

## Automatic Window System by Sensing Daylight

Varun Dave<sup>1</sup>, Yashashvi Gautam<sup>2</sup>, Shubham Joshi<sup>3</sup>, Vivek Singh<sup>4</sup>, Ajay Bhardwaj<sup>5</sup>

Swami Keshvanand Institute of Technology Management & Gramothan, Ramnagar, Jagatpura, Jaipur (RAJ.), INDIA

### ABSTRACT

The main idea of the design is to automate the window which can be controlled automatically or manually. The design will use a LDR (Light Dependent Resistor) to detect light coming from the sunlight. When excessive sunlight will be detected by the LDR, it will automatically open the windows. The light sensor circuit is a simple electrical circuit, which can be used to control the (switch on and off) electrical load appliances like lights, fans, coolers, air conditioners, street lights, etc., automatically. By using this light sensor circuit, we can eliminate manual switching as the loads can be controlled automatically

based on the daylight intensity. Hence, we can describe it as an automatic light sensor. There are different types of light sensors available such as photo resistors, photodiodes, photovoltaic cells, phototubes, photomultiplier tubes, phototransistors, charge coupled devices, and so on. But, LDR (Light Dependent Resistor or photo resistor) is used as a light sensor in this light sensor circuit(2).

**Keywords--** Window, Light Dependent Resistor, Sunlight

### I. INTRODUCTION

The main purpose of this project is to open & close window without manual operation. By using this system, manual work will be reduced. LDR sensors & micro controller (8051) are the main components of the project. LDR sensor is like our eye which detects the presence of an object. This system works on 2 principles, which are: (1) Providing the right amount of light & (2) Providing that light when it's needed.

When the right amount of light falls on LDR, circuit gives signal to op-amp, this op-amp generates single digit output to microcontroller, which generates binary digit output and gives the signal to motor controller, which then rotates in anticlockwise. When no light is detected by LDR, it gives signal to op-amp which further reaches to motor controller and it rotates in clockwise direction. LDR sensor is rugged in nature, hence can be used even in dirty and rough external environments. Hence, LDR is preferable compared to other light sensors as it can be used even in the outdoor lighting of homes and in automatic street lights. During night time (when the light illuminated on LDR decreases), the LDR exhibits a very high resistance of around a few M $\Omega$  (Mega Ohms). During daytime, (when the light is illuminated on LDR) resistance of LDR decreases to around a few 100 $\Omega$  (hundred Ohms).

Hence, the resistance of LDR is inversely proportional to the light illuminated on LDR.

Hence precise use of electricity will reduce manual work.(3)



