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Real Time Sign Language Recognition using Python

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ABSTRACT: - Our project mainly addresses to facilitate deaf and dumb person's life style. Dumb and deaf people communicate with common people throughout the world using hand gestures. But common people face difficulty in understanding the gesture language. To overcome this real time issues system is developed. This is a user friendly, cost effective system which reduces communication gap between dumb and deaf with ordinary people. The proposed system captures a hand gesture using camera. Image processing of captured gesture is done. The proposed system having four modules such as: pre-processing and hand segmentation, feature extraction, sign recognition and sign to text and voice conversion. Segmentation is done by using background subtraction algorithm. Finding contour area, convex hull, hull area, solidity. Also find the angle between two fingers and aspect ratio of hand. Finding the defects of hand using convex hull. Amplified audio corresponding to each processed gesture is the final output.

KEYWORDS: - AVR controller, Python Language, Image processing, Thresholding, Voice Conversion.

I.INTRODUCTION

Sign Language is a gesture language which visually transmits sign patterns using hand-shapes, orientation and movements of the hands, arms or body, facial expressions and lip-patterns to convey word meanings instead of acoustic sound patterns. Different sign languages exist around the world, each with its own vocabulary and gestures. Some examples are ASL(American Sign Language), GSL (German Sign Language), BSL (British Sign Language), and so on. This language is commonly used in deaf communities, including interpreters, friends, and families of the deaf, as well as people who are hard of hearing themselves. However, these languages are not commonly known outside of these communities, and therefore communication barriers exist between deaf and hearing people. Sign language communication is multimodal; it involves not only hand gestures (i.e. manual signing) but also non-manual signals. Gestures in sign language are defined as specific patterns or movements of the hands, face or body to make out expressions.

Speech and gestures are the expressions, which are mostly used in communication between human beings. Our project mainly analyses the visual data from a camera. A processing platform of Python used for recognizing these signs or gestures. These recognized gestures are further converted into speech. The intention of sign language translation is to translate the normal sign language or gestures into speech and make easy communication with dumb and deaf people. In order to improve the life style of dumb and deaf people the proposed system is developed. Image processing is the basic technique implemented in this project. Processing involves basic image processing techniques such as blurring, masking and eroding along with coded program logic. A continuous real time stream of video data captured by the pi camera is the basic input to the processing system. Image processed input visual data is mapped on to its corresponding audio. The audio signal is then amplified using an amplifier.

Advances in information and communication technologies have led to the emergence of Internet of Things (IoT). The hype around the IOT (Internet of Things) and smart technologies is building at a phenomenal pace. Handicapped individuals are the general population physically or mentally challenged. A Dumb and Blind people confronts such a variety of issues in the general public. Handicapped in the sense it is the condition of vulnerability and furthermore it alludes to the restrictions experienced by the disabled individual in correlation with the exercises of the unimpaired of comparable age and sex. This paper aims to lower the obstruction in communication. It depends on the



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need of building up an electronic gadget that can make an interpretation of gesture based communication into speech so as to make the communication between the mute groups with overall population conceivable. Motions of the hands are detected by the glove for Dumb people and it will be changed over into voice so ordinary individuals can comprehend their look motion in a gesture based communication. Also we can control home appliances using this gesture automatically. To design and implement an intelligent system for deaf and dumb person's life style. Gestures in sign language are defined as specific patterns or movements of the hands, face or body to make out expressions. Speech and gestures are the expressions, which are mostly used in communication between human beings. Our project mainly analyses the visual data from a camera. A processing platform of Python used for recognizing these signs or gestures. These recognized gestures are further converted into speech. Therefore, the rest of the paper is organized as follows, such as: in Section II give the literature survey, Section III provides proposed system and explain the actual system. Finally, Section V, VI gives the algorithm and conclusion.

II.LITERATURE SURVEY

The researches and some research have given suggestions clearly related to the innovations about the controlling of the signals in concern about the present population. Despite the information so as to there are individual viewpoints as well as many focus to specify from the investigation, however this impression consider have additional eagerness used for the accompanying classifications, because these are very important regions of movement based UI. The vast majority of the explores depend available motions. Coordinate control by means of hand stance is quick, however restricted in the quantity of Choices. There are looks into about body signal, finger point development [1].

