movement of the wheelchair this prototype also provides the user with many more facilities to manage the home appliances.

IV. HARDWARE REQUIREMENTS

ARDUINO UNO, ARDUINO MEGA, ADXL345, LORA TX AND RX MODULE, HCSR04 ULTRASONIC SENSOR, APR33A MODULE, L293D DC MOTOR DRIVER, SOS BUTTON, RELAYS, 230V LOAD

V. SOFTWARE REQUIREMENTS

Embedded C language

Arduino IDE

VI. WORKING PRINCIPLE

Model consists of 3 modes for movement, for voice announcement, and for controlling the home appliances. An ultrasonic sensor is used to detect the obstacles. The WIFI module is used to send emergency messages in critical situations. Based on our observations we decided ranges for x and y axis for the MEMS sensor.

Position 1: x ranges from -2 to 0
y ranges from 0 to 3.1

Position 2: x ranges from -2.5 to 7
y ranges from 1 to 11

Position 3: x ranges from -0.5 to 4
y ranges from -11 to -2.5

Position 4: x ranges from -11 to -8
y ranges from -1 to 2.6

Position 5: x ranges from 8 to 10.2
y rages from -0.7 to 1.7

VII. MODES OF OPERATION

Mode 1: movements of the wheelchair

position 1: Default Sto position 2: Forward position 3: Backward position4: Left position5: Right

Mode 2: voice announcement

position1: Default position Position2: Voice 1 Position 3: Voice 2 position 4: Voice 3 position 5: Voice 4

Mode 3: for controlling home appliances

position1: Default position off position2: Bulb A Position 3: Bulb A OFF position 4: Bulb B ON position 5: Bulb B OFF

VIII. RESULT

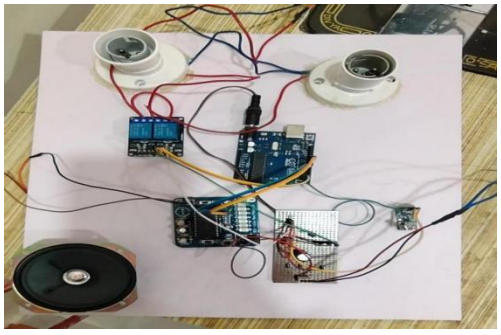


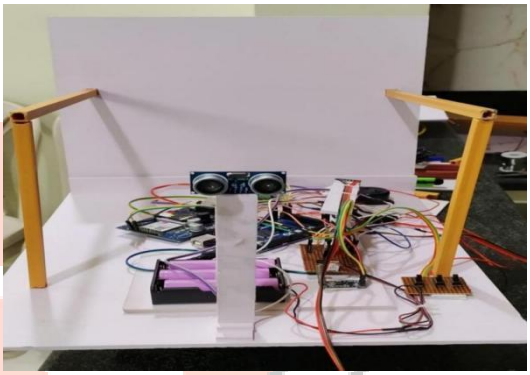
FIGURE 3: Prototype of Receiver

FIGURE 4 : Prototype of Transmitter

IX. ACKNOWLENGMENT

Great thanks to God finally I finish my project on A hand gesture based wheelchair for physically handicapped person with emergency alert system . Special thanks to my friends that share their idea and advice in completing my project. Their support and encouragement in my project have helped me in various aspects. Without their help, this project would very difficult to complete and it will take a long time to finish. Finally, thank to my dear friend that support me in various field such as fund, idea and moral in completing the project.

I hope that this project able to be a step for an gesture based wheelchair for handicapped person in the future because nowadays a larger scale for handicapped people designed for difference purpose.



X. CONCLUSION

In proposed work, we can successfully developed and implemented gesture based wheelchair control in real time application like handicapped person. The system will provide better performance in above mentioned real time application.

XI. FUTURE SCOPE

Gesture control wheelchair technology has already been developed and is being used by many people who are unable to operate a traditional wheelchair. However, the integration of wireless device switching and voice announcement using Lora technology presents exciting opportunities for further development and integration into healthcare settings. As technology continues to advance, the future scope of gesture control wheelchair technology with wireless device switching and voice announcement using Lora technology is vast. For instance, the use of AI and machine learning algorithms can help personalize the technology to the specific needs of each individual user. Additionally, there may be opportunities for integration with other healthcare technologies such as telemedicine , allowing healthcare providers to monitor the user's health remotely and provide assistance if needed.

Overall, the integration of Lora technology with gesture control wheelchair technology and wireless device switching

presents exciting possibilities for enhancing independence and improving the quality of life for individuals with mobility limitations.

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