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Modern Car For Disabled People

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***Abstract*—The objective of our paper is, the possibility of construction of voice and touch screen controlled car. Either the voice commands or Touch screen monitors can be used as inputs to drive car which replaces most of the hard, physical involvements used to control car. Controlling of car can literally be made at finger tips using touch panel. Incorporating wireless communication in this integrated system of voice and touch screen controlled car would be helpful to operate it in hazardous situations without driver, reaching the destinations safely thus helping physically challenged, dumb people to drive car with more ease**

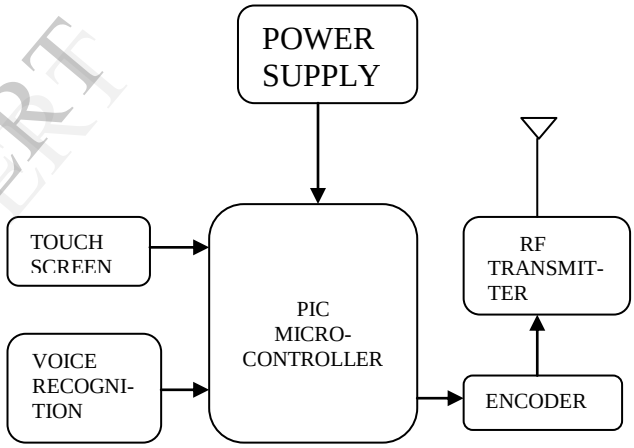
***Keywords*— speech recognition, touch panel, controlling car**

I. INTRODUCTION

The goal of interaction between a human and a machine at the user interface is effective operation and control of the machine, and feedback from the machine which aids the operator in making operational decisions. This broad concept of user interfaces includes many advancements mainly for controlling large number of distributed devices from a remote central location. The touchscreen is an assistive technology. This interface can be beneficial to those that have difficulty in using other input devices, or other assistive technology. It is incredible that vehicles have become one of the important factors in our lives. So in our paper, the above said technologies is being implimented together .i.e implementing the touch screen technology and voice recognition technology in cars. Here the car can be driven manually without the use of steering by either the touch input or vocal commands as inputs, thus getting all the operations of the car including accelarator, brake operations etc. Here a voice recognition IC and a touch screen panel are used with a microcontroller for controlling the commands. The transfer of commands to the car is achieved through wireless transmission technique. For this the system uses voice recognition algorithm (hidden Markov model), where the commands are verified, once the user starts giving controlling commands. The voice command is sent as input command to car via a microcontroller through a RF Transmitter which is by a wireless network. Also another provision for giving the commands to car is provided using a touch screen panel. The car motor receives all the control commands by either of the input method using a RF Receiver, and a microcontroller and is controlled accordingly. This helps to control the functions of car without manual actions.

II. SYSTEM DESIGN

1. INPUT SIDE(transmission)



Touch screen:

A resistive touch screen is composed of many layers. The two most important layers are made of a flexible polymer which are coated with a resistive material and are separated with an air gap or microdots. The resistive material is applied in lines on each sheet and they are placed perpendicular to each other. When a person touches their finger to a resistive touch screen, the two layers are pressed together, and the points of intersection on the two layers allow the controller to accurately measure the position of the touch

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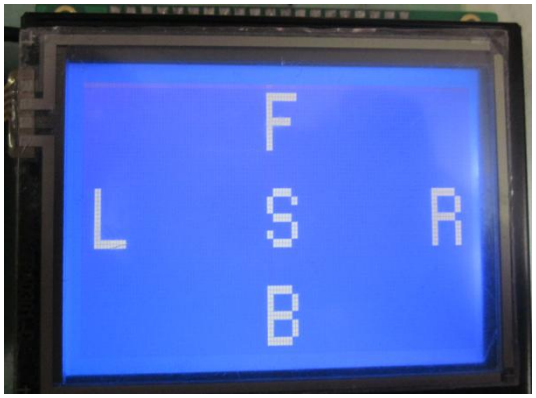
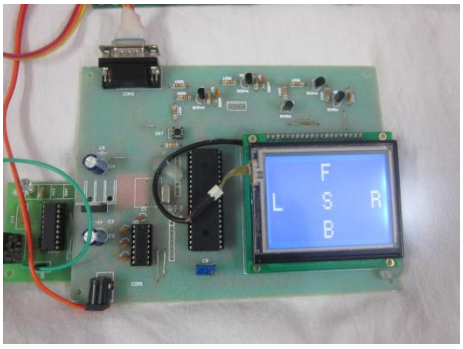


When pressure is applied to the screen, a uniform voltage is applied to the first sheet, and the second sheet measures the voltage as distance along the first sheet, which gives the X coordinate. Similarly, when the X coordinate has been ascertained, a voltage is applied to the second sheet, and the first sheet is used to measure the distance, which gives the Y coordinate. These measurements take place in only a few milliseconds, which means that a touch is registered as soon as contact is made.

