AUTOMATIC HAND GESTURE BASED REMOTE CONTROL FOR HOME APPLIANCES

Mrs. Rupali Deshmukh[1], Abhishek Bange[2], Akshay Nerkar[3], Sandip Mane[4]

1, 2, 3, 4 Department Of Electronics and Telecommunication Engineering,
Dr. D. Y. Patil Institute of Engineering and Technology, Pimpri, Pune.

--***---

Abstract –Nowadays we use Infrared Remote for controlling the home appliances.Primary motive of proposing the new system of hand gesture remote control is to remove the need to look in to thehandheld remote and to search for a specific key for specific function. This project presents a novel system to control home appliances through hand gesture as a remote control device. The system will referred to as handmote in this project. It uses real time image processing for hand gesture recognition in infrared vision using Arduino Board microcontroller development board. This project proposes a possible solution to control the gadgets for physically challenged and blind people.

Key Words:HAND GESTURE, IR, WEB CAMERA, AURDINO.

1 .INTRODUCTION

Communication and the ability to interact with the environment are basic human needs. Millions of people worldwide suffer from such severe physical disabilities that they cannot even meet these basic needs. This system proposes unique system interface of hand gesture recognition with web camera.

Gestures can be recognized by using sensors, camera, accelerometer etc. Hand gesture -based gesture recognition performs matching or modelling in time domain, there is no feature extraction stage. The detected and recognized hand gestures are used as the command signals for controlling devices, some user interfaces, e.g., icon-based interface or motion-based interface are adjusted accordingly in order to support natural hand control.

Hand Gesture Based Remote is a device to replace all other remotes used in households and perform all their functions. Normally in homes, remotes are used for appliances like TV, CD player, Air Conditioner, DVD Player and Music System. Remotes are also used for lights ON/OFF control, Door Opener etc. All these devices can be controlled by one Universal Remote. Though the technology is synchronized for all remote, there is no agreed convention on code format for data transmission. Communication between remote and appliances is established by following a predefined code.

1.1Types of gestures:

- Hand gestures
- Body gestures
- Finger point gestures
- Gestures with voice

1.1.1 Users:

Most of the research of the survey use or target the general users of any age. Initially it was for computers users to work on the objects or presentations. Wheelchairuser is also highly considered for accelerometer based gesture controlled system. Most of the last five years investigation are focused on elderly and disable people.

1.1.2 Technology:

The ways of recognizing the gesture can be considered as a significant progress of the technology. Process of the image processing technology has played an important role here.

Gesture have been captured by using:

- Infrared beam
- Data gloves
- Still camera
- Wired technology like gloves,pendant,infrared signal network server etc

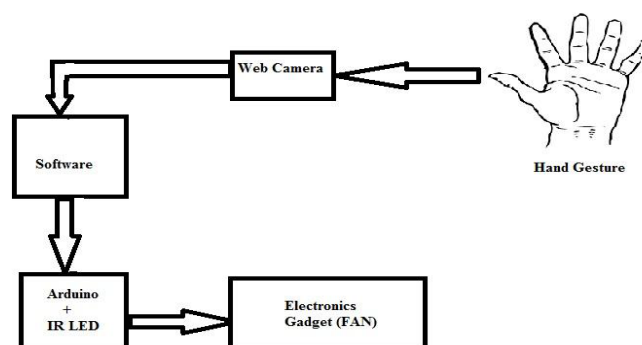## 2. Block Diagram:

2.1 Block Diagram

Fig 1: Functional Block Diagram.

System consist of :
1. Hand gesture
2. Web Camera

3. Arduino Board
4. IR LED
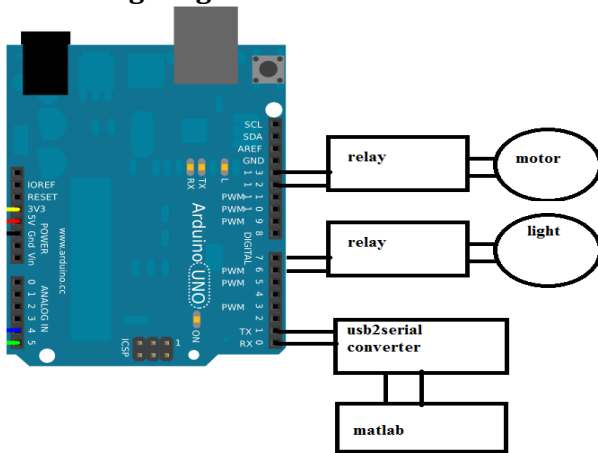5. Electronics Gadget

2.2 Interfacing Diagram:

Fig 2: Interfacing Diagram.

