Wireless Gestures Controlled Robot With Voice And Video Camera

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ABSTRACT

With the development of science and technology, in recent years medical fraternity has been developed to a greater extent. Usage of concepts like MEMS (Micro Electro Mechanical Systems), BIO medicine has been taking place in the field of medicine. Inspite of these many developments, people are becoming victims of a variety of diseases. Physically challenged persons like paralysis patients are one among those victims who need the help of some person or the other frequently.

The main aim of this project is to design and construct a gestures controlled device switching system and also wireless control of robot with a video camera on it for physically challenged persons. The user can wear this device to any movable part and with the simple gestures he can request the basic needs like water, food or medicine through robot with wireless control using acceleration sensor. User can also control the

electrical devices like light, fan etc; with the help of gestures.

Acceleration sensor is a highly sensitive sensor and capable of detecting the tilt. This sensor finds the tilt and operates the electrical devices and announces the basic needs depending on tilt. For example if the tilt is to the forward then the device will be “ON” for the first time then next time it will be “OFF”. In the same way, if the tilt is to the left

side then another device is going to be controlled. The tilt is in left side or right side direction the related need will be announced. This device is very helpful for paralysis and physically challenged persons.

An attempt has been made to develop something which is useful to the society and got succeeded. In future we can use this project in several applications by adding additional components to the project.

INTRODUCTION

This device is portable and this system operation is entirely driven by wireless technology. User can wear it to any movable part and can operate it by tilting the acceleration sensor.

This device makes use of a Relay and Triac for switching the devices and APR-9600 voice chip for audio announcements, DC motors for Robot movement, wireless camera to view the

surroundings, TV for viewing live images and Micro controller, which is programmed, with the help of embedded C instructions. This microcontroller is capable of communicating with transmitter and receiver modules. The acceleration based sensor detects the tilt and provides the information to the microcontroller (on board computer) and the controller judges whether the instruction is right movement or left movement instruction and controls the operation respectively.

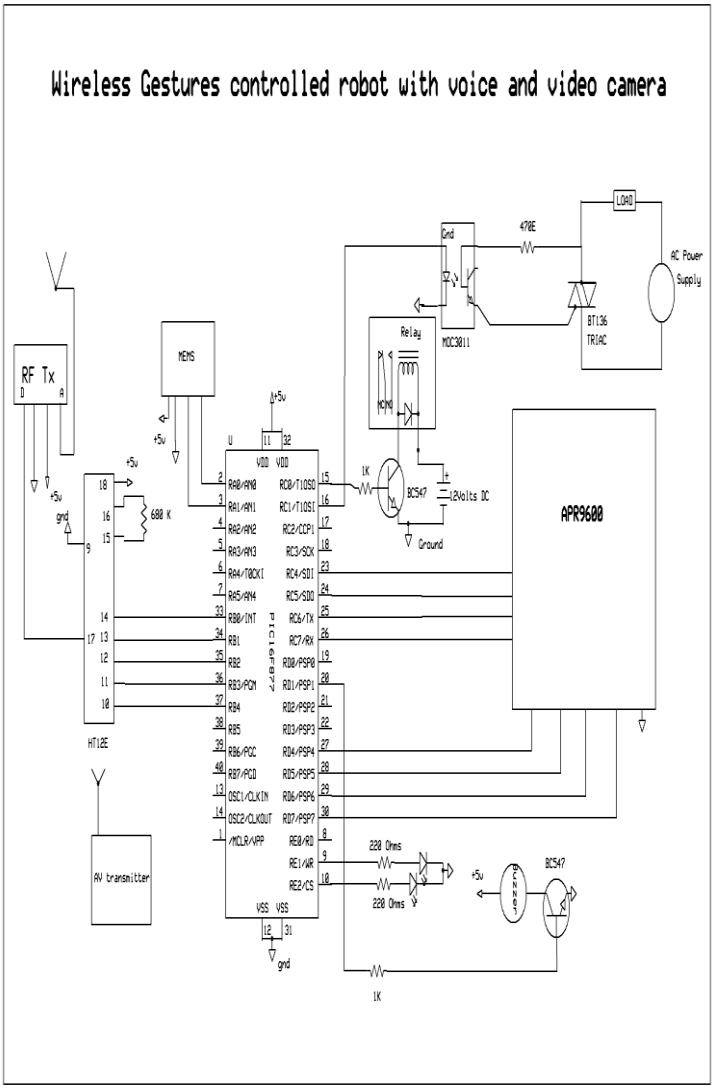
The main **objectives** of the device are:

