HAND GESTURE RECOGNITION SYSTEM USING DEEP LEARNING

Dr. Mary Praveena S[1], Pavithra P[2], Teena sree G[3], Winonah Rajendran[4]

[1]Associate Professor, Dept. of Electronics and communication Engineering, Sri Ramakrishna Institute of technology, Tamil Nadu, India.

[2,3,4]UG Student, Dept. of Electronics and communication Engineering, Sri Ramakrishna Institute of technology, Tamil Nadu, India.

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Abstract - *Physical contact with other people and also things inside hospital serves to be one of the major reasons for transmission of any kind of microorganisms. Here we consider a hand gesture-based system that interprets a user's hand gestures in real time to manipulate objects within an environment and in today's world many people are suffering from paralysis and most of the paralytic patients are dependent on care takers. Primarily, sign language was used by deaf and also people who can hear but having problem in speaking therefore, the approach used in this paper is vision based. In addition to this, the system continuously monitors the patient's heart beat and body temperature. If the body temperature or heart beat is abnormal, emergency mail will be directly sent to show the abnormalities with respect to patient so that the doctor can reach the patient on time. This system is also used for patients in ICU provided with the buzzer for emergency call.*

Key Words: **Networks, Hand Gesture Recognition, Image Enhancing.**

1. INTRODUCTION

Computer information technology is penetrating into the hospital domain at a very high rate. It is important for such technologies to be used in a safe and sound manner [1]. The fundamental point of building hand gesture recognition framework is to make a characteristic interaction among human and computer where the perceived gestures can be utilized for controlling electronic devices .The aim of this paper is to design the hand gesture recognition device, which is used for patient to take care of themselves without any care taker. In this device, patient can operate electronic devices such as fan, light and emergency buzzer using hand gesture also Patient can also check their pulse rate and body temperature themselves. In critical stage, if the patient's pulse rate or body temperature becomes abnormal emergency mail will be automatically sent to the doctor [2] .A radical evolution of the current Internet into a Network of interconnected objects that not only harvests information from the environment (sensing) and interacts with the physical world (actuation/ command/control), but also uses existing Internet standards to provide services for information transfer, analytics, applications, and communications. A web-camera placed above the screen is used to capture the sequence of images. The image of hand is segmented using color cues, a black and white threshold, and various other morphological image processing operations. The movement of hand is interpreted with the help of a tracking module[3]. The image is then cropped tightly around the blob of the hand and another accurate segmentation is performed.

1.1 EXISTING METHODOLGY

The first proposed technology controls the television set functions using hand gestures which used visual feedback from the television the number of gestures were limited using static method. The accuracy of that system was about 83.06% to 86.02% .The existing system does manual operations and identifies status when sensors increased and is controlled through human. A motion-based hand system is more natural form of human-computer interaction and could allow a greater number of gestures to be classified, thus enhancing controllability. However, such an approach requires additional execution time, which has a negative impact on the user experience.

1.2 PROPOSED METHODOLOGY

The major problem faced by people at hospitals is the transmission of disease-causing microorganisms through physical contact. Hence, we have proposed a system which uses hand gesture recognition to perform various primary functions [4]. This enhances safety in the premises of the hospital making it easier for the doctors to monitor the patients and for the patients to carry out their duties independently without much movement. The webcam is connected through pc to the Arduino for gesture recognition and detection. Connecting the temperature sensor and heart rate sensor for detecting the body temperature and heart beat rate of the patient. Various functions are stored for each gesture.

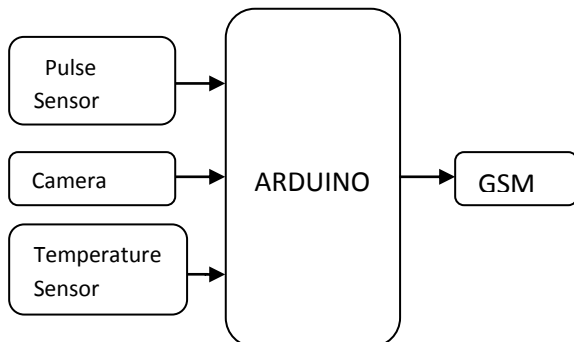## 2. HAND GESTURE RECOGNITION SYSTEM

Fig -1: Block diagram of the hand gesture recognition system

The existing system has identify status when sensors increased, manual operation for transferring information and controlling through human. The proposed system has the effective safety system and power saving, systematic approach for monitoring and controlling system and transferring messages through mail.

The block diagram given above in fig 1. shows that the system consists of sensors and camera. The camera is used to recognize the hand gestures[5]. Captured gesture image is transferred to the pc and for further processing [6]. The projector receives the information from the pc & projects it on to any particular surface or screen and control the appliances.
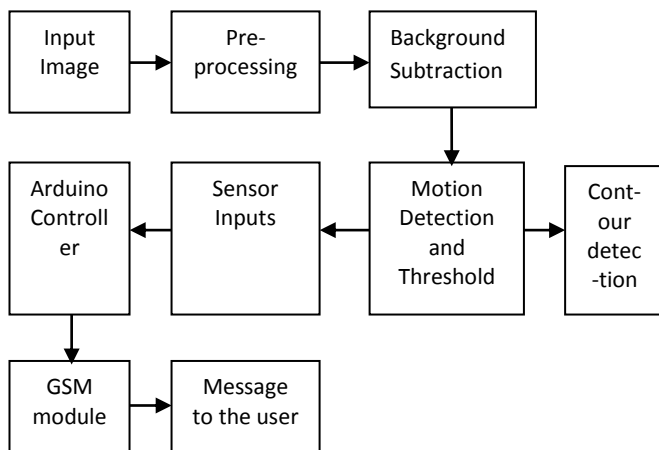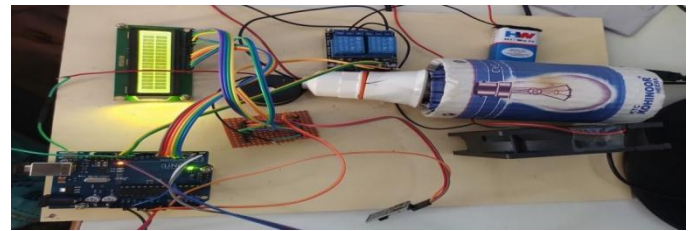

Fig -2: Flow of operations

Fig -3: Experimental setup of the hand gesture recognition system.

