Touchless Gesture Recognition

EE 230 Course Project
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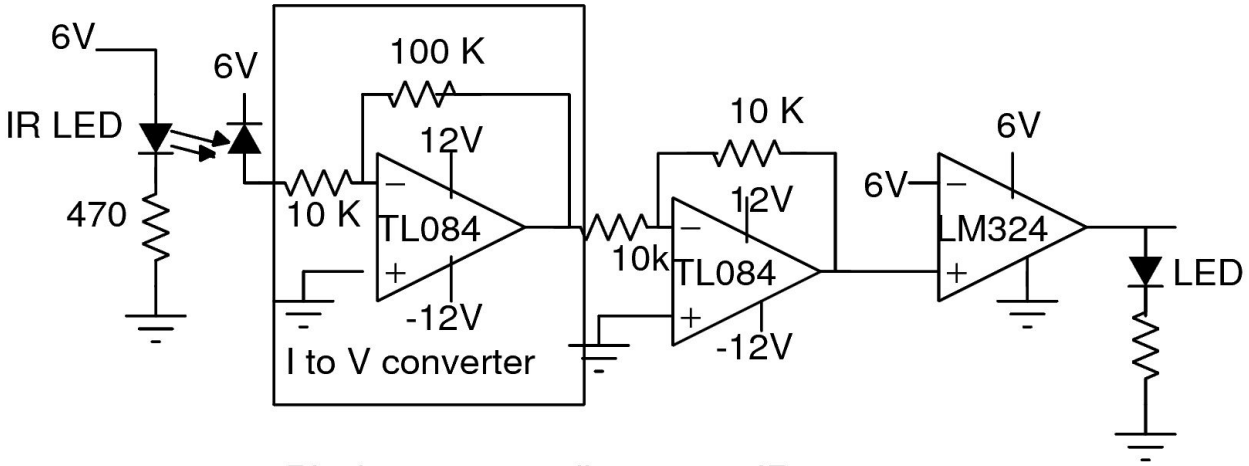
OBJECTIVE

The main objective of the project is to design a circuit which senses a gesture and responds in a unique way to a particular gesture. We have chosen to recognize 4 gestures- left swipe ,right swipe, upward swipe and downward swipe, and for a particular gesture, we represent the name of the gesture on the LCD module.

Main Blocks

1. IR LED Photodiode Pair- (TCRT5000)
2. I to V converter (TL084)
3. Inverting Amplifier (TL084)
4. Comparator (LM324)
5. Implementing FSM on Krypton Board/CPLD
6. Representing the Gesture name on the LCD module

Circuit diagram for 1 IR sensor, we repeated it 4 times for 4 sensors



Block corrresponding to one IR sensor

Designing of blocks

The amplitude of the signal after the inverting Amplifier is about 1.76 V due to ambient light, and goes to 7.8 V after bringing our hand very close to the IR LED.

The comparator compares the output of the inverting amplifier with a fixed DC Voltage, we took it as 6V so that it's output is +Vdd(=6V) only when we pass our hand through the IR LED but actually we got 4.5 V. We chose to compare with 6V as then, we could use the supply to the the IR LED and so we did not need additional DC supply.The output of the comparator is reduced to 3V using potential divider to be given as inputs to the CPLD board.

White LED's are connected to the output of the comparator, and glow when our hand passes through any of the four IR sensors.

LOGIC OF FSM

L1 (LED5) R1 (LED8)

L2 (LED6) R2 (LED7)

When first L1 and L2 generate 6V and then, R1 and R2 generate 6V, gesture is RIGHT swipe. (LED2)

When first R1 and R2 generate 6V and then, L1 and L2 generate 6V, gesture is LEFT swipe. (LED1)

When first R2 and L2 generate 6V and then, R1 and L1 generate 6V, gesture is UP swipe. (LED3)

When first L1 and R1 generate 6V and then, L2 and R2 generate 6V, gesture is DOWN swipe. (LED4)

LCD Module

The initial state is wait state.

On getting a particular gesture, it’s name, i.e. LEFT, RIGHT, UP, DOWN gets displayed on the LCD module.

After getting a particular gesture, we have to wait for 4 sec for the FSM to go to its initial state, and then it can recognize another gesture.

THANK YOU !!