1. Simple head movement based operation.
2. Voice announcement of needs.
3. Wireless data transmission.
4. Robot with video transmission system.
5. Live images display on TV.

DEVICE DESCRIPTION:

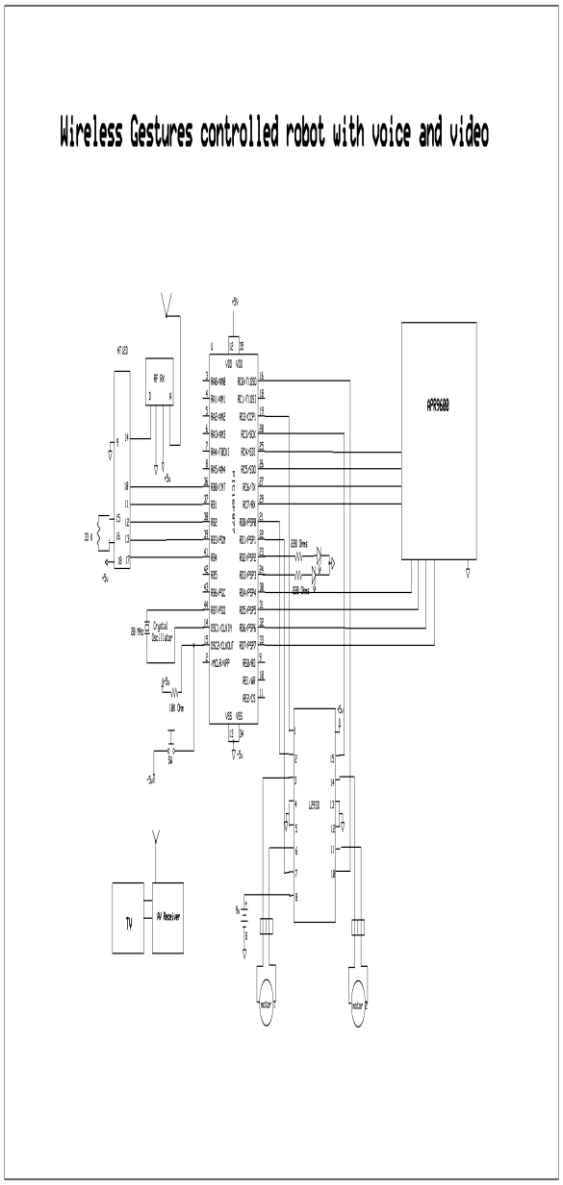
Schematic diagram and interfacing of PIC16F877A microcontroller with each module is considered**.**

