Review Paper on Home Automation

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ABSTRACT
Desktop PC based gesture recognizer, that make uses present wired or wireless communication components, has numerous restrictions, such as area restrictions, movement restrictions, and a variation in recognition size depends on the variation in background lighting environments when finding a user's meaningful gesture information from pictures. This paper is proposed in order to solve this problem by using a data glove based embedded gesture recognizer. The proposed System consists of an input unit , a identification unit and a output display unit inside the gesture recognizer based on embedded FPGA. The input information collected is transmitted through a FPGA board is received by the input module. The recognition module performs checksum function for gathered input information is compared with the header bytes to check whether the set of information is correct or not. The data from different gesture and design recognition model and the hand gestures are extracted and comparison and analysis can also be performed by this model. The recognition module output is displayed in display unit. LCD screen is used to display the result the output of display unit. The FPGA was the Spartan 6 and it was designed using VHDL.

Keywords
Gesture recognizer, Spartan 6,FPGA,home automation.

1 INTRODUCTION
For human computer interaction the major tool used is human hand gesture for communication. The communication process will become more interactive with person hand gesture integrated with voice verbal and expression of face. Security, signal language recognition and virtual gaming are some of the applications of hand gesture based human computer interface. In real time a variety of hand gesture are classified and recognized using human hand recognition system. To performs this a lot of evaluation are required to identify the hand gestures as suggested by numerous scholars. For real time application the planned model is limited because the model needs more training information which requires more processing time.

2 OBJECTIVE
In this system spartan 6 FPGA and gesture recognition is used for controlling various home appliances is the major part of home automation based on gesture based. The gestures such as down to up, up to down, rightwards to leftwards and leftwards to RIGHTWARDS is received by the gesture kit and this information is transmitted into FPGA controller. Finally, FPGA control Fan on/off and bulb on/Off through relay.

3 LITERATURE REVIEWS
The system [1] consists of Radio Frequency transmitter unit, receiver unit, microcontroller, accelerometer and the communication are through radio frequency signal. The different hand gesture is sensed by the accelerometer and the accelerometer senses and actual signal is transmitted to the receiver unit through radio frequency transmitter. The RF receiver module accepts the transmitted signal, the home appliances are controlled when the hand gesture matches with the stored hand gestures**.**

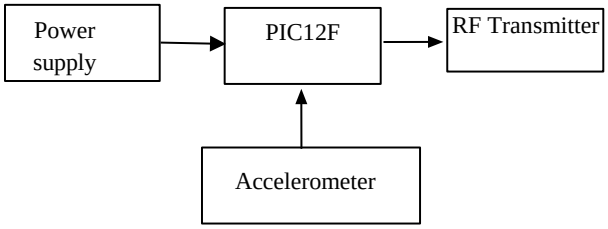

Fig -1: Block Diagram of Transmitter Module

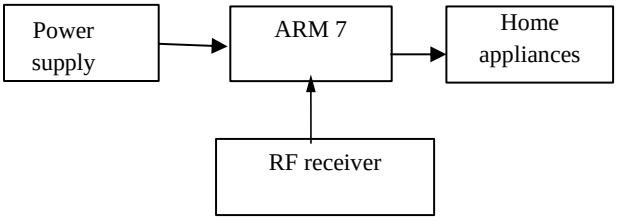

Fig -2: Block Diagram of Receiver Module

The fig 1 shows the block diagram of transmitter module. The three axis MEMS accelerometer placed in the gloves word by the person is used to detect the gesture of hands. The detected signal is processed in ARM7 controller. 434Mhz is the RF transmitter operating frequency.

The fig 2 shows the block diagram of receiver module. The radio frequency receiver operating with the same frequency as transmitter receives the signal transmitted. The home appliances are controlled when the received signal is compared with the saved hand gesture in the ARM7 controller and when it matches with the saved hand gestures.

Acceleration force is measured using micro electro mechanical system MEMS accelerometer is used. The hand gestures are recognized for interacting with the home appliances by using accelerator sensor.

