Gesture Control Home Automation

S.L.Lavanya[1] Indrani Das[2] Neha Singh[3] Nabeela Parveen[4] Monalisa Swain[5]

[1,2,3,4,5]U.G Student

[1,2,3,4,5]Department of Electronics & Tele-Communication Engineering

[1,2,3,4,5]RSRRCET, C.G, India

Abstract— Controlling the home appliances and electronics gadgets through an infrared remote control is now in general. But the same controlling tasks can be done more easily. Primary motive of proposing the new system of hand gesture remote control home automation system is to remove the need to look into the hand held remote and to search for a specific key for specific function. This abstract presents a small introduction to control home appliances through hand gestures are remote control device. The system will refer to as gesture control home automation system. It uses real time image processing for gesture recognition in infrared vision using embedded system and development board, microcontroller based. This abstract proposes a possible solution to control the gadgets for physically challenged and blind people, also for everyone. As we know the technology changing, we must go hand in hand with it, and explore more about it. Gesture recognition solutions can be divided regard to the type of gesture used for controlling a computer. Gesture can be considered as a change of the hand position (hand movement) in a particular time interval with a given velocity or as a change of the hand shape (forming ellipse with thumb and the index finger).Gesture that belong to the first group are typically called dynamic gestures while there from the second group are often referred to as static gesture. Second type of gesture can be a sign or a symbol given to a cell phone, like we have to give an indication of say 1, 2, 3 like that also known as online gesture.

Key words: Gesture, Home Automation, Gesture Technology

I. INTRODUCTION

Gesture recognition is a familiar and accessible concept to most people in western society. All that is needed in order to use gesture recognition is a smartphone with some form of gesture recognition application. Most phones even come with a gesture-recognition application pre-installed, such as in iphone. Gesture -recognition exists in a multitude of different environments other than phones and might be found in some automated phone queues or ticket-booking services to name a few.[4]

Home automation might not be as well-known as gesture recognition but it is still an area that offers a lot of products and solutions for people that are interested in a more comfortable or manageable lifestyle. Most home systems come in complete solutions with different kinds of features and possibilities. They can manage everything from controlling a television set and lighting to door locks and other security features.

Gesture recognition is a topic in computer science and language technology with the goal of interpreting human gestures via mathematical algorithms. Gestures can originate from any bodily motion or state but commonly originate from the face or hand. Current focuses in the field include emotion recognition from face and hand gesture recognition Users can use simple gestures to control or interact with devices without physically touching them. However, the identification and recognition of posture, gait, proxemics, and human behaviors is also the subject of gesture recognition techniques.[2]

Different ways of tracking and analyzing gestures exist, and some basic layout is given is in the diagram above. For example, volumetric models convey the necessary information required for an elaborate analysis, however they prove to be very intensive in terms of computational power and require further technological developments in order to be implemented for real-time analysis. On the other hand, appearance-based models are easier to process but usually lack the generality required for Human-Computer Interaction.[5]

The ability to track a person's movements and determine what gestures they may be performing can be achieved through various tools. Although there is a large amount of research done in image/video based gesture recognition, there is some variation within the tools and environments used between implementations
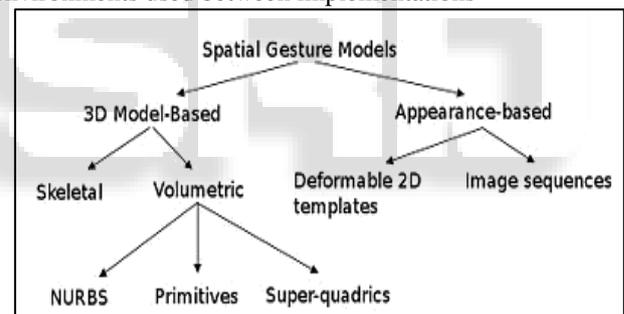

Fig. 1: Gesture Technology

Depending on the type of the input data, the approach for interpreting a gesture could be done in different ways. However, most of the techniques rely on key pointers represented in a 3D coordinate system. Based on the relative motion of these, the gesture can be detected with a high accuracy, depending on the quality of the input and the algorithm's approach. In order to interpret movements of the body, one has to classify them according to common properties and the message the movements may express.

Home automation or smart home (also known as domotics or domotica) is the residential extension of building automation and involves the control and automation of lighting, heating (such as smart thermostats), ventilation, air conditioning (HVAC), and security, as well as home appliances such as washer/dryers, ovens or refrigerators/freezers that use WiFi for remote monitoring. Modern systems generally consist of switches and sensors connected to a central hub sometimes called a "gateway" from which the system is controlled with a user interface that is interacted either with a wall-mounted terminal,

mobile phone software, tablet computer or a web interface, often but not always via internet cloud services.

