INTRODUCTION

Gesture recognition can be termed as an approach in this direction. It is the process by which the gestures made by the user are recognized by the receiver. Gestures are expressive, meaningful body motions involving physical movements of the fingers, hands, arms, head, face, or body with the intent of:

- conveying meaningful information or
- interacting with the environment.

They constitute one interesting small subspace of possible human motion. A gesture may also be perceived by the environment as a compression technique for the information to be transmitted elsewhere and subsequently reconstructed by the receiver.

Classification

hand and arm gestures:
Recognition of hand poses, sign languages, and entertainment applications.

head and face gestures:
Nodding or shaking of head; direction of eye gaze; etc.;

body gestures:
Involvement of full body motion, as in; tracking movements of two people interacting outdoors; analyzing movements of a dancer for generating matching music and graphics;

Benefits:
A human computer interface can be provided using gestures:
Replace mouse and keyboard
Pointing gestures
Navigate in a virtual environment
Pick up and manipulate virtual objects
Interact with the 3D world

DESCRIPTION

A. Architecture of recognition system

A basic gesture input device is the word processing tablet. In the system, two dimensional hand gestures are sent via an input device to the computer's memory and appear on the computer monitor. These symbolic gestures are identified as editing commands through geometric modelling techniques. The commands are then executed, modifying the document stored in computer memory. Gestures are represented by a view-based approach, and stored patterns are matched to perceived gestures using dynamic time warping. View-based vision approaches also permit a wide range of gestural inputs when compared to the mouse and stylus input devices.

Hand and arm gesture

Hand gestures are the most expressive and the most frequently used gestures. This involves:

1) a posture

Static finger configuration without hand movement, and
a gesture

dynamic hand movement, with or without finger motion.

Gestures may be categorized as

**Gesticulation**: spontaneous movement of hands and arms, accompanying speech. These spontaneous movements constitute around 90% of human gestures. People gesticulate when they are on telephone, and even blind people regularly gesture when speaking to one another;

**Language like gestures**: gesticulation integrated into a spoken utterance, replacing a particular spoken word or phrase;

**Pantomimes**: gestures depicting objects or actions, with or without accompanying speech;

**Emblems**: familiar signs such as “V for victory,” or other culture-specific “rude” gestures;

**Sign languages**: well-defined linguistic systems. These carry the most semantic meaning and are more systematic, thereby being easier to model in a virtual environment.

**Representation of hand gesture**

Representation of hand motion includes:

Global configuration: six DOF of a frame attached to the wrist, representing the pose of the hand.

Local configuration: the angular DOF of fingers.

**COMPONENTS USED**

The following components are used for making a working model of accelerometer based gesture recognition:

- Atmel Atmega 8 microcontroller
- L293D Motor Controller IC
- 3-axis Accelerometer
- RF module for wireless transmission and reception. It includes an RF transmitter and an RF receiver
- HT12E 12 pin encoder
- HT12D 12 pin decoder
- 7805 Voltage Regulator
- 7812 Voltage Regulator
- LCD
- Power Supply circuitry

The detailed description of each is given below.

**PIN CONFIGURATION OF ATMEL ATMEGA 8 MICROCONTROLLER**

```
PDIP

(RESET) PC8 1
(RXD) PC0 2
(TXD) PC1 3
(INT0) PC2 4
(INT1) PC3 5
(XCK0) PC4 6
(VCC) 7
(GND) 8
(REF) 9
(KTAL/TOSC1) PB6 10
(KTAL2/TOSC2) PB7 11
(T1) PB6 12
(AIN0) PB0 13
(AIN1) PB7 14
(ICI) PB0 15
```
The g-cell is a mechanical structure formed from semiconductor materials (polysilicon) using semiconductor processes (masking and etching). It can be modeled as a set of beams attached to a movable central mass that move between fixed beams. The movable beams can be deflected from their rest position by subjecting the system to an acceleration (Figure 3). As the beams attached to the central mass move, the distance from them to the fixed beams on one side will increase by the same amount that the distance to the fixed beams on the other side decreases. The change in distance is a measure of acceleration. The g-cell beams form two back-to-back capacitors. As the center beam moves with acceleration, the distance between the beams changes and each capacitor's value will change, \( C = \frac{A \varepsilon}{D} \). Where \( A \) is the area of the beam, \( \varepsilon \) is the dielectric constant, and \( D \) is the distance between the beams. IC uses switched capacitor techniques to measure the g-cell capacitors and extract the acceleration data from the difference between the two capacitors. IC also signal conditions and filters (switched capacitor) the signal, providing a high level output voltage that is ratio metric and proportional to acceleration.

