International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

Automatic Sliding Window

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Abstract: ***The automatic sliding window is one of most useful thing in our daily life as well as in mechanical concern (e.g. to open/closed the window). The objective of the sliding window was to examine the primary operating characteristics of the sliding window. In the basis, we designed and constructed mechanically based system for a linear actuating system and remote controls. There are so many researchers who have done work on design and analysis, but still there are so many areas of scope regarding this design and analysis. This project involves processes like design, fabrication and assembling procedures. Even though there are many types of the sliding window in the market, the completion of the new model provides a more practical usage than previous one.***

Keyword: Design Consideration, Calculation, sensor, Lead Screw, DC Motor

1. Introduction

The main purpose of the project is to get the knowledge of design and fabrication. The design is an environment friendly and uses simple properties such lead screw and dc motor properties which uses remote controls and sensor. The design is done so that knowledge of designing and mechanism are increased. In order to reduce the man efforts, we planned to create an automatic sliding window.

Nowadays sliding window has wide range of use. Its special feature is that it has rollers which help to slide on defined rack. It reduces friction and makes handling easier. But it has limitation according to handicapped peoples. They are not able to close or open window instantly. To overcome this problem we encourage making some system which help such peoples to operate window without changing their current position or place.

The theory of the automatic sliding window is very simple, when we press the open button; a signal is send to the main circuitry board which then allows the current to pass through to the window motor causing the motor to run and the window open. Once the window is fully open (depending on where the resistance beam is located) the motor stops running causing the window to stop moving. And when the close button is pressed the same thing happens but this time the motor run in the opposite direction, therefore causing the window close.

2. Literature Review

2.1 W. M. P. STUART (Jan 19, 1962) 3,152,368

Proposed hydraulic drive system could lower the windows at rest, since pressure from the hydraulic system was merely released to lower the window. Raising the windows required an electrically operated pump to operate and introduce pressure at the appropriate cylinder. These systems also required pressure lines to each cylinder (in the doors, as well as on certain cars, to the power seat and a power operated convertible top). Because of the complexity, the system could also leak fluid. Looking this circumstance he proposed rack and pinion design which can be operated more easily rather than the hydraulic drive system.

2.2 Dough Rasmussen (Oct 18, 2005) US,6,955,009,B2

Proposed when a body approaches within the operating range of the sensor, it sends a logical command to open the door. The door automatically closes with a fixed time delay. If there is no further movement within the PIR operating range. Interrupt signals are used through limit switches to avoid locked rotor condition of the motor. Further this project can be enhanced interfacing a counting arrangement for keeping a record of entry and exit of people at particular place. This can be achieved by interfacing the system with an EEPROM (non-volatile memory) to avoid loss of stored data even if the power fails.

Considering above ideas we designed, remote operated sliding window which is more economical and reliable for use.

3. Design

The main aim of this is to study the complete design of Automatic sliding window. The main objective of this project to minimize or overcome the problem which can faced in manual operated window. The automatic sliding window is simplicity in design and better control.