Image 1:- During night time i.e. window is closed

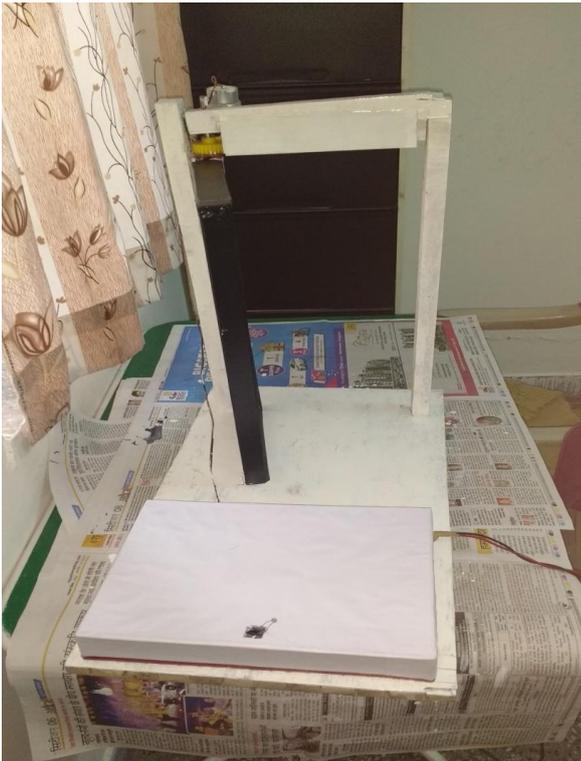


Image 2:- During day time i.e. window is open

## II. BLOCK DIAGRAM

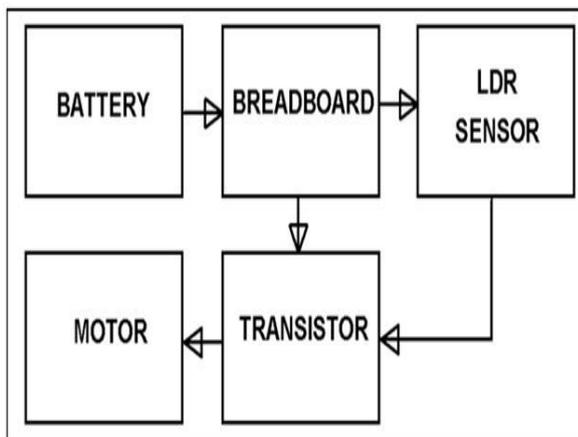


Fig 1: Block diagram of Automatic window system

## III. POWER SUPPLY

In alternating current the electron flow is alternate, i.e. the electron flow increases to maximum in one direction then decreases back to zero. It then increases in the other direction and then decreases to zero again. Direct current flows in one direction only. Rectifier converts alternating current to flow in one direction only. When the anode of the diode is positive with respect to its cathode, it is forward biased, allowing current to flow. But when its anode is negative with respect to the cathode, it is reverse biased and does not allow current to flow. This unidirectional property of the diode is useful for rectification. A single diode arranged

back-to-back might allow the electrons to flow during positive half cycle only and suppress the negative half cycles. Double diodes arranged back-to-back might act as full wave rectifiers as they may allow the electron flow during both positive and negative half cycles. Four diodes can be arranged to make a full wave bridge rectifier. Different types of filter circuits are used to smooth out the ripples in amplitude of the output voltage from a rectifier. The property of capacitor to oppose any change in the voltage applied across them by storing energy in the electric field of the capacitor and of inductors to oppose any change in the current flowing through them by storing energy in the magnetic field of coil may be utilized. To remove pulsation of the direct current obtained from the rectifier, different types of combination of capacitor, inductors and resistors may also be used to increase action of filtering(1).

## IV. MICROCONTROLLER

A micro controller is an integrated circuit or a chip with a processor and other support devices like program memory, data memory, I/O ports, serial communication interface etc integrated together. Unlike a microprocessor (ex: Intel 8085), a microcontroller does not require any external interfacing of support devices. Intel 8051 is the most popular microcontroller ever produced in the world market(4).

## V. LDR

LDR is a resistor whose resistance decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. It can also be referred to as a photoconductor or CdS (cadmium sulphide) device, which is the material from which the device is made and that actually exhibits the variation in resistance with light level. Note that although CdS is a semiconductor, it is not doped in silicon. A photo resistor is made of a high resistance semiconductor. If light falling on the device is of high frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band from valence band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance(4).

## VI. SLIDING WINDOW

We have used a wooden window as rotating window. This rotating window is associated with a dc motor and this dc motor is controlled by a wheel motor control IC (L293d). This sliding window is working according to the outside sunlight intensity. When there is sunlight outside, a signal is sent to the microcontroller which controls the window. At the day time, windows remain open and it remains close during night time. A LDR is made to sense the outside sunlight. After once when window will get open or close the feedback is sent back to the microcontroller. The microcontroller then sends a signal to close the dc motor. Since if we do not

provide a feedback then there is a power loss in circuit and it may damage the motor and wheel motor IC also(4).

## VII. CONCLUSION

In this project, we have prepared a hardware which is based on automation technology using LDR and microcontroller 8051. The hardware works in such a way that when sunrays fall on window, it will automatically open and during low light intensity, window will be closed. Today we find application of automation technology working for people in homes, industries, factories, warehouses and laboratories. Automation designs are useful in many ways, it can reduce the mundane work load that industry or people at home have to care about. It boosts economy because businesses need to be efficient to keep up with the industry competition. Finally, as the technology improves, there will be new ways to use automation which will bring new hopes and new potentials.

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