

Smart Assistive Device for Physically Challenged People

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Abstract— A nonverbal communication involves movements of different body parts to communicate a particular message. Hand, face and lips movements are other movements of body parts are regarded as gesture. In this project we have a method based on head movement's recognition by using a device. This will make a bridge between physically disabled and normal public. This project proposes a wearable device to help patients who are bedridden or have trouble in muscle strength to hold a mobile device. In this project a board is designed which is helpful for housebound people to communicate with people. The device contains two modes that is Keyboard mode or regular mode and Special mode(head mode). Hence this system provides a voice which is understandable by both dumb people as well as normal people.

Keywords— Arduino board, APR 9600 (Audio play Record), AAC (Augmentative and Alternative Communicative) device

I. INTRODUCTION

The main objective of this project is to provide a keypad device for the disabled people who cannot talk. In this project we are using arduino r3 board for implementing a device. Arduino is an open source computer hardware and software company, project and user community that designs and manufactures single board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. Arduino board designs use a variety of microprocessor and controller. The boards are equipped with sets of digital and analog input/output (i/o) pins that may be interfaced to various expansion boards (shields) and other circuits. The board features serial communication interfaces, including USB on some modules, which are so used for loading programs from personal computers. The microcontrollers are typically programmed using C and C++.

AR9600 is a voice module wherein we can pre record a voice and store in its memory, each buttons are assigned for specific task with a pre recorded voice which can be altered as per the user specifications. Accelerometer senses the change in direction of head and accordingly the signal is given to micro controller. Depending on the direction of the acceleration, microcontroller controls the device like left, right, front and back. Thus, The device allows users to tap the words they wish to communicate from the device keyboard which consists of a pre prepared words or phrases or by using a head movements, which are then in turn transmitted into audio phrases.

Arduino software

Arduino is an open source computer hardware and software company, project and user community that designs and manufacture single board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in physical and digital world

About Embedded

An embedded system is a special purpose computer system designed to perform a dedicated function. since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the project. Embedded system comprises of both hardware and software. embedded system is fast growing technology in various field like industrial automation, home appliances, automobiles etc. Embedded technology uses PC or controller to do the specific task and programming is done using assembly level language or embedded C.

APR9600

APR9600 is a low cost, high performance sound record/replay IC incorporating flash analog storage technique. Recorded sound is retained even after power supply is removed from the module. The replayed sound exhibits high quality with a low noise level.

D. Encoder / decoder

An encoder is a device, circuit, transducer, software programme, algorithm or person that converts information from one format/code to another, for the purpose of standardization, speed or compression. A decoder is a circuit that changes a code into a set of signals. It is called a decoder because it does the reverse of encoding.

II. RELATED WORK

“Speech Control of Assistive Devices for the Physically Disabled” proposed that the potential of speech recognition to aid disabled people is reviewed and assessed. Applications to mobility, robotics, environmental control and computer access are considered. [1]

“Interactive devices for deaf and dumb using atmega 328 processor

“proposed that the atmega 328 and sensors based interacting device is presented. The device discussed us basically data glove and a microcontroller based system. Data glove can detect almost all movements of hand and a microcontroller

based system converts some specified movements into human recognizable voice.[2]

“Providing voice enabled gadget assistance to inmates of old age home including physically disabled people

“proposed that the application of speech recognition, processing and subsequently activating relevant functions associated with an appliance. The newness in the project lies in the practical usage of such a system which, in this project, is oriented towards providing voice assistance to inmates of old age home including physically disabled and bedridden persons.[3]

“Voice recognition device as a computer interface for motor as speech impaired people

“proposed that the device enables a person to bypass the traditional keyboard and activate a computer through voice control. The user simply creates templates of a spoken vocabulary in computer memory. The computer then matches real-time spoken words to stored templates for activation. Results indicate that the system might be appropriate for rehabilitation programs though further technologic refinement of the device would increase its effectiveness.[4]

“An iconic and keyboard based communication tool for people with multiple disabilities

“Ratnajit Mukherjee et al proposed that the a portable version of Sanyog, an Augmentative and Alternative Communication(AAC) tool developed in India which caters to Indian multilingual needs. The communication tool is based on an iconic query-response interface. The system is currently available in English, Bengali and Hindi versions. It is used in a range of Indian institutions serving children with speech and motor impairments.[5]

