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ArduinoBased Head GestureControlled Robot UsingWireless Communication

*Saurabh Kandalkar, Pratik Kadam**, Prof. A. B. Kadu
TY-BTech(Department of Instrumentation and control,Vishwkarma Institute Of Technology,Pune.)
(Assistent ProfessorVishwkarma Institute Of Technology,Pune.)

ABSTRACT
This paper describes the robustness of ardiuno based head movement controlled robot. This robot is controlled using motion sensor which is mounted on the head. In future there is need of robots which can be used to ease the human tasks and interact with the human easily. Our objective is to control the robot using head gesture. Accelerometer is used to detect the direction of head movement. In order to full-fill our requirement a program has been written and executed using a microcontroller system. By observing the results of experimentation our gesture formula is very competent and it's also enhance the natural way of intelligence and also assembled in a simple hardware circuit.
***Keywords*–**Accelerometer, Arduino, Head movement, robot,wireless.

I. INTRODUCTION

Now days, human are working on developing the new techniques of interacting with the robot. The gesture is one of these techniques which is more flexible than other. A gesture is a form of non-verbal communication in which visible bodily actions communicate particular messages. It comprises of sound, light variation or any type of body movement. Based upon the type of gestures, they have been captured via Acoustic (sound), Tactile (touch), Optical (light), Motion Technologies , data glove, Bluetooth, infrared beams etc. Motion Technology has succeeded in drawing the attention of researchers from different parts of the world.

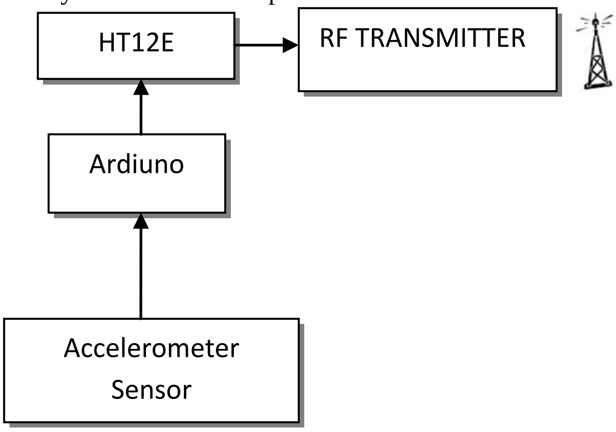
II. HARDWARE DESIGN:

Our requirement is to move the robot without any direct contact with it. Gesture is used to achieve this. Gesture is a nonverbal and easier physical action. A sensor that takes gesture as its input can do this job. The Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output

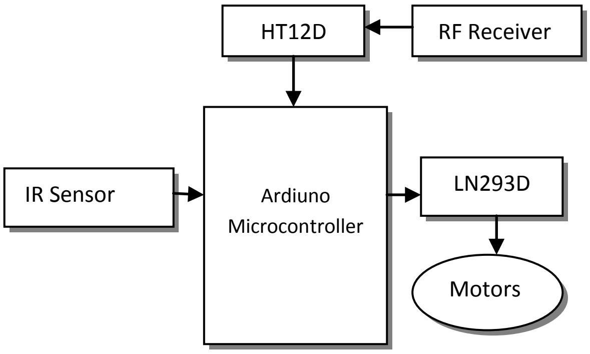
load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. The motion sensor is used is accelerometer. The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. RF module, as the name suggests, uses radio frequency to send signals. These signals are transmitted at a particular frequency and a baud rate. A receiver can receive these signals only if it is configured for that frequency. A four channel encoder/decoder pair has also been used in this system. The input signals, at the transmitter side, are taken through accelerometer while the outputs are monitored by motion of the robot.

This radio frequency (RF) transmission system employs Amplitude Shift Keying (ASK) with transmitter/receiver (Tx/Rx) pair operating at 434 MHz. 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. Here HT12E & HT12D have been used as encoder and decoder respectively. The encoder converts the parallel inputs (from the accelerometer) 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. This output is given to the ardiuno. Motor Driver LN293D is connected to the ardiuno microcontroller. The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other highcurrent/ high-voltage loads in positive-supply applications.

Transmitting section: The above transmitting diagram indicates the transmitting section which includes an accelerometer whose output is in continuous form as the encoder can only understands the digital data we are using the comparator for converting the analogy data to digital data and this data is to be transmitted so we are using radio transmitter which transmits the serial data converted by the encoder from parallel data.

