



MOVEMENT BASED AND VOICE ENABLED DEVICE SWITCHING AND BASIC NEEDS FOR PHYSICALLY CHALLENGED

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Abstract: The main aim of this project is to control the devices and to ask the basic needs like water, food or medicine by using MEMS (Micro Electro-Mechanical Systems) technology. MEMS is a Micro Electro Mechanical Sensor which is a highly sensitive sensor and capable of detecting the tilt. This sensor finds the tilt and makes use of the accelerometer to change the direction of the wheel chair depending on tilt. For example, if the tilt is to the right side, then the wheel chair moves in right direction or if the tilt is to the left side, then the wheel chair moves in left direction. Wheel chair movement can be controlled in Forward, Reverse, and Left and Right direction along with obstacle detection using ultrasonic sensor. These had greater importance than any other technologies due its user-friendly nature. The obstacle detection mechanism is done by an ultrasonic sensor that makes uses of ultrasonic waves to find the presence of an obstacle in its path. It makes use of the ultrasonic sensors to detect the obstacle present in its expected trajectory and dynamically changes.

Index Terms: MEMS (Micro Electro-Mechanical Systems), Wheelchair, Ultrasonic sensor, Accelerometer, Obstacle detection mechanism, Highly Sensitive sensor

I. INTRODUCTION

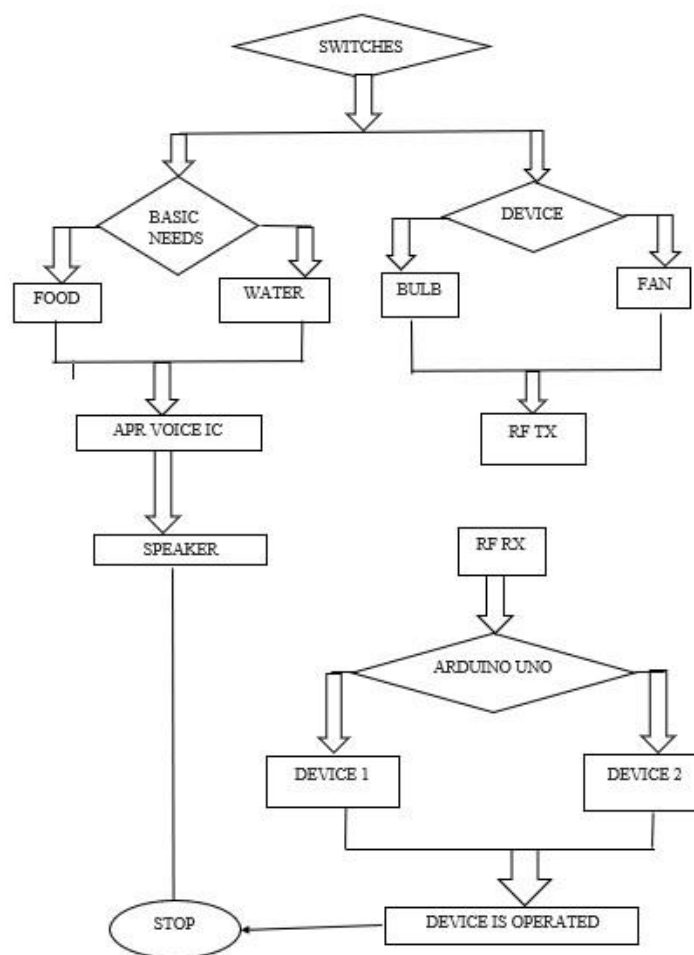
This project develops device switching via voice commands. Therefore, the focus is on device switching and controlling GSM modem to send SMS in case of emergency, all controlled by voice commands. To be specific, there are three main objectives in this project. First of all, to design and construct a voice enabled device switching system to assist physically challenged and elderly people. Secondly, to control the electrical devices like light, fan, etc. with the help of voice recognition system. Although many systems have been developed that use voice recognition such as voice enabled wheelchairs, voice enabled home loads and many more, they do not provide monitoring ability. In this project the user has the ability to monitor the loads and security system. This project focuses on device switching by voice commands, which is a great help to those with disabilities and elderly people. This system will give them an opportunity to live as autonomously as possible in their own house. They will have the ability to switch ON or OFF all their home appliances from anywhere in the house by voice commands while monitoring.

Speech recognition, which is also used in domestic automations, was first predicted in 1976 by Reddy Boldly. He predicted that in 10 years from 1976, connected speech systems will be built with the cost of \$20,000. Although the system was eventually built, it was not built within the expected time frame and its costs were much lesser than predicted. This technology has been improving every day, and the costs of it have been decreasing in turn, up-to the point that in today's life speech recognitions can be used in most smart phones and even laptops, with no extra charges. Speech recognition is one of the best advancements that will be center of attention in any field imagined due to its simplicity to use and affordable cost. Since speech recognition is the most natural way of interaction, it can be used in any system. We might witness a lot of machines, home appliances, robots and etc. fully functioning with voice commands, in the near future.