TRANSMITTER SECTION



SCHEMATIC DIAGRAM OF TRANSMITTER SECTION

RECEIVER SECTION



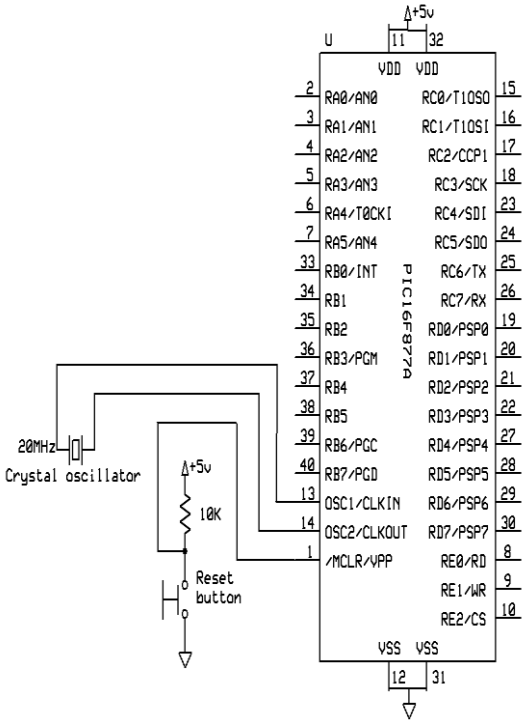
SCHEMATIC DIAGRAM OF RECEIVER SECTION

The above schematic diagrams of Wireless Gestures controlled Robot with Voice and Video Camera explains the interfacing section of each component with micro controller and MEMS accelerometer sensor, voice module.

The detailed explanation of each module interfacing with microcontroller is as follows:

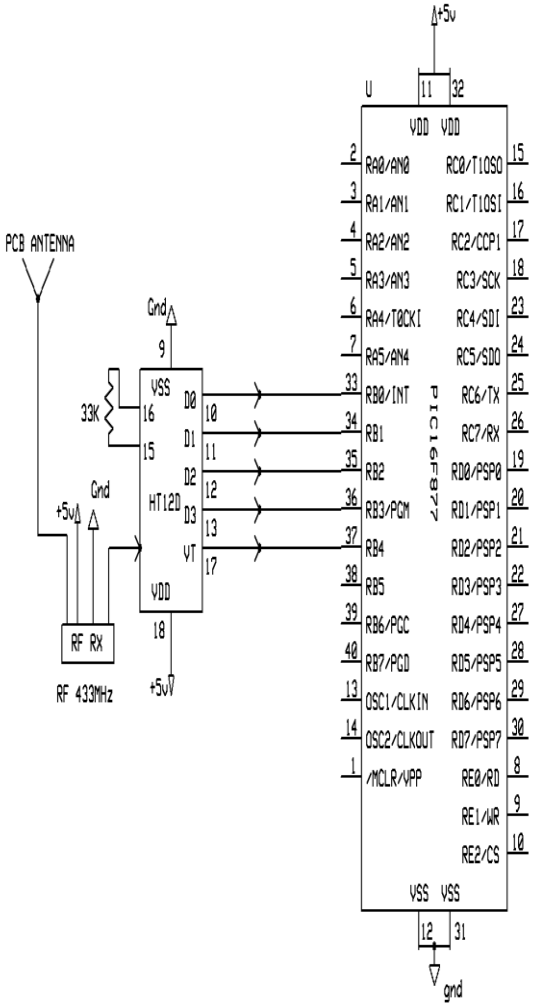
INTERFACING CRYSTAL OSCILLATOR WITH MICRO CONTROLLER

Fig 4.3 explains crystal oscillator and reset button interfacing to micro controller. The two pins of oscillator are connected to the 13th and 14th pins of micro controller; the purpose of external crystal oscillator is to speed up the execution part of instructions per cycle and here the crystal oscillator having 20 MHz frequency. The 1st pin of the microcontroller is referred as MCLR ie.., master clear pin or reset input pin is connected to reset button or power-on-reset.



