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GESTURE CONTROLLED ROBOTIC ARM

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Abstract:

Gesture Controlled Robotic arm is a robot which can be controlled by simple gestures. The user just needs to wear a gesture device which includes a sensor. The sensor will record the movement of hand in a specific direction which will result in the movement of the robotic arm in the respective direction. The robotic arm and the Gesture device are connected wirelessly via radio waves. The wireless communication enables the user to interact with the robot in a more friendly way.

Introduction:

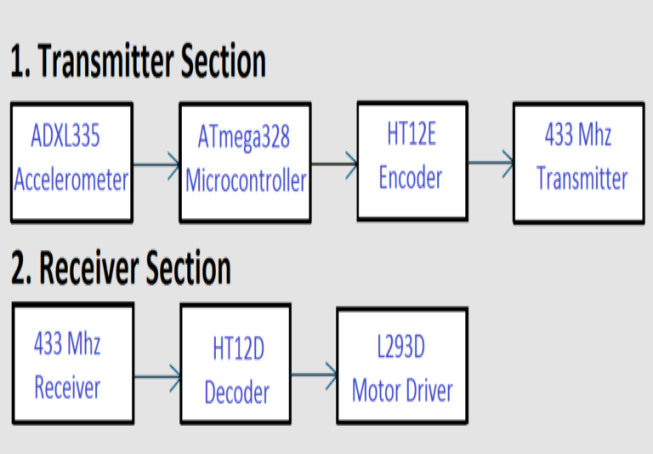
Recently, strong efforts have been carried out to develop intelligent and natural interfaces between users and computer based systems based on human gestures. Gestures provide an intuitive interface to both human and computer. Thus, such gesture-based interfaces can not only substitute the common interface devices, but can also be exploited to extend their functionality.

Literature review:

Our gesture controlled robot works on the principle of accelerometer which records hand movements and sends that data to the comparator which assigns proper voltage levels to the recorded movements. That information is then transferred to a encoder which makes it ready for bluetooth transmission. On the receiving end, the information is received wirelessly via bluetooth, decoded and then passed onto the microcontroller which takes various

decisions based on the received information. These decisions are passed to the motor driver ic which triggers the motors in different configurations to make the robot move in a specific direction. The

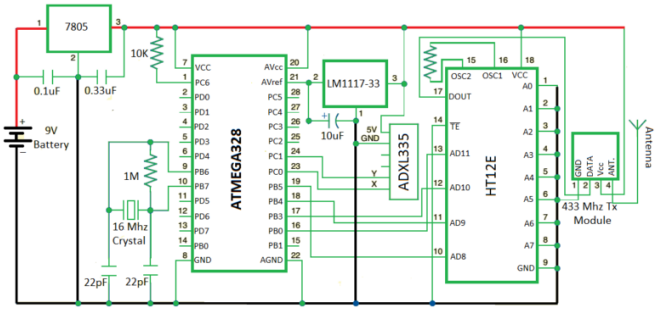
Block Diagram:



Implementation:

The RF modules work on the frequency of 433 MHz. It means that the carrier frequency of the RF module is 433 MHz. The RF module enables the user to control the robot wirelessly and with ease. The schematic of transmitting end can be seen below:

Gesture Controlled Robot Circuit:

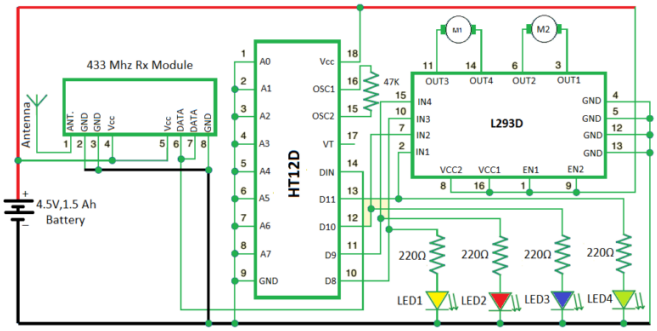


This transmitted signal is received by the RF receiver, demodulated and then passed onto the decoder IC. The decoder IC decodes the coded waveform and the original data bits are recovered. The input is a serial coded modulated waveform while the output is parallel. The pin 17 of the

decoder IC is the Valid Transmission (VT) pin. A led can be connected to this pin which will indicate the status of the transmission. In the case of a successful transmission, the led will blink.

The parallel data from the encoder is fed to the port 1of the microcontroller. This data is in the form of bits. The microcontroller reads these bits and takes decisions on the basis of these bits. What the microcontroller does is, it compares the input bits with the coded bits which are burnt into the program memory of the microcontroller and outputs on the basis of these bits. Port 2 of the microcontroller is used as the output port. Output bits from this port are forwarded to the motor driver IC which drives the motors in a special configuration based on the hand movements.

Gesture Controlled Robot Circuit:



The receiver part consists of 433MHz RF receiver module (RX1), HT12D decoder (IC5) and L293D motor driver (IC6) to run the motors. Here, receiver module RX1 receives the transmitted signal, which is decoded by decoder IC to get the same digital outputs. Four outputs of IC6 drive two motors. The robot moves as per tilt direction of the accelerometer in the transmitter.

At a dead stop, a motor produces no voltage. If a voltage is applied and the motor begins to spin, it will act as a generator that will produce a voltage that opposes the external voltage applied to it. This is called Counter Electromotive Force (CEF) or Back Electromotive Force (Back EMF). If a load stops the motors from moving then the current may be high enough to burn out the motor coil windings.

Limitations and future work:

- The on-board batteries occupy a lot of space and are also quite heavy. We can either use some alternate power source for the batteries or replace the current DC Motors with ones which require less power.

- Secondly, as we are using RF for wireless transmission, the range is quite limited; nearly 50-80m. This problem can be solved by utilizing a GSM module for wireless transmission. The GSM infrastructure is installed almost all over the world. GSM will not only provide wireless connectivity but also quite a large range.

- Thirdly, an on-board camera can be installed for monitoring the robot from faraway places. All we need is a wireless camera which will broadcast and a receiver module which will provide live streaming

Conclusion:

We achieved our objective without any hurdles i.e. the control of a robotic arm using gestures. The robot is showing proper responses whenever we move our hand. Different Hand gestures to make the robotic arm move in specific directions. r, an automated robot has been developed which works according to your hand gesture. The robot moves wirelessly according to palm gesture. The RF module is working on the frequency of 433 MHz and has a range of 50-80 meters. This robot can be upgraded to detect human life in earthquake and landslide by implementing the sensor accordingly. It can also be upgraded to bomb detecting robot as it has robotic arm it can also lift the bomb. GPS

system can be added to the robot by the help of which its location can be tracked.

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