Since these types of touch screens rely on a point of contact between the two resistive layers, any pointing device like a finger or stylus can be used on them. These screens are also quite inexpensive to manufacture as they don't require any specialized components. Due to the design of these screens, registering multiple points of contact was not possible due to vectoring issues. However, new technology is now available that overcomes these vectoring issues and allows multiple points of contact to be measured.

Of all the kinds of touch screens available, Resistive touch screens are easy to interface, cheap and they have fair sensitivity.Resistive Touch screens are simply transducers.

To Interface Resistive touch screen with a microcontroller, we need a microcontroller with inbuilt Analog-to-Digital converter having two or more channels. This is needed because, the touch screen will provide data in terms of an analog voltage on two different pins, using which, we have to determine position of the touch. Also, ADC input pins of the microcontroller should be configurable as General Purpose I/O (GPIO). The touch screen has total of 4 wires coming out. Pin configuration is shown in the fig. To read the position of the touch, we have to first read touch position sequentially i.e. first read X position and then read the Y position. To do this, connect X1 and Y2 pins of touch screen to ADC multiplexed GPIO pins of the controller. And connect X2 and Y1 pins of touch screen to simple GPIO pins of microcontroller.



This way, here in this proposed concept, resistive touch screens are used where in, the five keys are will be displayed such as forward(F), backward(B), right(R), left(L),stop(S). The desired key is pressed by the user for the corresponding actions to be carried out. It will give the relative value of the touch, which is taken as input to drive the motor.

Voice recognition:

The chip may be used in a stand alone or CPU connected. It requires a speech recognition system which is a completely assembled and easy to use. A Programmable speech recognition circuit, in the sense that the words can be trained, which the circuit to recognize. The technology behind speech recognition is hidden Markov model.

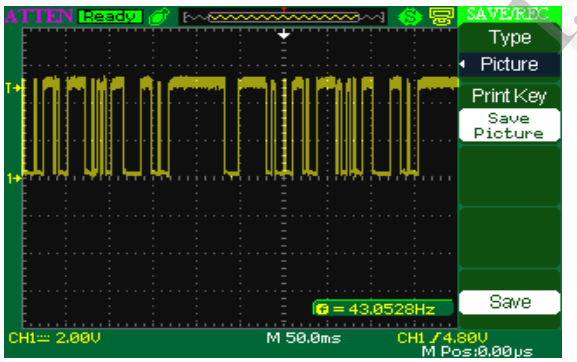
It stores the "trained" word patterns used for recognition in external memory. For memory, the circuit uses an on board 8K X 8 static RAM. The main board has a coin battery holder that provides backup power to the static ram when the main circuit is turned off. This keeps all the trained words safely stored in memory (SRAM) so the circuit does not have to be retrained every time it is turned on. A fresh coin battery provides years of memory protection.

This is speaker independent. Speaker independent is a system trained to respond to a word regardless of who speaks. Therefore the system must respond to a large variety of speech patterns, inflections and enunciation's of the target word. The command word count is usually

lower than the speaker dependent however high accuracy can still be maintained within processing limits.

It operates with the Input Voltage - 9 to 15 V DC . and so the Output Data - 8 bits at 5V Logic Level, which is interfaced with PIC microcontroller at the input side.To train the circuit,the word number to be trained is being pressed. The circuit can be trained to recognize either 40 (one-second) words or 20 (two-second) words. This option is selectable by setting a jumper on the main circuit board. For example number "1" is pressed to train word number 1. When the number(s) is pressed on the keypad the red LED will turn off. The number is displayed on the digital display. Next the "#" key is pressed for training. When the "#" key is pressed it signals the chip to listen for a training word and the red LED turns back on. Now the word is being spoken into the microphone that the circuit wanted to recognize. The LED blinks off momentarily, which is a signal that the word has been accepted.

To erase all the words in the RAM memory (Training) "99" on the keypad is pressed and then the "*" key is pressed. The display will scroll through the numbers 1-40 (or 1-20) quickly, clearing out the memory. To erase a single word space the number of the word that has to be cleared is pressed, and then the "*" key is pressed. The testing signal(human voice) and its response is shown below here.