While there are many competing vendors, there are very few world-wide accepted industry standards and the smart home space is heavily fragmented. Popular communications protocol for products include X10, Ethernet, RS-485, 6LoWPAN, Bluetooth LE (BLE), ZigBee and Z-Wave, or other proprietary protocols all of which are incompatible with each other. Manufacturers often prevent independent implementations by withholding documentation and by suing people.[11]

Gesture recognition enables humans to communicate with the machine (HMI) and interact naturally without any mechanical devices. Using the concept of gesture recognition, it is possible to point a finger at the computer screen so that the cursor will move accordingly.

II. METHODOLOGY

In this section, we are going to find out how the development board is prepared. The basic block diagram of our project is as shown:
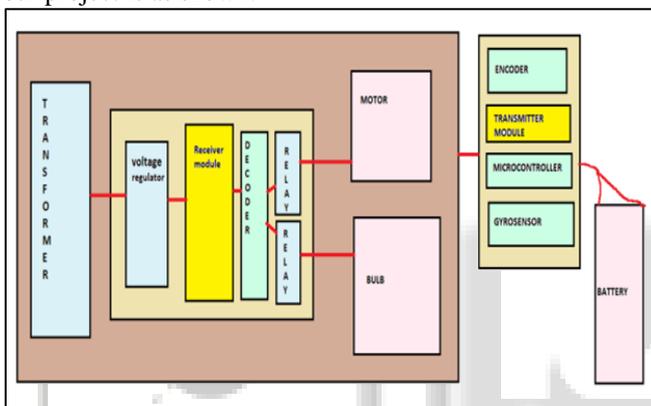

Fig. 2: Block diagram of gesture control home automation

The basic methodology of our project is it involves the PCB boards for receiver and transmitter parts differently.

Here a transformer of 12-0-12 is used to converts 230v ac voltage to 12v. it is further connected to a receiver board, which has a diode. The bridge diode converts ac signal to dc signal which is then connected to a capacitor. The capacitor converts pulsating dc signal into pure dc.

The voltage regulator is then connected, which converts 12v to 5v for the sake of microcontroller. The receiver board has also included the receiver module as well as a decoder for getting information of what task has to be done at the moment. The receiver board also contains two relays for motor and bulb respectively. The transmitter board has the main components of the project which contains a microcontroller and an encoder for proper transmission. It also has transmitter module for its working and a switch for on and off. The transmitter board has a gyro sensor which has an electromagnetic ball inside it for which the movement of that ball decides the task of automation over there. Basically, the transmitter is a separate body, which looks like a remote as well, and it works on a battery of 9v (dc). The up and down movements of this transmitter board decides the on and off of the bulb, and the left and right movements decides for the motor. There is no censor kind of thing, it has a range of 100m and it can work over walls as well, for the maximum convenience of the user.

III. RESULT

The gyro-sensor recognizes four types of hand gestures such as up, down, left and right. The gyro sensor accelerates the hand gestures and the signals are sent to the microcontroller at the receiver section. The reference gestures are already stored in the microcontroller at the receiver as templates. The received inputs are matched with the reference gestures, based on the corresponding gesture recognition devices are controlled. The gesture up is meant to turn on the bulb, down gesture to turn off bulb, left gesture to turn light on the motor, right gesture to turn light off the motor. The various hand gestures can be used in controlling the different home appliances, by connecting more number of appliances in the circuitry.

IV. CONCLUSION

We have got the first research in 1980. The journey has started then and we can see the evolution of the gesture based system from the researches of last 2-3 years. Initially it was with difficult technology like sensor, glove etc. now it becomes easier with webcam, image processing software and gaming tools. Poor usability was an issue in the early stage, but now it's intuitive and natural. In the early research gesture control or recognition process was complex, but now it's simple vision technique using hand, head or even whole body gesture. Computer application operating was the main target in the early stage. But now it is widely accepted for ambient device and ubiquitous computing. In recent researches, the more focus have been given to control home appliances, to use mobile device, large screen, table top screen and to manage group work, or even home residents activities. Another most important aspect is now it's really affordable, while it was expensive before. [7]

This survey is the accomplishment of the task where gesture controlled user interface for elderly and disable people has been reviewed along with the other gesture technologies. From this survey it has been identified that elderly and disable needs more technology support using their nature behavior, considering their limitations.[1] We can use affordable technology for daily activities. In our final research 'A gesture controlled communication aid for elderly and disabled people', we are working to develop a rich augmented interface in the regular & familiar appliances like TV sets to control everyday communication using gesture. There are many challenges associated with the accuracy and usefulness of gesture recognition software. For image-based gesture recognition there are limitations on the equipment used and image noise. Images or video may not be under consistent lighting, or in the same location. Items in the background or distinct features of the users may make recognition more difficult.[6]

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