

## Controlling home appliances using hand gesture

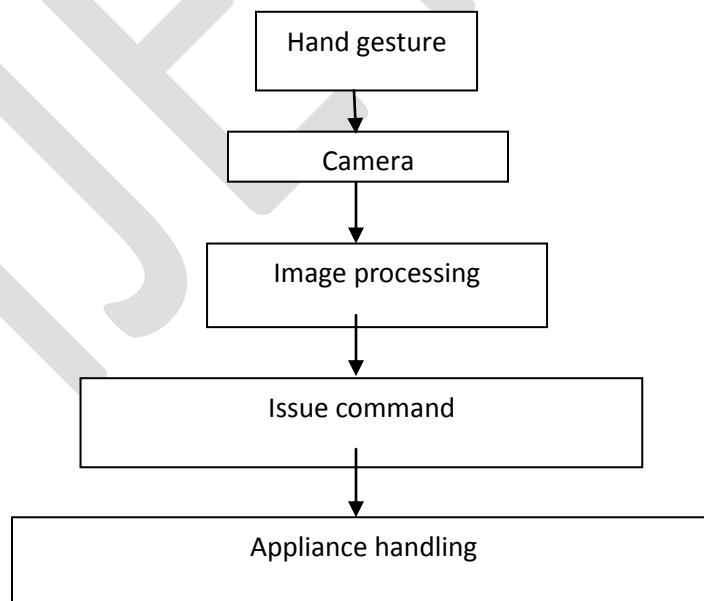
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**ABSTRACT:** This paper presents very simple but efficient method for hand gesture recognition and accordingly controlling home appliances. Different gestures are assigned for different appliance control. This paper includes the method of capturing image, recognizing hand gesture and sending signal to control the gesture related home appliance.

**Key words:** Appliance control, issue command, gesture recognition.

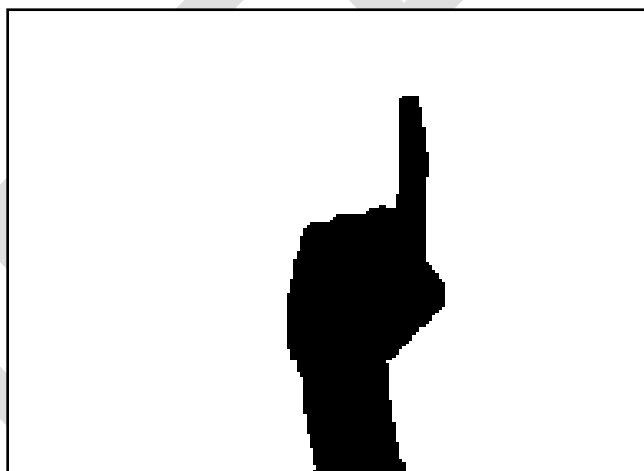
**1. INTRODUCTION:** For controlling appliances switches and remote controllers are developed. But making a single controller over all appliances makes life simpler. In this paper we have designed new method of controlling home appliances using hand gesture. His method reduces the problems faced for controlling appliances by people with physically handicap by legs and also provides single controller for many appliances.



**2. IMAGE PROCESSING:** Four simple gestures are used in this paper to control two appliances. Hand gesture is captured using camera which is a color image.



This image is converted into binary image. This image is having uniform background with less intensity color as compared with the hand color intensity. A threshold value 0.5 is considered and the luminance of pixel greater than the threshold value is considered as 1(white) and other pixels are considered as 0(black). So after converting into binary image the background occurs white and hand occurs black.