CRYSTAL OSCILLATOR INTERFACING WITH MICRO CONTROLLER

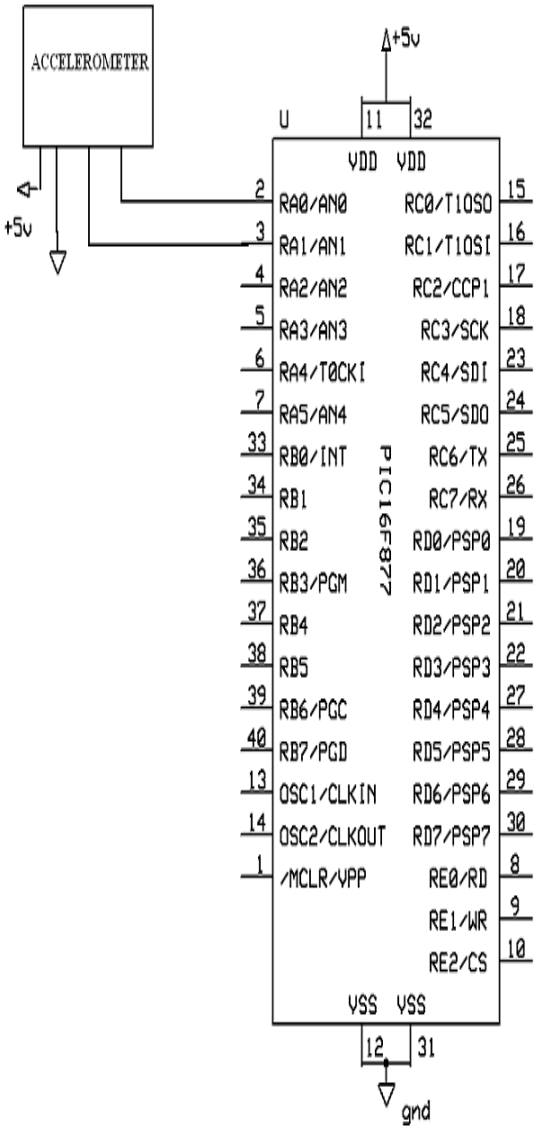
INTERFACING RF MODULE WITH MICRO CONTROLLER



RF MODULE INTERFACING WITH MICRO CONTROLLER

The above figure shows the interfacing of RF module with microcontroller. The D0,D1,D2,D3 pins of RF module are connected to 32 – 36 pins of microcontroller. The VT pin of RF module is connected to 37th pin of microcontroller.

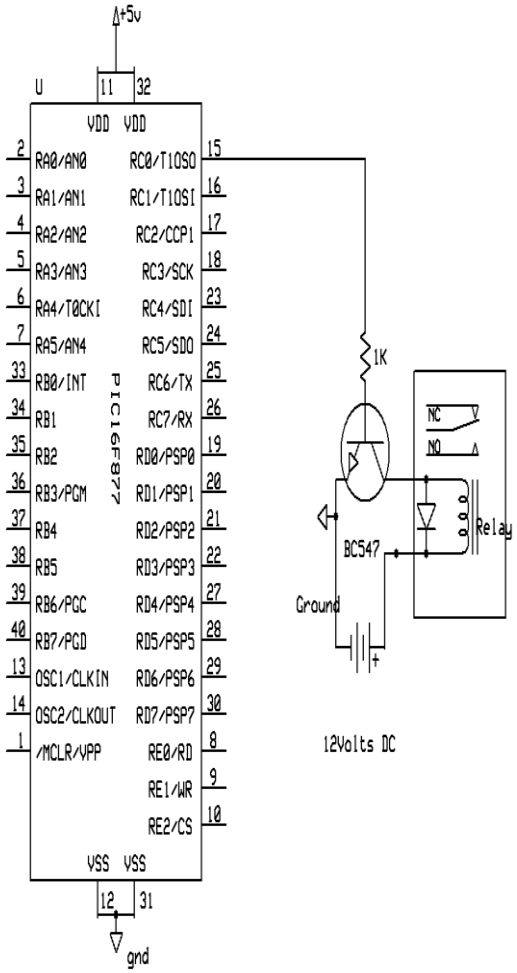
INTERFACING ACCELEROMETER WITH MICRO CONTROLLER



ACCELEROMETER INTERFACING WITH MICRO CONTROLLER

The above figure shows the interfacing of accelerometer with microcontroller. The X-axis and Y-axis output pins of accelerometer are connected to 2&3 pins of microcontroller.