“A remote computer control system using speech recognition technologies of mobile devices”

proposed that the design of an Arduino based voice controlled automated wheelchair. The design is developed with a voice recognition system, which allows the physically disabled person to control the wheelchair by voice command who have issues in hand movement due to ageing or paralysis for joystick controlled wheelchairs. The design also provide some additional features such as obstacle detection for the safe movement and a GSM based navigation system for tracking and sending notifications to increase the usability of the automated wheelchair system. [6]

“Speech recognition based robotic system for wheelchair for disable people

“proposed that the system aims to design, assimilate, combine and test a motorized, speech recognized protocol of wheelchair. This idea helps physically disabled patient to control the direction without any external manual force. There are many people who are unable to control the standard joystick interfaced wheelchair. speech controlled wheelchair can provide easy access to them who cannot control the wheelchair with hand movement. This robotic system uses raspberry pi for the speech recognition. In this prototype, Bluetooth interface is used between android phone and Raspberry Pi. Android phone is used which is connected

to the HC-05 Bluetooth module via BT connection. HC-05 is the Bluetooth module which is connected to the Raspberry Pi. The objective is to design a system which will make the life of disable people easier. [7]

“A remote computer control system using speech recognition technologies of mobile devices

“proposed that the a remote control computer system using speech recognition technologies of mobile devices for the blind and physically disabled population. These people experience difficulty and inconvenience using computers through a keyboard and/or mouse. The purpose of this system is to provide a way that the blind and physically disabled population can easily control many functions of a computer via speech. The configuration of the system consists of a mobile device such as a smartphone, a PC server, and a Google server that are connected to each other. Users can command a mobile device to do something via speech such as directly controlling computers, writing emails and documents, calculating numbers, checking the weather forecast, and managing a schedule. [8]

“Dual mode application of control system for people with several disabilities”

proposed that the Assistive Technology plays a vital role in the lives of people with severe disabilities. It helps them to lead an independent self-supporting life. Disabled persons as a result of causes traumatic brain injuries and spinal cord injuries to stroke and cerebral palsy are find it difficult to carry out everyday tasks without continuous help. Already there exist a speech recognition system which provide support to the physically disabled people. But those people who cannot communicate through speech can use the tongue motion to control the environment.[9]

“Design of intelligent robotic arm for visually challenged

“proposed that the A physically disabled person nourishing himself was considered as a great deed in the 19th century. But this age has become an era where talents are considered as the matter of fact, in spite of their physical weakness. Here is a newfangled technology, through which a robot imitates human handwriting and acts as a proxy during strenuous circumstances. What the robot does is that, it acts according to the voice commands imposed on it, thereby fulfilling the physical ailment of the needy. Writing is brought by feeding a particular style in the form of images, which is stored as fonts in its memory. This not only assists disabled persons, but also supports people who need a proxy for their hand writing. When a particular font is fed, it writes what was dictated, thereby, acting as a human hand. This methodology that has been proposed here is much practical and the design shows improved efficiency.[10]

III. METHODOLOGY

A. BLOCK DIAGRAM

In the transmitter part, the input to the arduino board consists of the RPS(7805), which produces a standard 5v output power supply for the input voltage between 6.8V- 24V

power supply. If the input goes beyond 24V power supply then it shut downs as high voltage and if the input provided is less than 6.8V then it becomes low voltage. The keypad device consists of 8 keys in which each key has some pre recorded voice. It is always in the pull down condition and when a particular key is pressed then it becomes pull up and the particular pre recorded voice is generated. Accelerometers is used to sense the head movements which is fed as an input to the arduino and it can sense 4 directions. By using a switch we can switch between two modes that is regular mode and head mode.

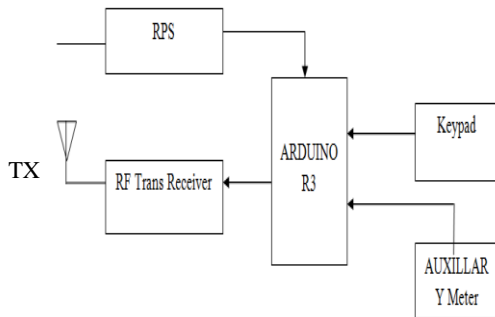


Fig1: transmitter block diagram

In the receiver part by using a loop antenna we receive the information from RF trans receiver which is provided as the input to the arduino. The arduino produces a voice module by using APR9600 which is a pre recorded voice and it is fed to a loud speaker for the person to hear.