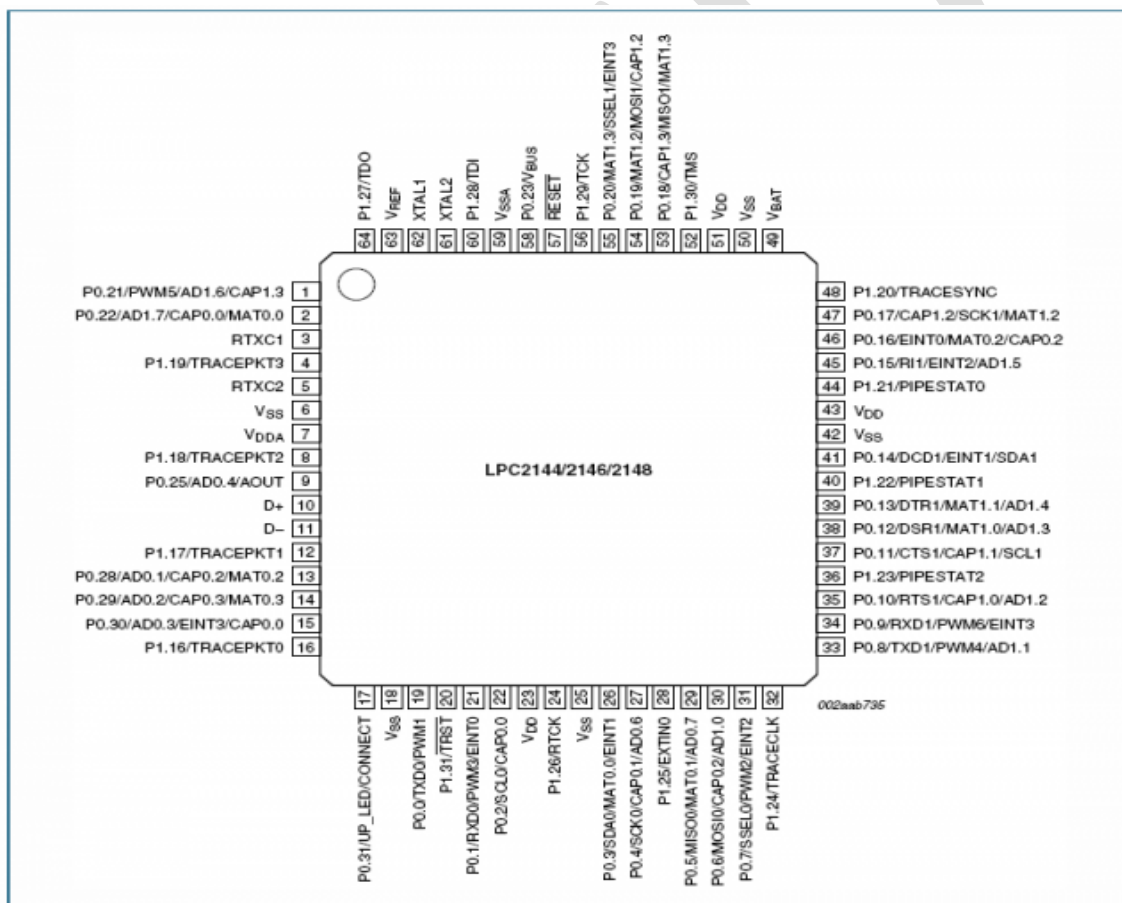
Carry out this process on every gesture and count the black pixels. The count of black pixels for different hand gestures is different. Hence we can count the black pixels and recognize the hand gesture.

**3. HARDWARE:** Mainly to control the appliance ARM7 controller and Relay is required. According to the gesture recognized the related appliance control signal is transmitted to ARM7 controller. And the ARM7 controls the appliance using relay.

### 3.1 ARM7:



**Fig1: ARM7 IC**



**Fig2: pin diagram of ARM7**

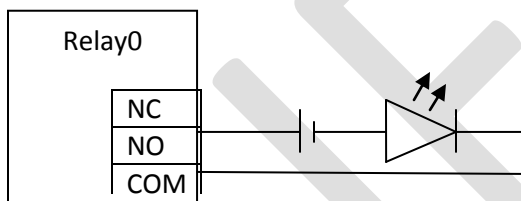
ARM7 controller has two ports namely port 1 and port 2. According to the gesture detected, related appliance control signal is transmitted to ARM7. A simple embedded C program is dumped in ARM7 controller which helps controls appliances using received signal. For controlling appliances ARM7 controller controls Relay connected to it.