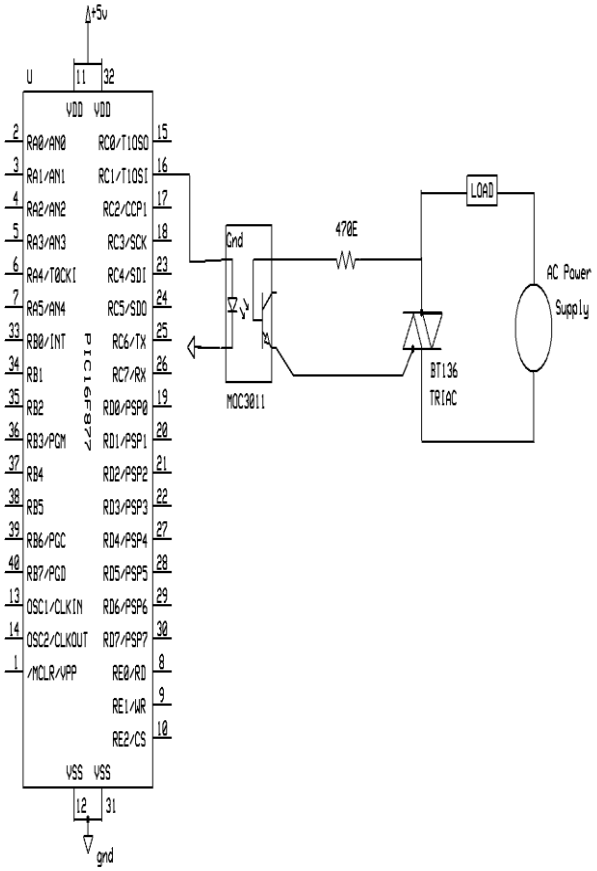
INTERFACING RELAY WITH MICRO CONTROLLER



RELAY INTERFACING WITH MICRO CONTROLLER

The above figure shows the interfacing of relay with microcontroller. The relay is connected to 15th pin of microcontroller.

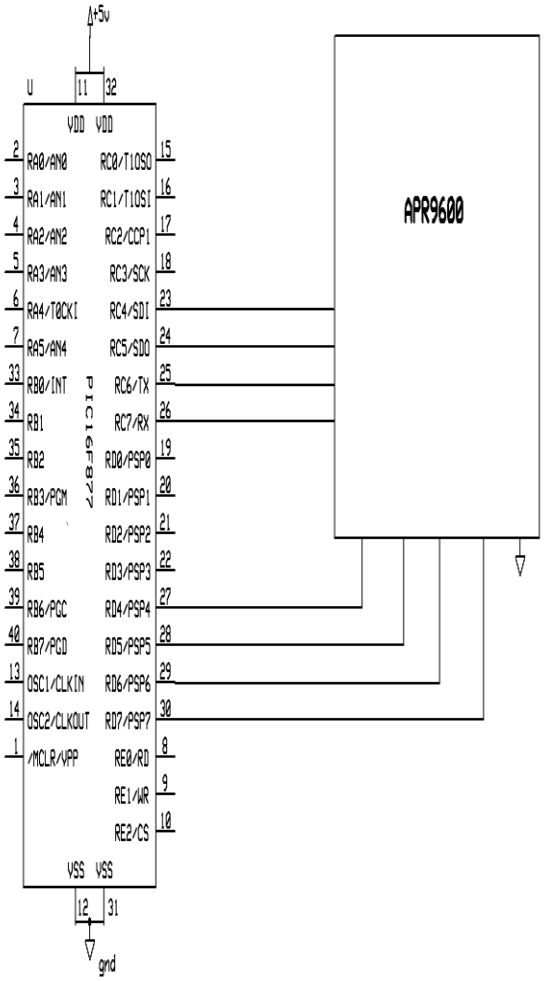
INTERFACING TRIAC WITH MICRO CONTROLLER



TRIAC INTERFACING WITH MICRO CONTROLLER

The above figure shows the interfacing of triac with microcontroller. The triac is connected to 16th pin of microcontroller.

