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Review Paper on Hand based Gesture Recognition Technologies

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Abstract - *Since early years technology around us were controlled through remotes or physical buttons, but recently there has been an emerging field of gesture recognition system among which hand-based gesture recognition technologies is the first approach towards gesture recognition technology. This article deals with gesture recognition systems that can be used in our daily life and proposing the advancements that can be done in this kind of system and also creating a combined gesture module that can fit in as universal controller for the devices around us. The proposed system concludes the use of micro-controller, Bluetooth, 3D accelerometer, display, IR sensor. The system can be used as a universal controller for IR devices, switching Bluetooth fan and lights and gaming all through hand gestures.*

***Key words**: Gesture, Accelerometer, Gyroscope, Home automation, IR Sensor, Gaming, Universal Controller*

1. INTRODUCTION

This system deals with identifying the hand movements and using these actions to control various gadgets around us. The main motive is to create more interaction with human and machine in a natural, intuitive and seamless manner. This system can be built using various technologies like image processing, ultrasonic, sensor, electrodes, accelerometer, Flex sensor, EMG sensor, each division has their pros and cons, depending on the application appropriate mediums can be used to create a justified seamless system. Researchers have successfully implemented this system in various field with high accuracy and impact using a highly feasible system. Products like Myo arm band, Microsoft Xbox 360, fast track's WAV and leap motion are the front-facing products of gesture controlled tech. Each product has a different methods of extracting the gesture depending on the application. These system can be modified and can be controlled through a universal gesture controller by combing the necessary hardware.

2. LITERATURE SURVEY

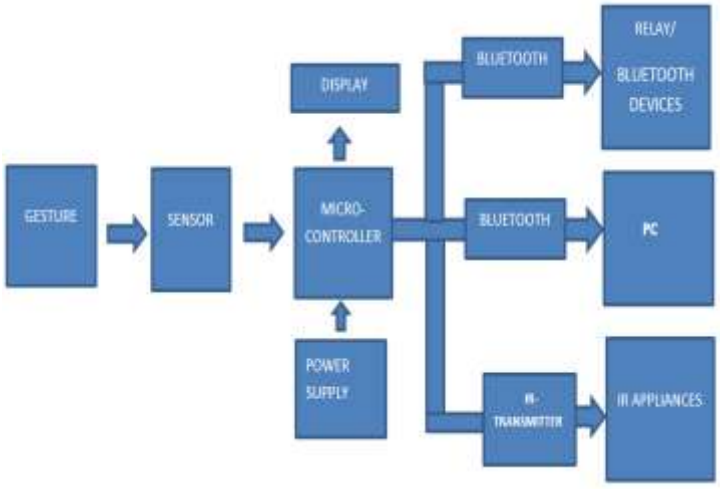
[**A**] Home automation: Gesture-based home automation can we achieved by using cameras in existing devices, adding ultra-Sonics sensors or electrodes, but these methods have limitation of distance, and complicated image processing but can overcome by using wearable tech like a glove or wrist bands. Abhijit M., Anjana Nair, Jikhil John, Shabasbasheer, Munna Basil Mathai has developed [1]GESTO a hand glove equipped with accelerometer and gyroscope sensor is used for gesture controlled system. In this system there is a transmitting section and receiving section. [4] The transmitting section of accelerometer and gyroscope which senses the title of the hand, sense the acceleration of movement by the hand, this gesture are converted into data with help of micro-controller which is then transmitted over RF transmitter to the receiving section received by the RF receiver.

RF decoder decodes the data through the micro-controller which transfers to relay whose output have respective devices connected like TV, DVD player, computer, etc. which are controlled through the gesture. This system provides easy operation and help the disabled and aged people. This system can be improved by adding an IR transmitter for the purpose of controlling [7] IR application through gestures. Implicating IR sensor with this glove technology will add more to its application and impact factor.

[B] Gaming: This sector is gaining greater attention and gesture controlled gaming is the new trend in this industry. Microsoft and Sony have implemented gesture gaming in their platform PS4 and Xbox 360.The Xbox 360 has a kinetic sensor which consist of depth, color sensing cameras and IR sensor which altogether forms the kinetic sensor which can be used for gaming. Whereas PS4 not only use 3D depth sensing cameras but also accelerometer and gyro –scope Sticks for more playing options and gesture. Image processing is complicated and adds more cost to the system, if accelerometer and gyroscope sensor programed effectively the 3D sensor camera can be avoided but may lead to certain limitation. Dr. Parameshachari B D, Rubeena Muheeb, Nagashree R N, ,Deekshith B N, Keerthikumar M, Rashmi P, Rachana R illustrated the use of Microsoft kinetic sensor [2], Microsoft kinetic sensor can be used for developing our own set of instructions for games through its SDK environment tool. This tool tracks 20 points in our body each point combination resulting into an index value that scan be programed for game controls. [3] **A.D**

whitehead demonstrated, Arm sensor pods can be effectively used to detect motions in 3D using the motion acceleration sensor. When two arm bands are combined attached on two different hands will result in multiple control options and multiply the control instruction for gaming.