The working of this project is as follows: In the fig 1, the following connections the Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and is easy-to-use hardware and software [7]. The Uno can be programmed with the Arduino Software (IDE). Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a message - and turn it into an output - activating a motor, turning on an LED, giving a mail alert and so on. Pulse Sensor is a well-designed plug-and-play heart-rate sensor for Arduino through which user can take live heart rate or pulse rate data and can feed it wherever it wants. Temperature sensor is a device which helps in detecting the temperature and measures the temperature through an electrical signal it requires a thermocouple or RTD (Resistance Temperature Detectors)[8]. A webcam is connected to a computer for the gesture capturing. Liquid crystal display is an electronic device which is compact in size and has the technology which is widely used for televisions and other types of displays such as computer screens. A buzzer is a tiny speaker which can be connected directly to an Arduino by applying an electric signal with right frequency, the crystal can make sound. The values of the temperature and the pulse is displayed on the LCD and in case of emergency a mail is sent to the doctor/nurse from the registered mail id indicating that the patient has some problem.

3. RESULT AND DISCUSSION

This section shows the final outcomes obtained by applying the techniques mentioned in this paper. The result is fed into the system using a webcam which captures the hand gestures as images. There are 10 gestures that have been trained for performing 10 distinct functions. The images given below are the gestures that are to be used to perform their respective function.

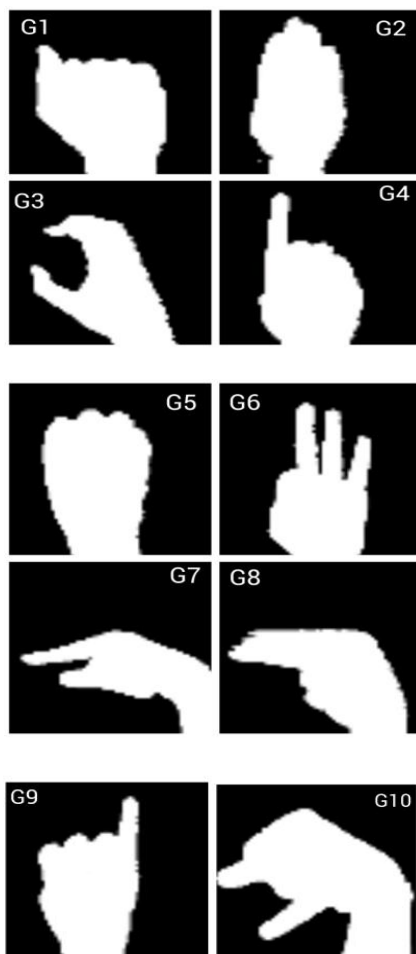| Sl No.	Figure 4	Functions
1	G1	FAN ON
2	G2	FAN OFF
3	G3	LIGHT ON
4	G4	LIGHT OFF
5	G5	BUZZER ON
6	G6	BUZZER OFF
7	G7	EMERGENCY MAIL
8	G8	HELP MAIL
9	G9	TEMPERATURE DISPLAY
10	G10	PULSE RATE DISPLAY

Table 1: Gestures and its functions

Fig -4 : Gestures for the various functions

In the below Fig 5. shows the complete setup of the project. The component-setup, computer system in the place of processor and the webcam constitute the three distinct parts of the hardware. Also the Figure shows the real time conversion of hand gestures into the black and white (0s and 1s) format.This black and white image is compared with the trained set and thus the functions are performed. This is processed by Deep Learning. Deep learning, which is a broader version of machine learning, enables a system totake decisions on it's own from the previously data. This reduces the necessity of human intervention which makes the functioning of a system simpler and user-friendly.
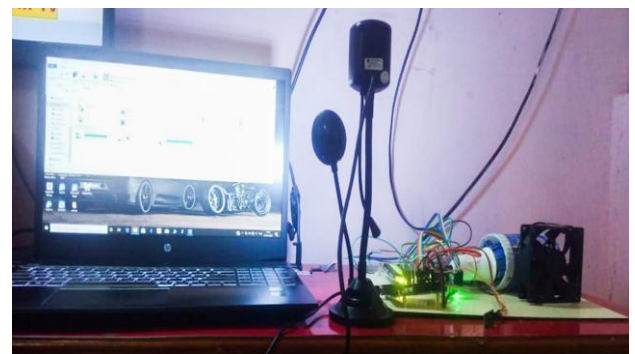

Fig -5: Hardware module setup

4. CONCLUSION

Thus a prototype hand gesture recognition system for hospital application has been   programmed, constructed and tested successfully. This system serves as an aid for the patients and the doctors in carrying out certain primary functions without any physical contact which is the main reason for the transmission of any kind of microbes. The system mentioned in the paper would bring about a huge change in maintaining hygiene and safety in the premises of the hospital.

ACKNOWLEDGEMENT

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