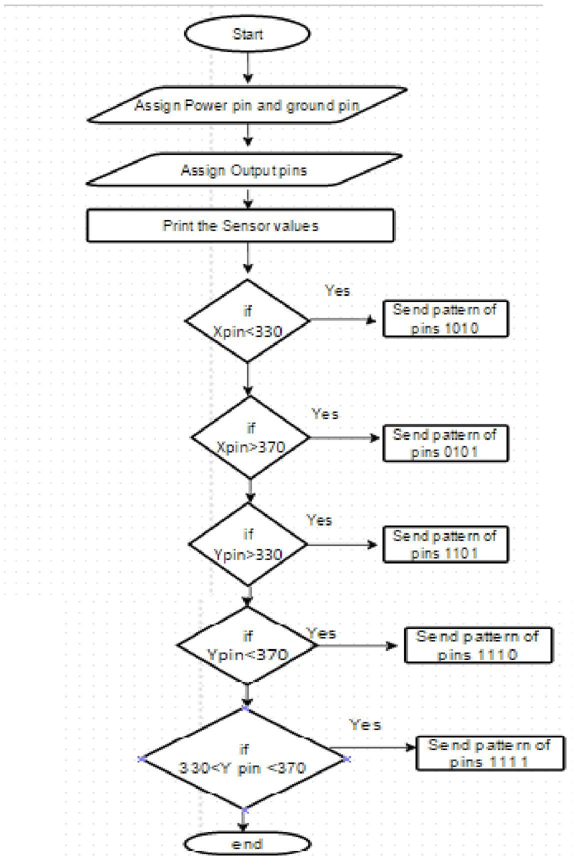


Receiving Section: The above receiving block diagram indicates the receiver section the transmitted data by the transmitter is received by the RF receiver and the serial data is given as input to the decoder which converts the serial data to parallel data and is given as input to the microcontroller which consists of a predefined program to fulfil our task, depending upon the data received the controller generates some signals to the motor driver.here the purpose of the motor driver is to drive the motors.



III. SOFTWARE PART

We have developed program using arduino IDE. First We checked the reading of accelerometer output on serial monitor of arduino software and then observed the changes in outputs in our required directions. We have given a range of x-pin and y-pin for doing particular pins high. Here we are using four pins which are connected via RF to another driver circuit to drive motors. By sending the particular bit configurations or patterns we are making the vehicle to move in that particular direction accordingly.



IV. EXPERIMENTAL RESULTS:-

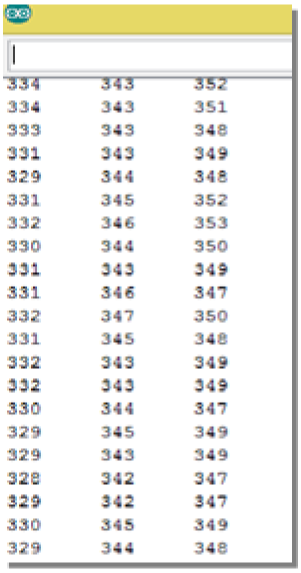
When we move our head downward robotic vehicle moves in forward direction. By moving head moving upward our vehicle moves in reverse direction and when we make our head stable that is Looking straight the robotic vehicle stops. When we move our head towards right side the vehicle takes the right turn & respectively when we move our head towards left side the vehicle takes left turn.

V. FIGURES AND TABLES

1.Direction of Robot according to the outputs of accelerometer:-

Direction	Analog Values	Transferred Data
Forward	Xpin<330	1010
Reverse	Xpin>370	0101
Right	Ypin>330	1101
Left	Ypin<370	1110
Stop	330<Ypin<370	1111

2.Outputs of Accelerometer on Serial Monitor



334	343	352
334	343	351
333	343	348
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331	346	347
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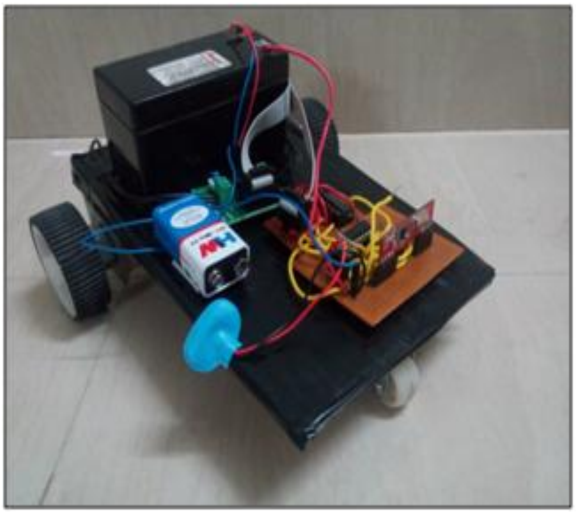
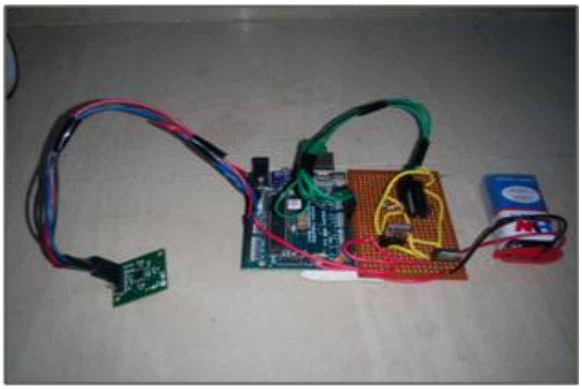


BOT ASSEMBLY



GESTURE DETECTOR ASSEMBLY

MOUNTING ON HEAD(CAP)

VI. CONCLUSION

We proposed a fast and simple algorithm for head gesture recognition for controlling robot. We have demonstrated the effectiveness of this computationally efficient algorithm on real images we have acquired. In our system of gesture controlled robots, we have only considered a limited number of gestures. Our algorithm can be extended in a number of ways to recognize a broader set of gestures. The gesture recognition portion of our algorithm is too simple, and would need to be improved if this technique would need to be used in challenging operating conditions. Reliable performance of head gesture recognition techniques in a general setting require dealing with occlusions, temporal tracking for recognizing dynamic gestures, as well as 3D modelling of the hand, which are still mostly beyond the current state of the art.

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