The system[2] was based on SMS technology which controls the different electronic home appliances and the system has made use of GSM technology. The mobile number which is registered in the programmed microcontroller receives the message. The code saved in the microcontroller is read and decodes the information and send a text message of the appliance’s status.

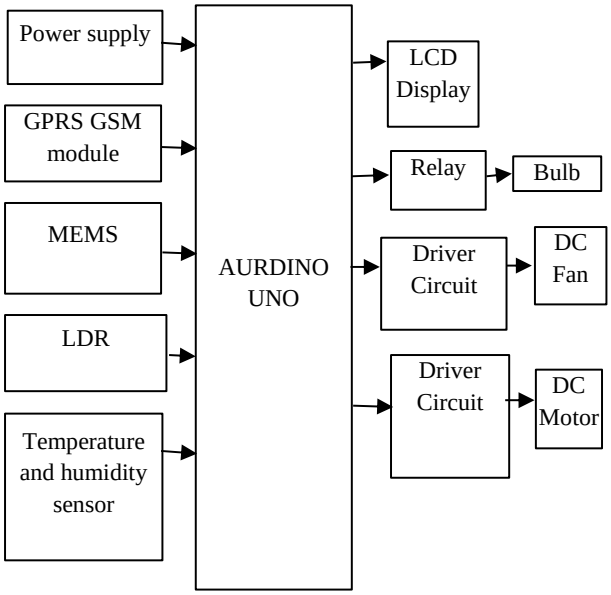

Fig 3: block diagram of gesture system using IOT

The above fig 3 shows the block diagram shows GSM based system This monitoring system using Arduino is successful. GSM module, a GSM based phone ,an Arduino uno board, power socket ,home appliances and phone are used in the proposed system. The system is low cost and operator friendly and is constructed wirelessly.

The gesture [3] is captured by the camera and handled by MATLAB software. If the present gesture matches the gesture which is already available the data, then the microcontroller receives the data and microcontroller controls the household appliances.PIC microcontroller, light, fan camera, power supply LED and GSM module are used as hardware module is used as serial converter bus with driver software is used connect hardware module to simulation software.

The fig 4 shows the block diagram of gesture based home automation system. The image collected by the camera may be processed quickly using gesture detection, the software tool used is MAT LAB simulator.

But exact recognition is difficult to do since matching stored movements to existent gestures is difficult operation. This technology is more accurate than using hand gloves. The Arduino compatible with MATLAB simulation is more expensive and difficult to integrate with a PC than the MATLAB compatible with PIC microcontroller.

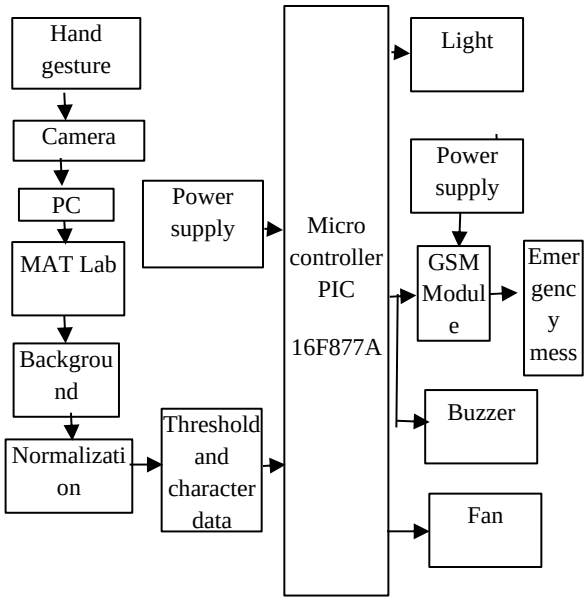

Fig 4: Block diagram of gesture-based home automation

The software [4] performs two major task for recognizing the gesture accurately by using camera unit and odrroid-XU4.The odriod XU4 identifies the hand gesture using gesture recognition algorithm running on odroid-Xu4,identified gesture are send and mapped to zed board for accurate control of the robotic hand.