2.3 Block Diagram Explanation and Working:

Working:

1) Accelerometer: It is used for making the gestures. Gestures made are up, down, left, right. It basically operates in tri-axial mode but for convenience we are just considering the 2 axes. Web camera capture images and give to the microcontroller with the help of accelerometer.

2) IR transmitter and Arduino Board: The data to be transmitted is given to micro-controller through accelerometer. Then the data is converted into digital form with the help of inbuilt A/D Converter present in micro-controller. The digitized data is then transmitted through IR LEDs.

3) IR receiver: In the receiver section, IR signals are detected by IR receiver module. Based on the hand gestures made at the transmitter, the devices (bulb, fan, DVD player) connected at the receiver are controlled.
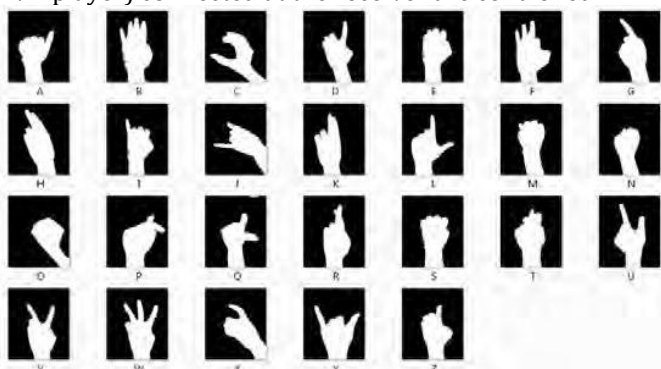

Fig 3: Different Hand Gestures.

3. AURDINO BOARD:

- It is an Open-source hardware platform based on an Atmel AVR 8-bit microcontroller.
- Open source development environment and easy-to learn language and libraries based on Wiring language. Integrated development environment based on processing programming environment Available for Windows, Mac, Linux.
- Until now Over 300000 boards have been manufactured. Arduino Due is based on a 32-bit ARM Cortex.

Types of ArduinoBoard:
- Arduino Uno
- Arduino Leonardo
- Arduino LilyPad
- Arduino Mega
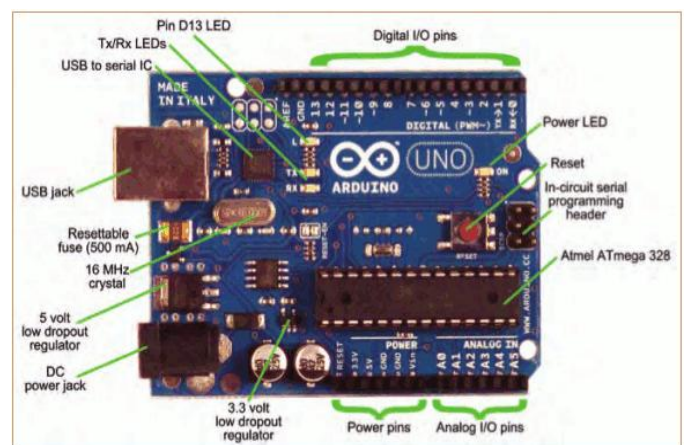- Arduino Nano
- Arduino Mini
- Arduino Mini Pro.

Fig 4: Arduino board.