Response graph: Voice recognition analysis
Testing Signal:- human voice
Error produced:- 0.4 %
Response time:- 15 ms

So here the necessary commands such as “turn right, turn left, forward, backward, break, accelerator are being trained. And hence the words are recognized when being spoken, and the output Analog data is obtained which is then transmitted. These inputs can bee also be wired to the motor through the controller(without wireless transmission)

Controlling functions at transmitter side:

Microcontrollers which follows Harvard architecture for internal data transfer is used for controlling functions.PIC microcontrollers which has inbuilt ADC are preferable since both the inputs(touch screen and voice commands)which are of analog form needs to be converted to digital for further transmission. It is based on advanced RISC architecture and in this architecture, the instruction set of hardware gets reduced which increases the execution rate (speed) of system.

The function of PIC microcontroller here is to monitor and control the touch screen input and the output from it is then encoded and transmitted**.** So it will be monitoring and responds immediately when a particular key is being pressed. So the corresponding analog signal (touch screen input) will be given as input to microcontroller. This digitally converted data is then transmitted through rf transmitter. Similarly all the operations of the car including accelarator, brake operations etc can be obtained .

Transmission:

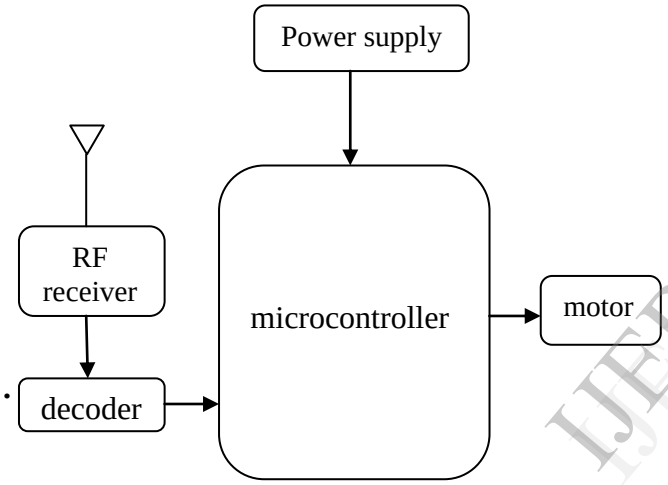
The radio frequency (RF) transmission system employs Amplitude Shift Keying (ASK)with transmitter/receiver (Tx/Rx) pair operating at a particular frequency. The transmitter module takes serial input and transmits these signals through RF. The transmitted signals are received by the receiver module placed away from the source of transmission. The system allows one way communication between two nodes, namely, transmission and reception. The RF module has been used in conjunction with a set of four channel encoder/decoder ICs. The encoder converts the parallel inputs (from the remote switches) into serial set of signals. These signals are serially transferred through RF to the reception point. The decoder is used after the RF receiver to decode the serial format and retrieve the original signals as outputs. These outputs can be observed on corresponding LEDs.

Transmission is enabled and the control signals from the microcontroller are given to the corresponding pins of encoder. The serial data is then fed to the RF transmitter

.Transmitter, upon receiving serial data from encoder, transmits it wirelessly to the RF receiver through RF signal.

The transmitter generally accepts both linear and digital inputs, can operate from 1.5 to 12 Volts-DC, and makes building a miniature hand-held RF transmitter very easy. The encoder transmits the same address and the data 4 times for a proper single transmission. This is done just to ensure that data transmitted is received error free. The data is received 4 times and checked that there is no error in the transmission. If the 4 datas accepted at the receiver are not same then error is reported at the receiver. These signals are serially transferred through RF to the reception point.

2. OUTPUT SIDE(reception)



Reception:

The receiver, up on receiving these signals, sends them to the decoder. The serial data is received at the data pin . The decoder then retrieves the original parallel format from the received serial data.

When no signal is received at data pin, it remains in standby mode and consumes very less current (less than 1µA) for a voltage of 5V. When signal is received by receiver, the oscillator gets activated. It then decodes the serial data and checks the address bits three times. If these bits match with the local address pins of decoder, then it puts the data bits on its data pins and makes the VT pin high. An LED which is connected to decoder works as an indicator to indicate a valid transmission. The corresponding output is thus generated at the data pins of decoder IC. Thus here decoder is used after the RF receiver to decode the serial format and retrieve the original signals as outputs. This output is then given to the controller.