The hand gesture recognition performs two, first is the estimation of accurate finger and hand from the input frame is done by the motion detection segment. Secondly the palm

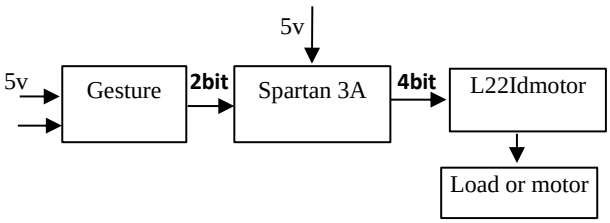

Fig 5:Block diagram of gesture robot

center is essential in hand gesture to find the number of figures in is gesture recognition .The fig 5 shows the block diagram of gesture robot.

The hardware part comprise of xilink Zed Board FPGA, XU4 odroid ,Arm robotic.It comprise of two units, arm controlled robotic and servo Pulse width modulator generator unit.

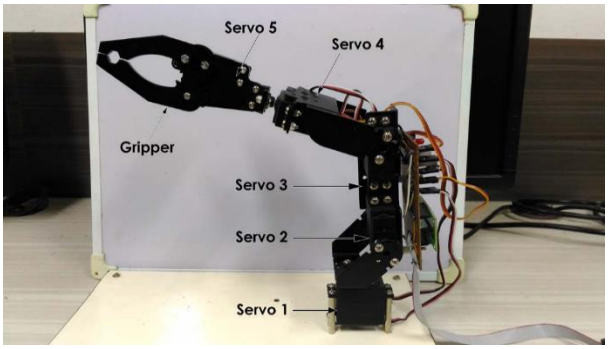

Fig 7: Robotic arm

In real time video streaming this system is enormously fast way to achieve hand gesture recognition. Some assumptions are made that there must be hand and finger in the region of motion where motion detection takes place.V2 sensor of Microsoft's Kinect might be used to find even more exactly the hand motions for the RGB channels of an image ans also the images provided by the sensor in depth information for more robust solution.

The main aim [5] of this system is to develop the robot which is controlled by hand gesture for interacting with human being and computer. The robot is controlled by recognizing the hand gestures.

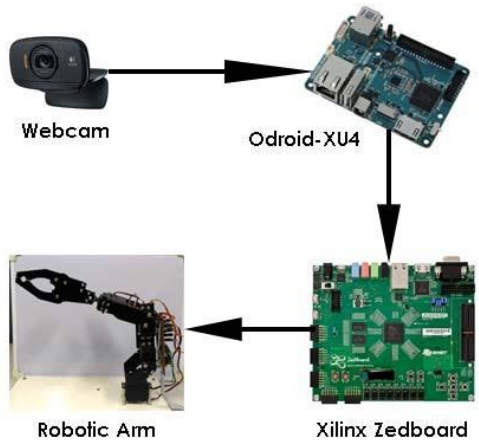

Fig 6: Block diagram of robotic system using hand gesture

The control robot is designed using FPGA. The ICMS generates the electric field in the analog form from the received transmitted signal on the receiving end the receiving electrode processes and coverts the analog data into digital form and these data used for hand movement of the user.

The spartan FPGA board processes the PWM program and the PWM output is applied to pin enable of L293D .The enable pin further activates the quadruple high current half H-driver chip of L293 and the speed of motor L293 in different direction like right side, left side, forward side and backward side. as shown in the table below.

Table1: operation of robotic Arm

Function	Input
Forward	1100
Backward	0011
Left	0101
Right	1010

The fig 7 shows the robotic arm operation by different servo motor.

In this system an algorithm is used for controlling the robot with hand gesture which is easy and fast but the proposed system has some limitation that it can recognize limited number of hand gesture considered. To recognize edge set of gesture the system can be extended in many ways for tunning the music players and change the channel of television. More application such as game controller, window player by interfacing the single gesture board with the PC for social network. For handicapped people wheel chair with gesture signal can be designed.