Speech recognition is basically translation of spoken words into text, in computer science point of view. The main two engines running speech recognition in Microsoft speech are automatic speech recognition (ASR) and Text to Speech (TTS). There are two types of speech recognition: 1- Speaker dependent 2- speaker independent. In the first type the system only responds well to the individual who trained the system and there is a wide range of words that can be detected. This type of recognition can be used for security systems and personal computers that work with voice recognition. The second type works based on the words detected and does not depend on the individual who gives the commands. Although in this type the number of words that can be recognized is

less, it can still be as accurate as the speaker dependent systems. The project is a user friendly and cost-effective system to help physically challenged, elderly, and disabled people

FLOW CHART:



WORKING PRINCIPLE:

The People suffering with paralysis unfortunately are bound to a very limited range of motion and are left with no choice but to entirely depend on a person or helper for any or all their day-to-day chores round the clock.

Needless to say, communicating with the person attending to their needs gets difficult as a result of their highly slurred speech.

This project aims to aid the patients with their transport, which is the control of their wheelchair, communicating with the helper regarding their needs and also switching the electrical appliances according to their liking hence imbining a sense of independence in the patient.

This project achieves all this keeping in mind the patient's impaired motion in the body by using the MEMS technology at the core.

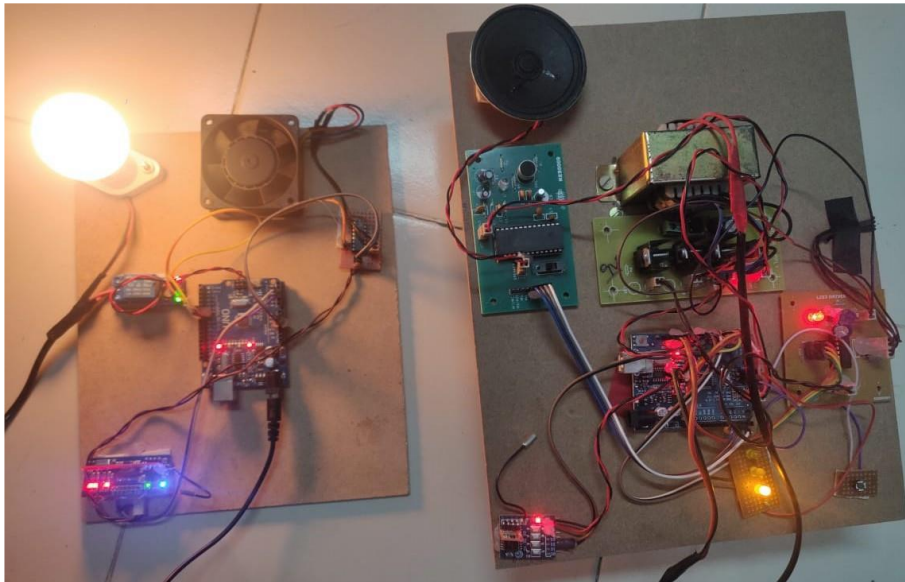
This project mainly works in three modes to start with and can be switched using the mode selector, the first mode gives the access to the control of the wheelchair, the second mode helps to communicate with the helper with his needs like asking for food, water, medicine or to take him to washroom and more. The third mode allows the patient to control the electrical appliances in his room like the switching of fans and lights.

The project uses a MEMS sensor to achieve all the this, the MEMS sensor recognises the input in terms of motion of the hand in up, down, left and right directions, at the core it uses an Arduino UNO.

In the first mode the motor driver triggers the 2 motors attached to the back wheels for the movement.

In the second mode, the project uses a Voice module to record as well as to playback the programmed messages through the speaker. And in the third mode, it first uses a RF transmitter and receiver module where the receiver would be connected to the switch board, where an electrical relay helps with the switching.

RESULTS:



In the first module the movement of wheel chair can be controlled by the MEMS sensor. MEMS is tilt sensitive sensor. If the MEMS sensor is tilted to the right side, then the wheel chair moves in the right direction. Similarly, the wheel chair can be moved in the left direction and forward and backward. Thus, the wheel chair can be moved in the desired direction with the help of MEMS sensor

In the second module basic needs like food, water and medicines can be provided to the physically challenged persons. This project consists of a voice IC which is APR 9600 which can be loaded with some predefined voices and there is also a speaker to announce the basic needs when required. The physically challenged persons can record their voice and they can also listen their recorded voices.

In the third module physically challenged persons can control the electrical appliances whenever required. Whenever it is required, they can control the electrical appliances like bulb, fan etc. When the MEMS sensor is tilted in one direction then the bulb gets automatically switched ON and when it is tilted in some other direction it gets switched OFF. Electrical appliances thus can be controlled with the help of MEMS and relays. Here relays act as a switch which automatically turns ON and OFF based on the tilting of the MEMS sensor. Here relays are used as switches to automatically ON and OFF the electrical Appliances.

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