In the early stage, analysts utilized gloves with microcontroller and associated with the gadget through a cable. Motion of the head and signal produced in addition to the voice were additionally within the examination, yet hand motion was the most overwhelming some portion of motion control framework. Clients Most of the examination of the study utilize or focus on the general clients of all ages. At first it was generally for PC clients to take a shot at the articles or introduction. Wheelchair clients prefer signal controlled system which is based on the accelerometer sensor [2].

The extent of the application reveals us the significance of more examines in a action controlled structure. Maximum applications are to replace predictable information devices like console and mouse, open application for elderly-impair like accelerometer. Presently individuals can unite with any media utilizing signal to control wide variety of consumptions. We have motion based business items in 2003. Gestures have been trapped by using infrared bars, information glove, still camera, wired and many between accompanying progressions like gloves, pendant, and infrared flag arrange server and so forth. Late vision procedure, video and web cam based motion response has made it conceivable to catch any intuitive motion for any ubiquitous gadgets from the regular environment with 3D perception. Latest and wonderful surveys of the work done in gesture recognition field by many scientists are described in [3].

In this paper human Interface Devices have reliably been a confinement for joint effort between the human and propelled world. In any case it is further less requesting to collaborate with the PC if trademark signals, for instance, just a tilt of the arm or a point could control the mouse. The same here is recognized through an assortment of sensors whose data is arranged and mapped to a particular parameter that can be controlled in the physical world. The paper looks at the structure prototyped to control the mouse of a PC through movements and tilt of the wrist. The same is recognized utilizing Accelerometer, Reed Switch and a Flex sensor. From this paper I have information about sensors used to get the flag data and to controlling the mouse and comfort remotely [4].

This paper gives information about flag affirmation to moronic and hard of hearing individuals and this structure is made with the help of microcontroller. To see movements is set as the essential tenacity of glove diagram. For this we require flex sensor, voice module and a microcontroller. The sensors rely on upon the surveyed of sign pictures, which uses the measure of sensors in upgrade. AT89S52 is used as the microcontroller. For remote data convey we can use Bluetooth contribute android convenient. Resulting to evaluating the hardware required for the affirmation of signs, the glove is formed physically. As opposed to microcontroller I am supplanting Raspberry Pi 3 show in my venture to make it open remotely using web [5].

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III. PROPOSED METHODOLOGY

3.1 Block Diagram:

The block diagram showing the architecture of the proposed system is shown in Figure.1 The system mainly consist of a high definition, Arduino Uno module and an audio amplifier. Real time continuous stream of video is being captured using the PC camera, which is an optical instrument for recording or capturing images which could be stored locally, transmitted to another location or both. Python language is used for. By using this sign language we can ON/Off the light or fan as shown in block diagram.

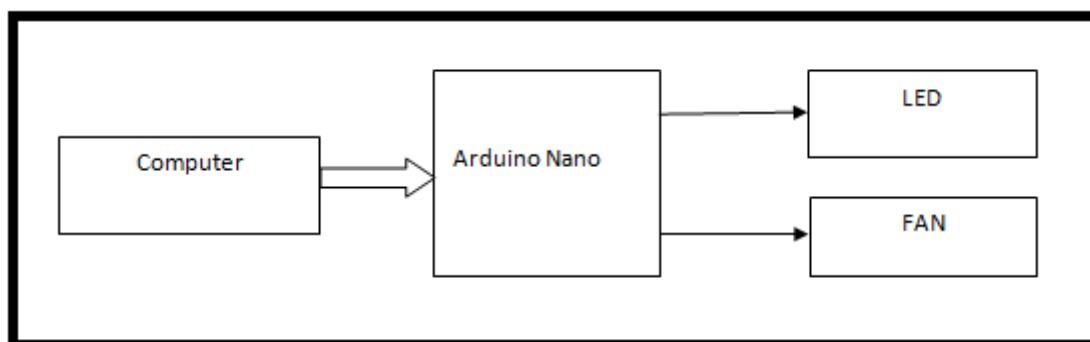


Fig 3.1.1 Block Diagram of System

3.2 Elements of Block Diagram:

1. Arduino Nano:-

The Arduino Nano is the latest version after the Duemilanove with an improved USB interface chip. Like the Duemilanove, it not only has an expanded shield header with a 3.3V reference and a RESET pin (which solves the problem of how to get to the RESET pin in a shield) AND a 500mA fuse to protect your computer's USB port, but ALSO an automatic circuit to select USB or DC power without a jumper! The Uno is pin and code-compatible with the Duemilanove, Diecimilla and older Arduino so all your shields, libraries, code will still work.