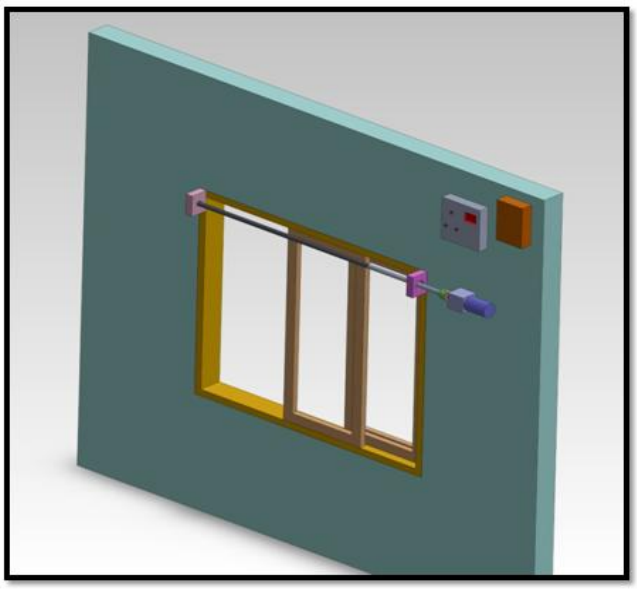

Figure 1: Modelling of Automatic Sliding Window

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3.1. Lead Screw

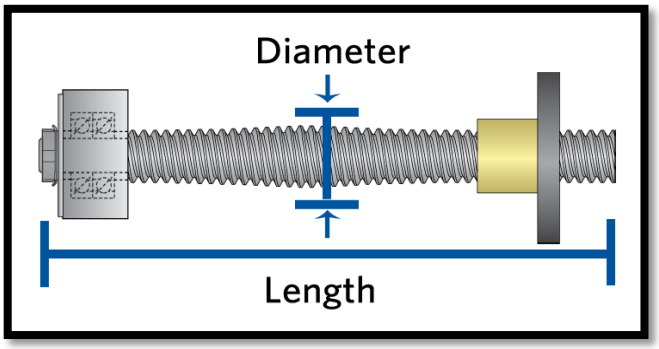

Figure 2: Lead Screw

The material used for the lead screw is aluminium alloy, other stainless grades, and high machinability grades of carbon steel which is having specification are as follow,

Specification:-
a) Length- 1727mm
b) Outer Diameter-13mm
c) Inner Diameter-11mm
d) Material- Mild Steel
e) Thread type- V Thread
f) Pitch- 2mm
g) Lead- 4mm

3.2. Remote Control

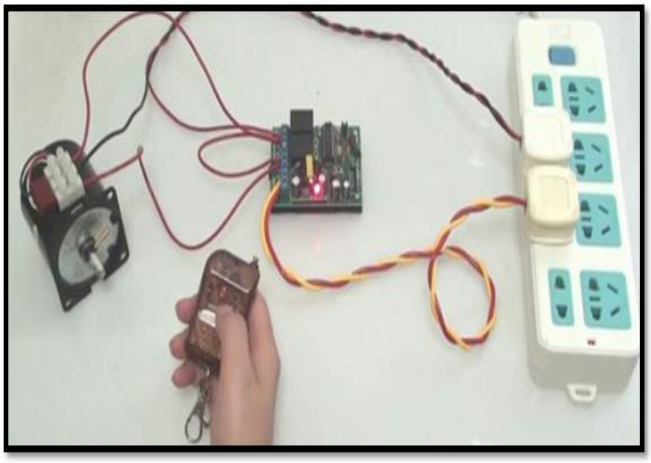

Figure 3 Remote Control Operations

A remote control is component of an electronic device such as a television set, DVD player, or other home appliances, used to operate the device wirelessly from a short distance. Remote control is a convenience features for the operator, and can allow operation of devices that are out of convenient reach for direct operation for controls.

Specification:-
a) Input- 9V
b) Range- 10 M

3.3 Frame

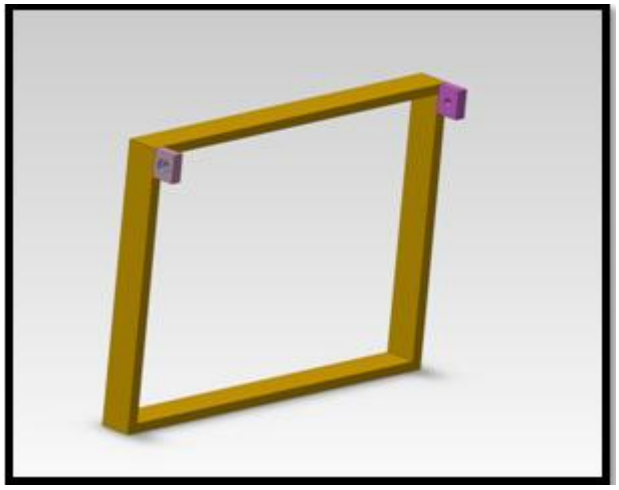

Figure 4: Frame

The sliding window frame is made up of aluminium material. The main purpose to use the aluminium frame is light in weight as well as relatively low strength. The aluminium is not affected by moisture and aluminium windows do not warp and stick. We have selected standard frame of material mild steel.

4. Working

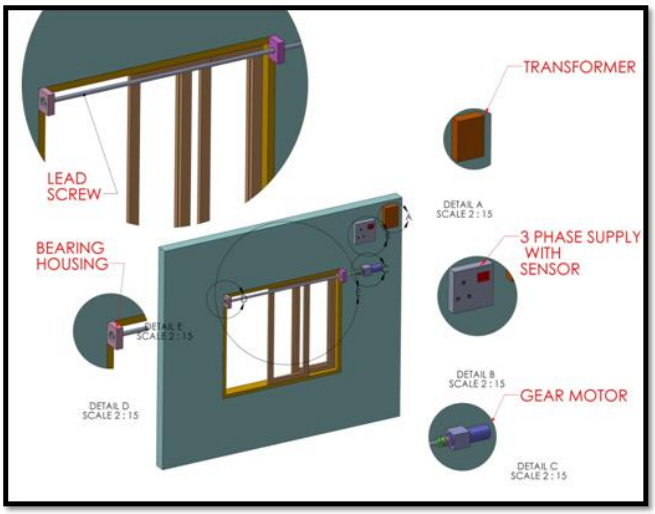

Figure 4: Project Model Details

Opening the Window

- When the automatic switch is pressed, the current will sent to the transformer to allow a current to be sent to the motor to move left or right.
- Once the current reaches the motor will start to move and it will move the gate back and forth.
- The gate reaches the end the gate touches the limit switch
- When the gate touches the limit switch, a current were sent to the circuitry to stop the flow of current and stops the motor.