### 3.2 Relay:

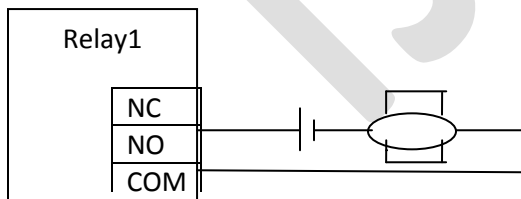


**Fig3: Relay**

In this paper two Relays are connected to ARM7 namely Relay0 and Relay1 at port1 pin P1.23.....Light source is connected at Relay0 and motor is connected at Relay1 and four simple set of hand gesture are used to control light and motor. Power supply is connected to the relay and appliance in series. When Arm7 turns ON Relay0 the light source will be turned ON and when Relay0 is made OFF light source is turned OFF. Similar in case of Relay1 and motor. Below figures shows connection of relay, power supply and appliance.

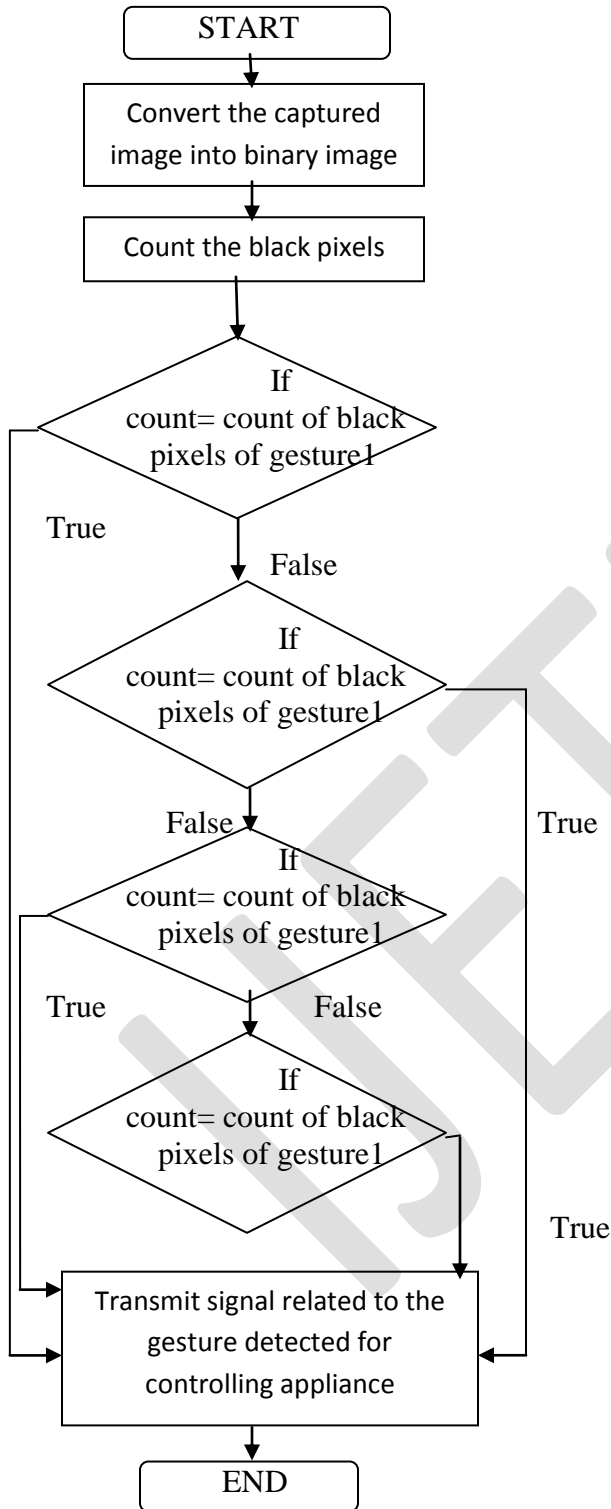


**fig2: LED connected to Relay0**



**fig3: Motor connected to Relay1**

#### 4. FLOWCHART:



**5. RESULTS:** The simple four hand gestures used to control light and motor are as follow:



**Gesture1**



**Gesture2**

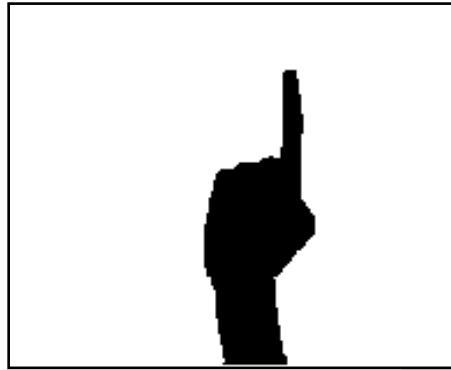


**Geature3**

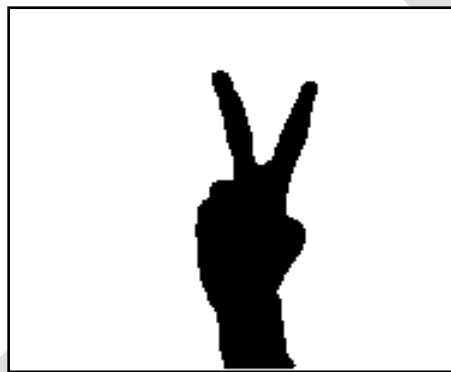


**Gesture4**

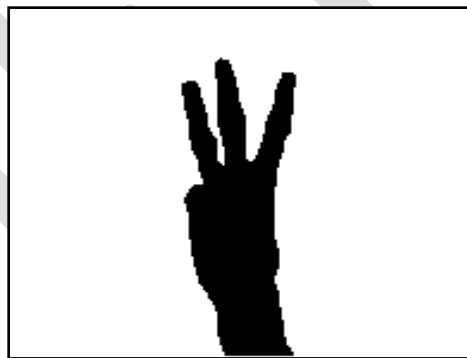