3. PROPOSED BLOCK DIAGRAM



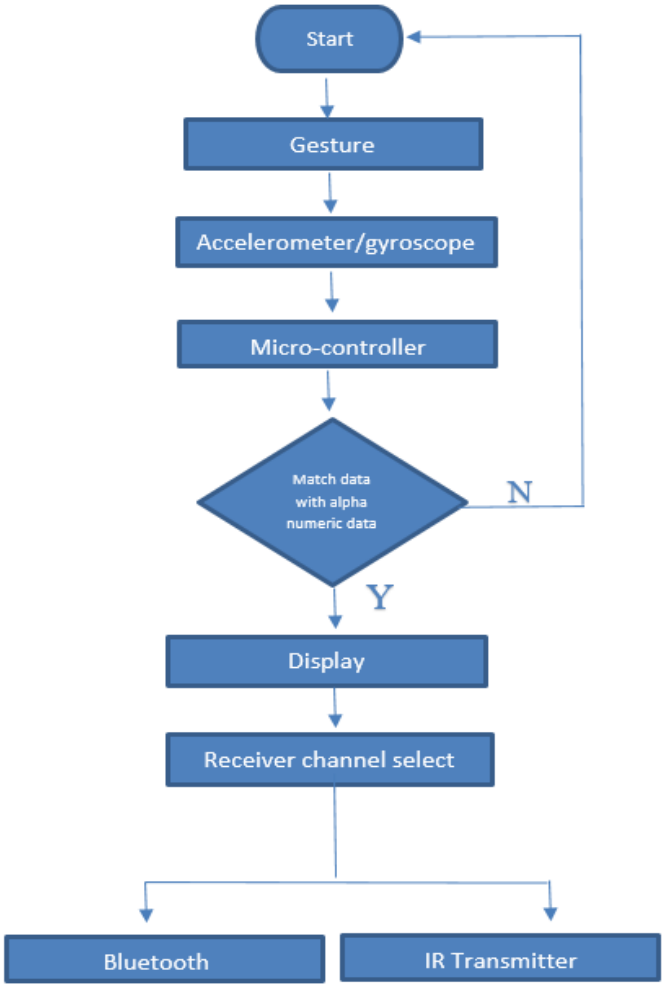
4. PROPOSED METHODOLOGY

The system is proposed in effort to control multiple devices from the same controller. This controller can be achieved through Bluetooth module, display, gyroscope, accelerometer, micro-controller. Effortless Hand gesture can be created simply by swinging the hand or changing the tilt angle of sensor. The orientation sensors, sense the motion and direction of the hand using the accelerometer and gyroscope to find the title of the hand and to identify the motion.

This system can at least sense movements in 6 directions. These movements are encoded into alpha numeric data with the help of micro-controller. This alpha numeric data is a set of specific data that is used to perform a specified action for specific data.

A selection switch is then used to target a particular device that can be any Bluetooth or IR device around us. Bluetooth module can be also used at the receiver end and connected to a relay module and the relay model's output can be connected to non-Bluetooth devices.[6] Any IR appliance like TV, car multimedia system, speakers, Air conditioner, etc. can be controlled through this gesture module. Similarly the same transmitting Bluetooth module can be connected to a Pc's Bluetooth receiver which can be interpreted by small python script to control mouse and keyboard functioning. When two modules used on individual arms one hand's gesture can be used to control [5] mouse functions and other can be used to control keyboard function. Since the components are used in this module are less and smaller in size it can be assembled and can be used as a wrist band wearable Tech. Works as low energy device and can be used for hours is almost weight less.

5. FLOWCHART



6. APPLICATIONS

- Home automation
- Controlling Bluetooth Devices.
- Gaming.(Controlling mouse and Keyboard)
- Controlling IR appliances.
- Providing gesture controlled relay switches

7. CONCLUSIONS

- Gesture controlled system has a greater growth in leading industries. Considering hardware requirement, research, weight, and size, the module can be manufactured as smart wrist band.
- This will help the disabled and aged group people to easy their lifestyle.
- Opening a whole new platform for gaming and device controlling.
- A whole new gesture controlled Universal remote

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BIOGRAPHIES

Rutvik P. Kshirsagar, is currently a Diploma Student of Electronics and Telecommunication 3rd year, at Government Polytechnic Aurangabad, Maharashtra, He has presented Seminar Paper at National level competition held at Government engineering College Aurangabad(GECA) and also presented paper at state level at The Chhatrapati Shahu Maharaj Shikshan Sanstha, Aurangabad (C.S.M.S.S) and won the first prize.

Dr. Sachindra Dhoot awarded Ph.D. degree in the area of Intelligent Fault Diagnosis under QIP ((poly) scheme at Jodhpur (Rajasthan). He is Senior Lecturer in Government Polytechnic, Aurangabad (Maharashtra). Project guided by him have won State level Awards four times and National Level Award once. He has been also awarded by Department of Technical education for outstanding academic performance in 1999 and 2006.He has published 19 papers in National / international journal and Conference. he is recipient of best polytechnic teacher award for Maharashtra and Goa state in 2010 and 2011.