3.1 The ATmega328 microcontroller used by the Arduino board:

- The ATmega328 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture.
- Single clock cycle, the ATmega328achieves throughputs approaching 1 MIPS per MHz processing speed.
- 32 general purpose working registers.
- Ten times faster than conventional CISC microcontrollers.
- 32 Kbytes of In-System Programmable Flash Program memory.
- 512 bytes EEPROM.
- 2 Kbyte SRAM, 32 general purpose I/O lines, 32 general purpose working registers.
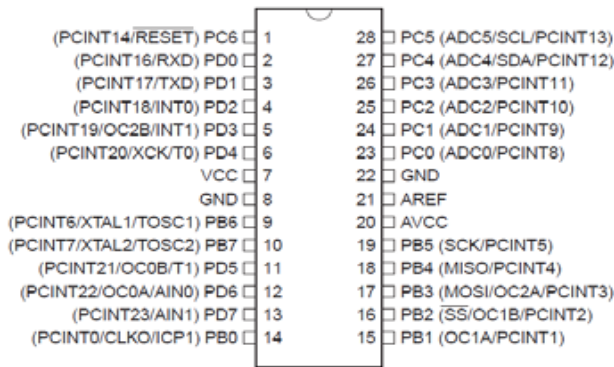- 8-channel, 10-bit ADC.

Fig 5: ATmega328.

4. WEB CAMERA:

Fig 6: Web Camera

Camera used in handmote prototype is a simple web camera.The exact modification did to this camera is shown in figure.Light spectrum contains visible light and infrared light.Aim is to use infrared spectrum is that camera will not see the visible spectrum but only IR light reflected back from hand.Now this camera will give infrared region images of environment to the software application.

Here is a list of Fuze recommended webcam model

- Logitech c920c enterprise webcam.
- Creative 1080p hd webcam.
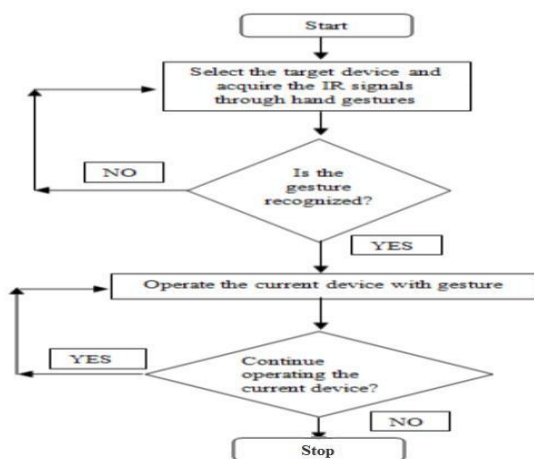- Microsoft lifecamhd.

5.Flowchart:

Fig 7: Flow Chart.

6. Advantages and Applications:

6.1 Advantages:
- It consumes low power.
- It is user handy.
- Low cost.
- It requires small space.
- Device can be controlled more comfortably.

6.2 Applications:
- It can be used by patient suffering from Paralysis.
- It can be used to play simple video games.
- It can be used to control various home appliances.
- It can be used in home theatre system where short distance communication is required.
- Suitable for physically challenged people to operate the devices within room.

7. Conclusion:
- The objective of this project is to develop such a system which will help physically impaired to control home appliances by hand gestures using accelerometer.
- This provides comfort and convenience for common as well, especially in home theatre.
- This technology is also used for home automation for physically impaired.

8. REFERENCES:

[1] Shiguo Lian, Wei Hu, Kai Wang, **"*Automatic User State Recognition for Hand Gesture Based Low-Cost Television Control System*"**, IEEE 2014.

[2] Ahmad Akl. Chen Feng and Shahrokh Valaee, "*A Novel Accelerometer-Based Gesture Recognition System*", IEEE Transactions On Signal Processing, Vol. 55, 13 March 2004.

[3] Matthias Rehm, Nikolaus Bee, Elisabeth André, Wave Like an Egyptian - Accelerometer Based Gesture Recognition for Culture Specific Interactions, British Computer Society, 2007

[4] Gang Pan, Jiahui Wu, Daqing Zhang, Zhaohui Wu,Yingchun Yang, Shijian Li, "*GeeAir: A universal multimodal remote control device for home appliances*", Springer-Verlag London Limited 2010,10 March 2010.

[5] M. Ebrahim Al-Ahdal & Nooritawati Md Tahir, "*Review in Sign Language Recognition Systems''* Symposium on Computer & Informatics(ISCI),pp:52-57, IEEE ,2012.