These images after converting into binary image are obtained as below:



**Gesture1**



**Gesture2**

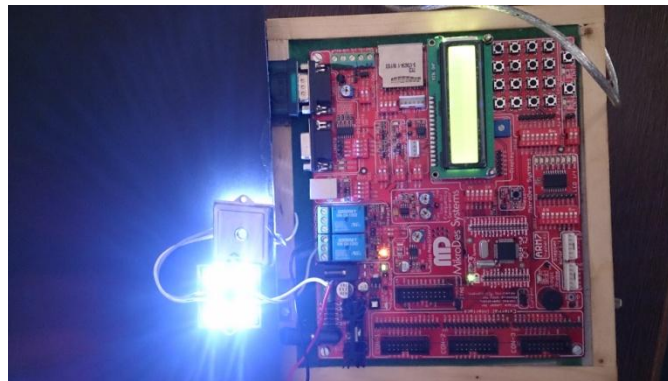


**Gesture3**



**Gesture4**

After gesture1 is shown in front of camera the light source is turned on as shown below:



(NOTE: Only the ARM7 IC, Relay and Com Port are used for the experiment)

**5. CONCLUSION:** In this paper, we have designed a user interface for a home appliance control system that is based on hand gestures. A new simple method is introduced to control home appliances using simple set of hand gestures. This method gives a single controller to control many appliances, reducing the number of different remote controls for different appliances which improves the quality of life for people. We believe that such an interface can overcome the difficulties that people with physical handicap by legs experience while controlling home appliances.

#### 6. REFERENCE:

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