**HAND HELD UNIT**

In this unit we are using a Avr series of microcontroller which is having inbuilt ADC. Accelerometer XY signals are applied to the ADC input of microcontroller for conversion of analog signal into digital form. Then these signal are compared with a threshold value using programming and transmitted in a form of 4 bit data signals to a RF encoder IC HT 12E. This IC converts this 4 bit information into serial form by which it can be transmitted by a RF transmitter.

**BASE UNIT**

In base unit RF signal being received by the receiver is applied to decoder IC from where it is applied to a H bridge circuit for controlling two dc motors. H bridge is one of the popular circuit used for controlling directions of a dc motor for a single dc motor it requires two input, hence four input are required for two dc motor.
H BRIDGE MOTOR CONTROLLER

This chip is designed to control 2 DC motors. There are 2 INPUT and 2 OUTPUT PINs for each motors. The connections is as follows.

<table>
<thead>
<tr>
<th>Connections</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>STOP</td>
<td>LOW</td>
<td>LOW</td>
</tr>
<tr>
<td>CLOCKWISE</td>
<td>LOW</td>
<td>HIGH</td>
</tr>
<tr>
<td>ANTICLOCKWISE</td>
<td>HIGH</td>
<td>LOW</td>
</tr>
<tr>
<td>STOP</td>
<td>HIGH</td>
<td>HIGH</td>
</tr>
</tbody>
</table>

just need to set appropriate levels at two PINs of the microcontroller to control the motor.

Since this chip controls two DC motors there are two more output pins (output3 and output4) and two more input pins(input3 and input4). The INPUT3 and INPUT4 controls second motor in the same way as listed above for input A and B. There are also two ENABLE pins they must be high(+5v) for operation, if they are pulled low(GND) motors will stop. The following program starts the motor runs it one direction for some time and then reverses the direction.

ACKNOELEDGEMENT

It is our immense pleasure to express deepest sense of gratitude and indebtedness to our highly respected Prof. AMIT AGRAWAL H.O.D, Electronics & comm. Engineering , Takshshila Institute of Engg. and Tech , Jabalpur (M.P.).His invaluable guidance , inspiration , continuous encouragement , sincere criticism and sympathetic attitude could made this Project possible.

We would take this opportunity to express deep sense of gratitude and acknowledgement to prof. S.R SONI, Principal, Takshshila Institute of Engg. and Tech , Jabalpur (M.P.).for his encouragement , inspiration and kind approval of this dissertation. We thank him for providing required resources from the college. We are indebted to our highly respected and esteemed guide Prof. SHOBHIT VARM, for his / her valuable and precious suggestions during making of this project.

We are equally indebted to supporting staff members of Department of Mechanical Engineering, TIETECH, Jabalpur who have helped us directly or indirectly.

Last but certainly not the least, we express our gratitude to Almighty for his blessings and courage.
REFERENCES

This academic article was published by The International Institute for Science, Technology and Education (IISTE). The IISTE is a pioneer in the Open Access Publishing service based in the U.S. and Europe. The aim of the institute is Accelerating Global Knowledge Sharing.

More information about the publisher can be found in the IISTE’s homepage:  
http://www.iiste.org

CALL FOR JOURNAL PAPERS

The IISTE is currently hosting more than 30 peer-reviewed academic journals and collaborating with academic institutions around the world. There’s no deadline for submission. **Prospective authors of IISTE journals can find the submission instruction on the following page:** http://www.iiste.org/journals/  
The IISTE editorial team promises to the review and publish all the qualified submissions in a **fast** manner. All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Printed version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information:  http://www.iiste.org/book/

Recent conferences:  http://www.iiste.org/conference/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digital Library , NewJour, Google Scholar