INTERFACING VOICE MODULE WITH MICRO CONTROLLER

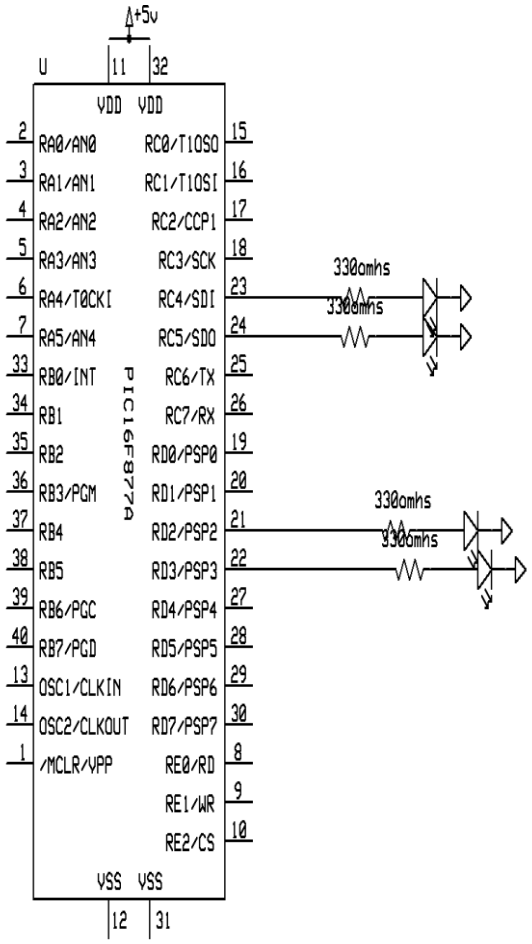


VOICE MODULE INTERFACING WITH MICRO CONTROLLER

The above figure shows the interfacing of voice module with microcontroller. The pins of voice module are connected to 23 – 26 pins and 27-30 pins of microcontroller.

LED INTERFACING WITH PIC16F877A

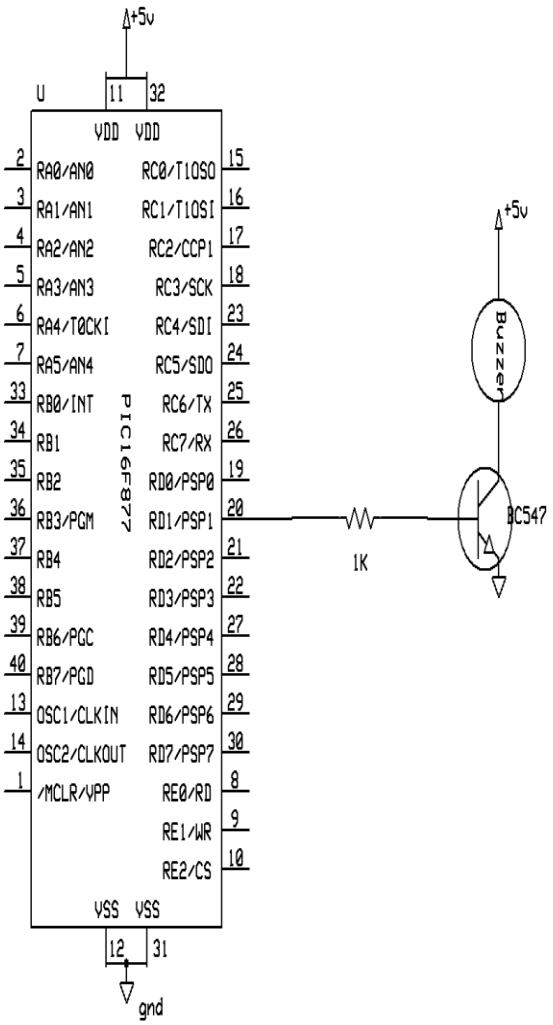
LED stands for Light Emitting Diode and these are connected to micro controller through resistors.



LED INTERFACING WITH PIC MICROCONTROLLER

The above figure shows the interfacing of LEDs with microcontroller. The LEDs are connected to 21, 22, 23, 24 pins of microcontroller.