Closing the Window

- After a few minutes the gate will automatic close cause a time relay sensor is used in the circuit.

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- Cause of the sensor used in the circuit the programmed IC will send a current to the time relay to close the motor.
- When it almost reaches the end the gate will touch another limit switch.
- Then it will be touched, a current were sent to the circuit and a current sent to motor to make it stop.

5. Circuit

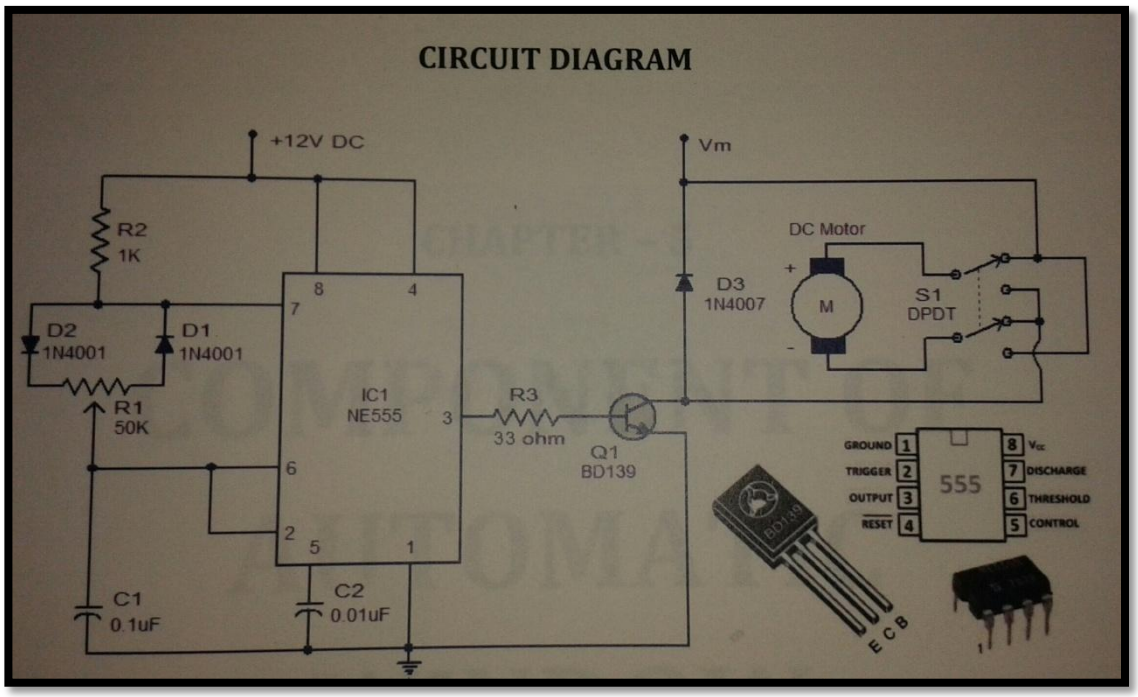

Figure 5: Circuit Diagram

This is the circuit representive in our project which has been assembled with respect to IC1 NE555 and sensor. This linkage of circuit is assembled with the frame of sliding window and lead screw. In this the sensor is fitted in 3phase supply which emits the signal and When we press the button, a signal is sent to the main circuitry board which then allows the current to pass through to the windows motor causing the motor to run and the window open.

6. Future Scope

a) High power and faster mechanisms can be used with availability of better power supply.
b) We also realized that properly organizing the work and working as a team can help in time management. This can result in more efficient and effective outputs.
c) We can install solar panel for saving of electricity as well we can also install the rain sensor to opening and closing the window.

7. Conclusion

The automatic sliding window system fabricated and tested. The result was what we expected that is, the motor and circuit was compatible with each other with the sliding window. The motor was able to move the window from one end to the other and smoothly with the push of a button. We learned many skills such as welding, wiring the circuit and other tools that we use for this project.

In other words, we found more good than bad from this system because it is safer and more secure and it is able to keep the people who live in the house safely.

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