Light dependent resistor and logic gate based wheelchair control

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Abstract -- when an unexpected accident or event occurs which affects the locomotion of a person, it is necessary to seek the help of wheelchairs which acts as a means of locomotion. Wheelchairs are not only used by physically challenged persons, but also by very aged persons and persons who are affected by quadriplegics i.e. paralyzed over a significant percentage of their bodies. These people will find very difficult task to perform any task that requires even a small amount of force. Here we propose a simple control for wheelchair movement with Light Dependent resistor and logic gates. This system consists of just three LDRs and basic logic gates (EXOR and AND gates). Since this system does not use microcontroller and any complex circuits, it is very simple to implement and very low cost.

Keywords — LDRs, LEDs, logic gates, motors, transistor switching, wheelchair, XOR

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1 INTRODUCTION

The wheelchair is one of the important way of transfer for physically handicapped and aged people. Intelligent wheel chairs are being developed by many researchers due to increased needs of more safer and comfortable wheelchairs. Different Kinds of developed wheel chairs uses electric power and are controlled by a joystick. Various sensors and embedded computers are added to the existing systems to obtain intelligent wheelchairs (IWs).

The IWs consists of different kinds of improvements in design and operations making the user more convenient. Large number of cameras and sensors are used in intelligent wheelchairs as in latest automobiles. Additionally, some wheelchairs are programmed with route analyzing the environment looking for borders of walls.

Previous ideas propose to control the wheelchairs by speech and even with the position of lips and its movements; however these systems fail when there is conversation while the seat is operated, or when the wheelchairs are working in noisy environments.

Additionally, many works have been developed to control the wheelchair by detecting the user's face, by detecting the position of iris using the camera mounted in front of the user. But these type of intelligent wheelchairs needs that the user should always only in the direction of displacement, and hence it is very difficult to use it.

In this article proposes a simple

wheelchair which is controlled by logic gates. The input for these logic gates are taken from the LDRs. Based on the position of finger on the LDR, corresponding input is given to logic gates and the wheels are controlled. This system only uses simple components and hence easy to design and available at low cost.

2 METHODOLOGY

To realize this project a mobile wheelchair model has been developed, and in future works a real wheelchair will be used. The model is designed with logic gates and basic simple circuit to get input from LDR.
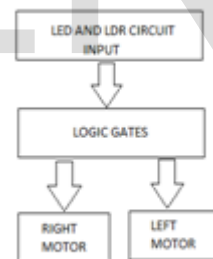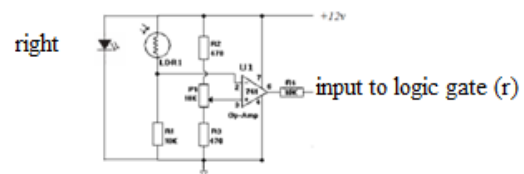

FIG 1.Block diagram of LDR and logic gate controlled wheelchair

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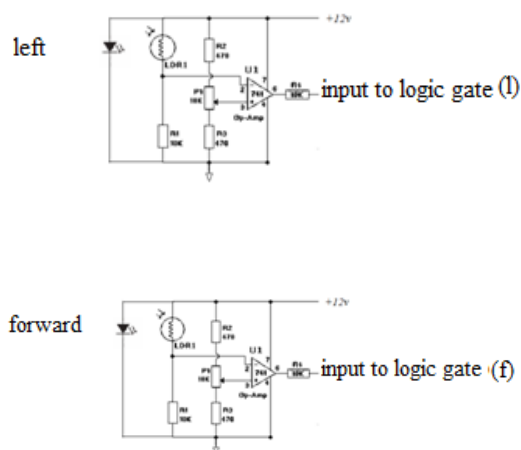*. E-Mail- cvidhya321@gmail.com*

FIG 2.circuit to get inputs for logic gates(r, l, and f) from LED and LDR (right, left and forward).

The left and right wheels of the wheelchair are controlled based on the conditions in the logic gates whose inputs are from LDRs.

RIGHT LDR OUTPUT	LEFT LDR OUTPUT	FORWARD LDR OUTPUT	RIGHT WHEEL	LEFT WHEEL
0	0	0	0	0
0	0	1	0	0
0	1	0	0	0
0	1	1	0	1
1	0	0	0	0
1	0	1	1	0
1	1	0	1	1
1	1	1	0	0

TABLE 1. Truth table for wheel control

Based in the above truth table, the control for the wheels can be obtained.

RIGHT WHEEL: r and (f xor l)
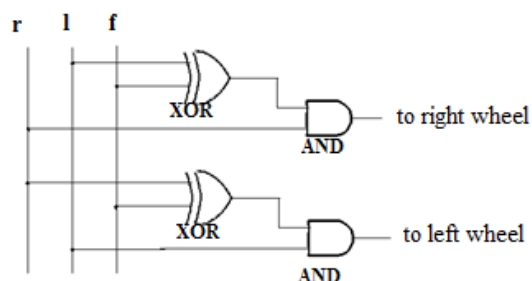
LEFT WHEEL: l and (f xor r)

FIG 3: Circuit diagram for wheel control in logic gates.

3 WORKING:

When the wheelchair is in ON condition, all the LED glows. Hence the output of the LDR circuits will be "1". When a finger is placed in-between the LED and LDR the light from LED will not fall on the LDR and hence the output from LDR circuit will be low, i.e., "0". Here three LEDs namely left, right and forward are used and three LDR circuits are used. When any one of the LDR is closed with finger, the wheel is controlled according to the output from LDR circuit (i.e. input to logic gate).the input to logic gate is given by transistor switching. For example if the LDR named front is interrupted, the output of LDR circuits (input for logic gates) are l=1; r=1; and f=0. So, right wheel=1; Left wheel=1; Hence the wheelchair moves forward.

If LDR named left is closed with finger, the input for logic gates will be l=0; r=1; and f=1;

So, right wheel=1; Left wheel=0;

Hence the left wheel does not move and right wheel moves causing the wheelchair to turn left.

4 CONCLUSION

The prototype for simple light dependent resistor and logic gate controlled wheel chair was implemented and the movement of wheelchair was verified. The controlling mechanism used in this project is very simple. The main advantages of this project are

- Very simple to design and implement.
- No microcontroller is needed, hence no programming.
- Cost effective.

5 REFERANCES:

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