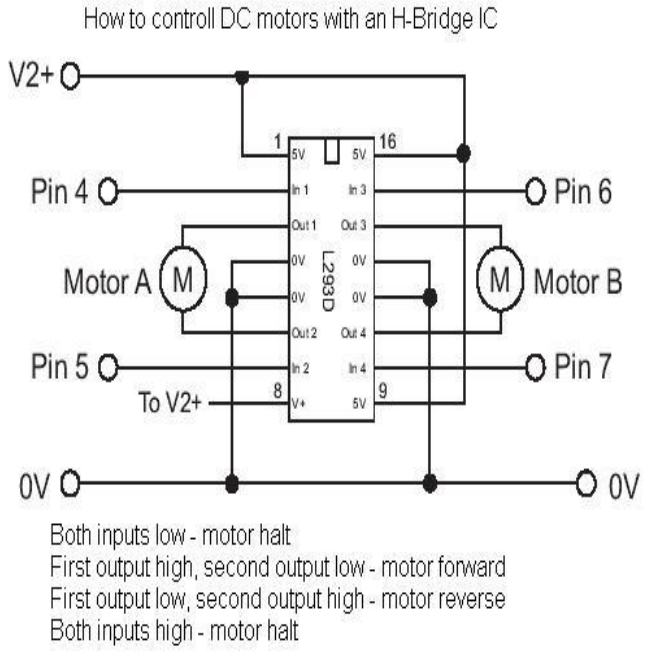
BUZZER INTERFACING WITH PIC16F877A



BUZZER INTERFACING WITH MICROCONTROLLER

The above figure shows the interfacing of buzzer with microcontroller. The buzzer is connected to 20th pin of microcontroller.

INTERFACING DC MOTOR DRIVER TO MICROCONTROLLER

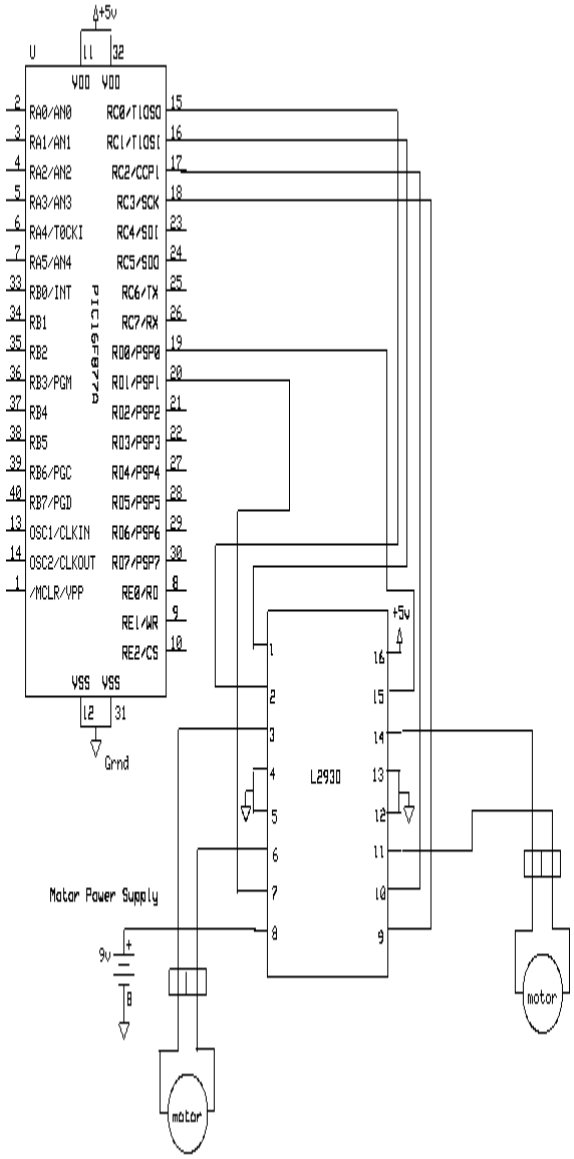


CONTROLLING OF DC MOTORS WITH A H-BRIDGE

From the figure, we can conclude that the DC Motor is not interfaced directly to the micro controller. It is interfaced through its driver L293D .As shown in the above figure L293D is a 16 pin IC in which the two motors are connected to pins 3,6,11,14of L293D and in turn the L293D is connected to Microcontroller to its Pins 4,5,6,7(Port A).