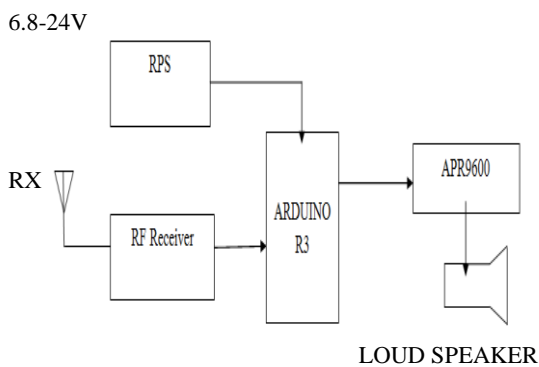
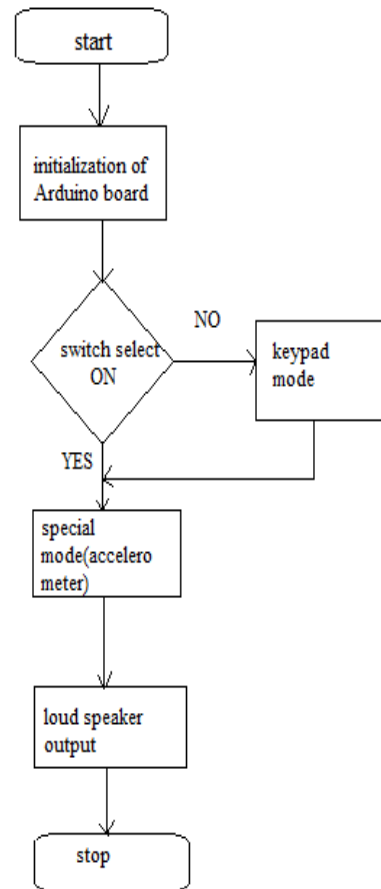


Fig2: receiver block diagram

B. FLOWCHART



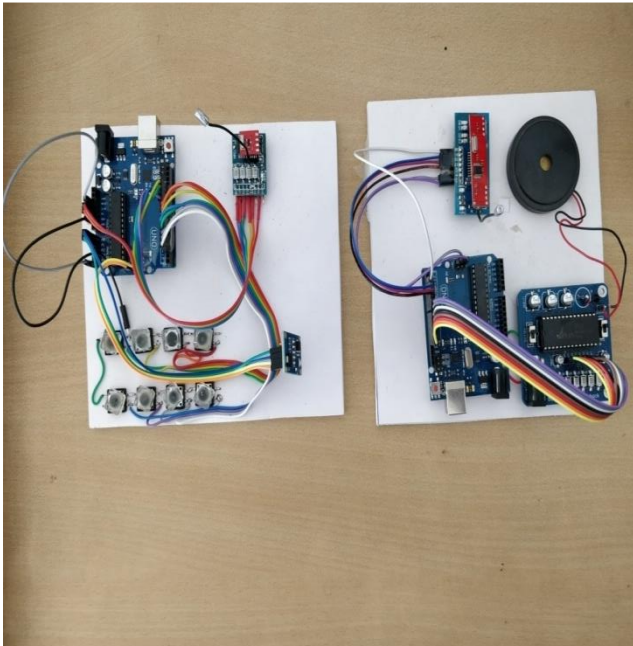
ADVANTAGES

- Easy to use
- Effortless function
- No training required
- Low cost boards
- Simple
- Non volatile flash memory
- Low power consumption

APPLICATIONS

- Used in hospitals
- Used by people who are incapacitated or confined to bed
- People suffering from speech disabilities, stroke, brain injuries.

RESULTS



The developed device will provide voice assistance to the bed-ridden individuals / aged people in their day-to-day operation of the applications present in their surroundings thus increasing the level of comfort.

This project describes the design and working of a system which is useful for dumb people to communicate with one another and with normal people.

This device forms a bridge between the physically disabled people and the normal people.

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