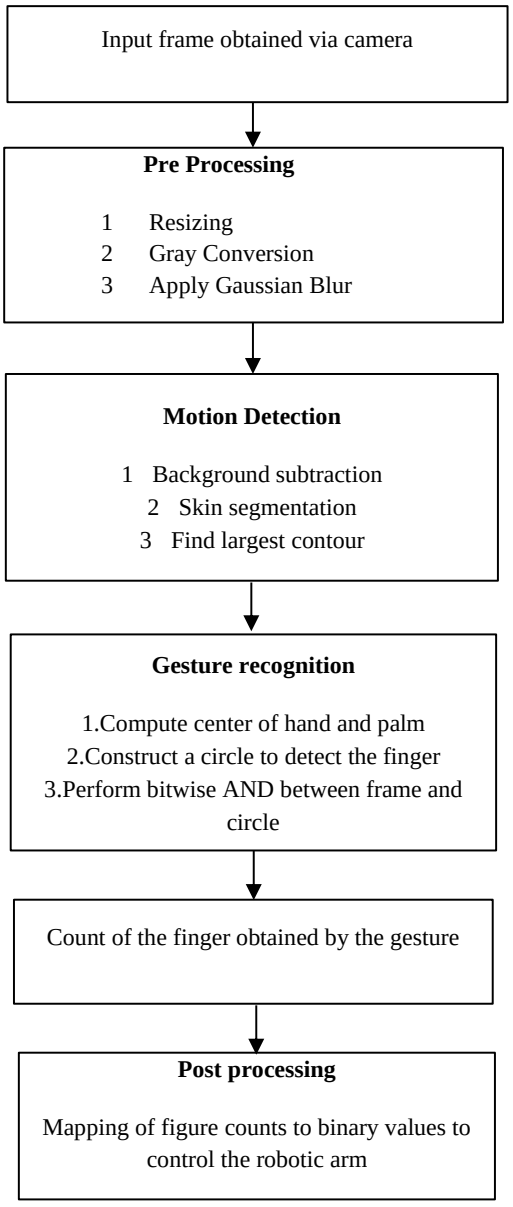

Fig 8: Gesture based algorithm

The above fig 8 shows the hand gesture based algorithm the input frames are obtained by camera and are resized converted into grey coding then gaussian blur is applied .Motions are detected by background subtraction and largest contour are found.

Fig 9 shows the servo motors operation with different hand gesture codes.

Code GPIO	Action	On-Time in microseconds				
		Servo 1	Servo 2	Servo 3	Servo 4	Servo 5
000	Neutral	1500	1500	1500	1400	600
001	Pick Up	600	1700	700	1400	600
010	Pick Down	600	1700	1000	1400	600
011	Drop Up	2000	1700	1000	1400	1400
100	Drop Down	2000	1700	700	1400	1400
101	Gripper Open/ Close	-	-	-	-	600/ 1400

Fig 9 :PWM servo motor with hand gesture code

4 COMPARISON BETWEEN RELATED WORK

References	**Parameters considered**					
	Controller	**Programming Software**	**performance**	**cost**	**Power consumption**	**Mode of operation**
1	ARM 7 MEMS accelerometer	------	Less	less	more	Sequential
2	GSM Module Arduino Uno	MATLAB	Low	less	more	Sequential
3	PIC microcontroller	MATLAB	low	less	more	Sequential
4	ZED board FPGA	Odroid XU4	High	low	less	parallel
5	SPATRAN 3A FPGA	XILINX	High performance	Low cost	least	parallel
Proposed model	SPATRAN 6FPGA	XILINX	Very high performance	Low cost	Least than spatran 3	parallel

5. CONCLUSION

The various ways to recognize hand gesture using Arduino have been examined in this review paper . The efficiency and application of many methods have been studied. Five papers were examined to understand how to reach the main goal, which is to use hand gestures to control home appliances. Each paper takes a exclusive approach in attaining the proposed outcome. In the foremost paper, the microcontroller and accelerometer has been used and MEMS technology has been employed The subsequent paper GSM module Arduino and smart phones has been used to operate the home appliances. The IOT principle is used which has an advantage that user doesn't require any additional resource installation which makes it more comfortable for user to use this system. The FPGA controller utilization provides high performance for remotely controllable appliances.

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