2. LED:-

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a pn-junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electro-luminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor. An LED is often small in area (less than 1 mm²) and integrated optical components may be used to shape its radiation pattern.

3. Exhaust Fan:-

Their noiseless operation along with aesthetic looks, high utility and performance make these multipurpose machines a must have. With a sleek and trendy design, Havells exhaust fans are lightweight and carry out their functions silently. These fans also last for a longer period as they have a rust proof body and blades. Though, it is essential that these fans are taken good care of so that they last and function for long. Provided that these fans perform an important function, it is required that every home has at least one installed in their kitchen as well as bathroom.

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IV. FLOW CHART

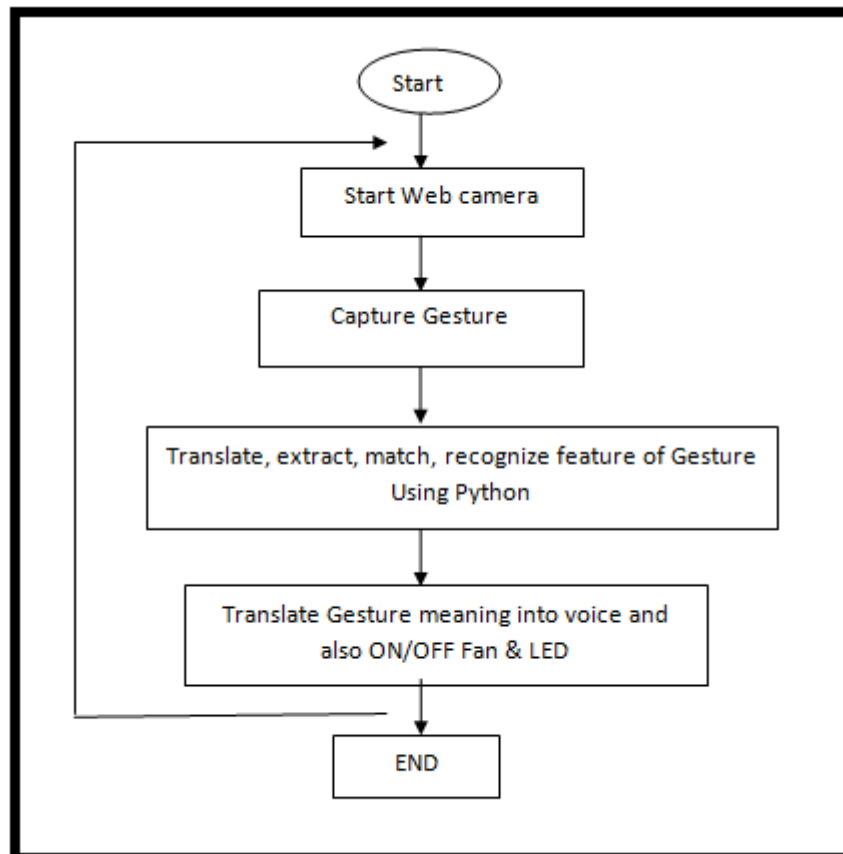


Fig. 4.1 Flowchart of System

V. ALGORITHM

- Step 1:** Reading image from camera and applying pre-processing techniques like gamma correction, blurring.
 - Step 2:** Hand Segmentation using background subtraction algorithm
 - Step 3:** Hand detection using thresholding and dilation
 - Step 4:** Finding contours of hand for getting shape of hand
 - Step 5:** Finding contour area, convex hull, hull area, solidity
 - Step 6:** Also find the angle between two fingers and aspect ratio of hand
 - Step 7:** Finding the defects of hand using convex hull
 - Step 8:** Finally classifying using solidity, aspect ratio, convex defects and angle
 - Step 9:** if image (sign) == database image, then
ON the led or Fan or speak the meaning of that sign
- Repeat **Step 9**
END



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VI.CONCLUSION

This project aims to develop a useful tool that uses gesture recognition for reducing the communication barrier between the deaf and dumb community and the normal people. This project was meant to be a prototype for checking the feasibility of recognizing gestures using image processing. Using the designed project it is possible to convert hand gestures into speech which can be understood easily by normal people. The idea of the proposed system has greater possibilities of future expansions. If more programming logic is introduced, more number of gestures could be incorporated. It could be developed into a multilingual speech enable system. Also our system ON/OFF the home devices through the hand gesture such as LED and Fan. From this gesture (sign) our system tells the meaning through the audio output.

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