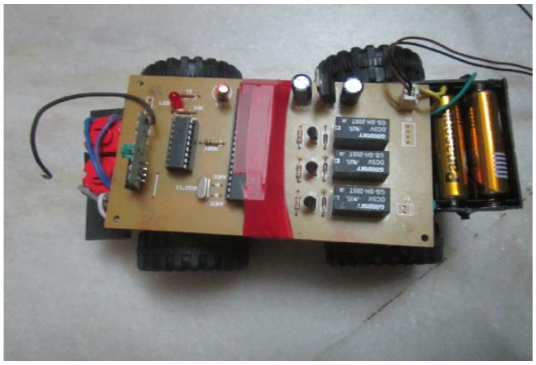
Controlling functions at receiver section:

Here the output from the decoder is serially given to the microcontroller, in which there is no need of analog to digital data conversion therefore we can use a simple basic microcontroller for the controlling functions. The microcontroller is programmed to transmit the output data in the digital format to the driver which is necessary to drive the motor.

Interfacing microcontroller with motor:

Generally, the motor and microcontroller cannot not be connected directly since excess current from motor will pass through microcontroller which can damage. Therefore we are using a driver connected between the motor and the microcontroller. Thus the relay circuit used here is connected as follows. The base of transistor is connected to microcontroller port pin, and the colletor of transistor is connected with the coil. A motor consists of two wires in which one wire is connected to the NC pin which is in contact of common pin(c) and the other to NO pin. Thus as the power supply is given, such that when the applied voltage is greater then cut off voltage, forward bias occurs. Hence the coil gets energized , so that the connection between C pin and NC pin gets changed to C pin and NO pin. Which means the motor which is connected to this relay circuit starts running according to the digital input.

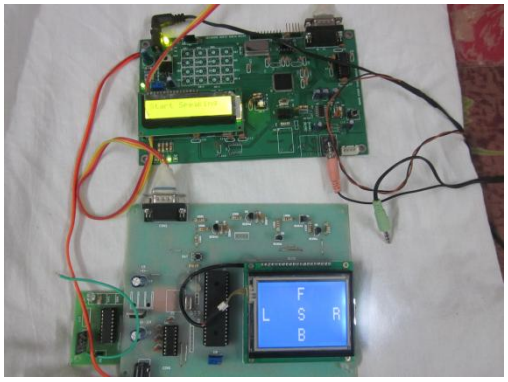
The output from the relay circuit provides excellent response to starting/stopping/reversing. The motors response to digital input pulses provides open-loop control, making the motor simpler and less costly to control. The motor can be operated in the left, right, forward reverse and stop directions with the help of the driver IC.



The functions of the motor is also programmed in the microcontroller with the help of the Keil software. As soon as the circuit is powered on, the controller fetches the codes from its internal memory. This output signal signal from the controller drives the DC motor in one direction. This enables the car to move forward. As soon as the output of the controller is pulled low to P0.0=0, the controller alters the spin of the DC motor, stops the DC motor, thereby stopping the car. For instance, to move in the Forward direction, the motor is interfaced with the microcontroller through relay driver circuit and program is loaded with the help of KEIL software in the microcontroller(i.e)

III EXPERIMENTAL RESULTS:

Based on the concepts and design mentioned in the previous part, this proposed concept is experimented as a project by us In this system, the experiment's results are focused on the usability and the effectiveness of the system. Here in this developed car is tested by giving voice commands through a simple mike, and the corresponding movement of car has been verified. Also when the input is given by pressing the touch input, the car moves correspondingly. One of the greatest advantage here is that, the input can be given in either ways as per the user's wish. It works well in all places including noisy areas, open spaces etc.,



FUTURE SCOPE:

The future scope of the proposed concept is the use of MEMS technology for voice recognition to control the car. Micro-Electro-Mechanical Systems consists of mechanical elements, sensors, actuators, and electrical and electronics devices on a common silicon substrate.The sensors in MEMS gather information from the environment through measuring mechanical, thermal, biological, chemical, optical, and magnetic phenomena. The electronics then process the information derived from the sensors and through some decision making capability direct the actuators to respond by moving, positioning, regulating, pumping, and filtering, thereby controlling the environment for some desired outcome or purpose.

CONCLUSION:

As per the experimental results, we developed this proposed concept and thus it is practically possible . Thus this system will help the physically challenged people to a greater extent and also improves the sophistication in driving.

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