If the both the inputs to the Motor Driver is Low and high the motor is in halt position. If the first output is high, Second output is low then DC Motor moves forward .If the first output is low, second output is high as shown in the above figure then DC Motor moves reverse.

Here the pins of motor driver that is four input pins i/p1,i/p2,i/p3,i/p4 and heat sink pin and enable1 and enable2 pins and ground pin and vs pins are connected to micro controller pins c0,c1,c2,c3,d0,d1, ground, vdd respectively, here L293D is the motor driver and its having one 'H' bridge inbuilt to handle two motors by using two enable pins.



MOTOR DRIVER INTERFACING WITH MICRO CONTROLLER

RESULT

The project "Wireless Gestures controlled Robot with Voice and Video Camera" is designed such that a physically challenged person can control a wireless device switching system and a robot with simple gestures. The user can wear this device to any movable part and with the simple gestures he can request the basic needs like water, food or medicine through robot by using acceleration sensor. A wireless camera attached to the robot helps in finding any person in the vicinity of the patient and then the patient announces his/her needs to the person through robot.

This project has two sections, Microcontroller, an accelerometer, voice module; RF transmitter section, switches like relay, TRIAC is interfaced with transmitter section at the patient. The RF receiver at the receiver section has a robot which is interfaced to the micro controller. This project makes use of a Relay and Triac for switching the devices and APR-9600 voice chip for audio announcements, DC motors for Robot movement, wireless camera to view the surroundings, TV for viewing live images and Micro controller, which is programmed, with the help of embedded C instructions. This microcontroller is capable of communicating with transmitter and receiver modules. The acceleration based sensor detects the tilt and provides the information to the microcontroller (on board computer) and the controller judges whether the instruction is right movement or left movement instruction and controls the operation respectively.

This project can be extended using Zigbee technology, which increases operating wireless distance.

CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

Inspite of the usage of the highly advanced ICs, the project has the following advantages and disadvantages:

ADVANTAGES

1. Wireless controlling of robot using Accelerometer.
2. Wireless controlling of devices.
3. Fast response.
4. Efficient and low cost design.
5. Low power consumption.

DISADVANTAGES

1. Limited distance.

FUTURE SCOPE

In future we can use this project in several applications by adding additional components to this project. This project can be extended using Zigbee technology, which increases operating wireless distance.

By connecting wireless camera to the robot, then we can see the outer world from our personal computer only by using GPRS and GPS. We can

use this robot at so many fields and we can use to handle so many situations.

By connecting bomb detector to the robot, we can send it to anywhere i.e (battle field, forests, coal mines, to anyplace) by using our personal computer and we can able to detect the bomb at field, here sensor detects the bomb and gives information to micro controller and it gives the information to transceiver and it sends the information to the personal computer.

By connecting temperature sensor to the robot we can get the temperature of dangerous zones in personal computer itself instead of sending human to there and facing problems at field we can send robot to there and sensor will detect the temperature and it gives information to the micro controller and micro controller gives the information to the transceiver from that we can get the data at pc side. By connecting smoke sensor to the robot we can get the information related concentration of smoke or gases in respective field's i.e. (coal mines, dangerous zones, etc). sensor sense the information and it give to the micro controller and it gives to the transceiver and from that we get the information in personal computer.

By connecting corresponding instruments to the robot we can use it in agriculture for farming purpose. This robot can move either forward and backward and left and right depend upon our instructions so we can do some part of agriculture from pc only by using robot.

By connecting firing instrument and wireless camera to the robot we can fire the target from pc. Here by using camera we can see the opposite target and we can fire the target from personal computer by pressing selected button and we can easily handle the situations like Mumbai terrorist's attack without loss of human life's and we can decrease our soldiers effort too.

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