

MODELING AND FABRICATION OF AUTOMATIC BOARD DUSTER USING SOLAR ENERGY

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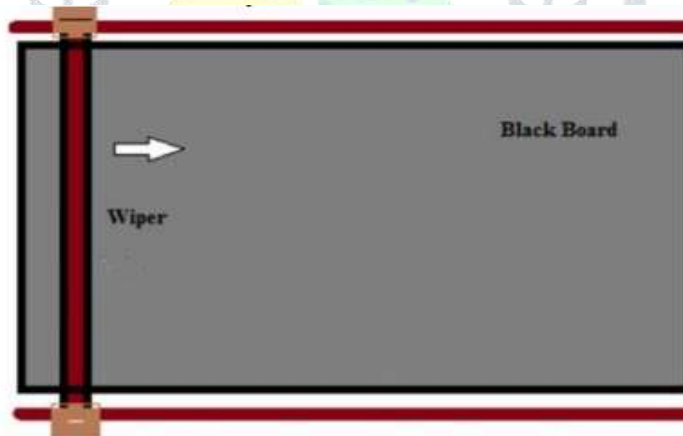
Abstract: Automatic board dusters are made in order to facilitate the repetitive activity of deleting writing boards by instructors or understudies. Chalk dust or the marker ink may demonstrate risky to wellbeing to both the educator and additionally understudy. So to decrease such issues Automatic board dusters are one of the options. The manual technique for erasing board has one more inconvenience 'TIME'. The time spent on cleaning the board can be used for much better purposes like instructing or on the other hand participation. ourselves and the future age. This project propose a frame work to interface the basically mechanical aspects of the mechanical erasing system with DC geared motors and solar system so as to enhance it into automation rather than manual and the minimum time to clean the board is 49seconds exactly.

Keywords: Board, DC Geared Motors, Solar panel, Lead Acid Battery.

I.INTRODUCTION

An Automatic board duster is a system that is be used to clean board consequently with the help of duster. By the utilization of this Automatic board duster we can save time and energy. In India, schools that still utilize chalk, instructors overcome the best direct hazard during teaching is the passage of chalk dust in the respiratory system through nose and mouth which could be high in instructors because of their vicinity to the board and successive opening of mouth while teaching. And chalk dust, might stay suspended in air for quite a while before settling, on the floor and body of the teachers and students.

To eliminate these problems, Automatic cleaning mechanism is an innovation that is large utilized in now a days. A system for consequently erasing a board where in a duster is mounted longitudinally on the board and has motors mounted there on that is mechanically interconnected to a drive assembly to produce the movement of the duster in a erasing task. The vital objective of the present Automatic board duster is to give a connection to writing boards as a power driven erasing mechanical assembly which can be set in activity by the toss of a switch, therefore disposing of the drudgery of physically cleaning boards.



The structure is basic; the utilization is advantageous, perfect and sterile; and the impact of saving time is great.

Crude chalkboard erasers were at first wet materials or wood boards appended with eraser materials. They were successful however made the client open to the chalk dust which may not be lethal but rather could make sensitivities and issues people influenced by asthma or some other breathing issues. The fundamental design constantly incorporated the chalkboard itself as an essential part and in addition the duster put in various conduct however with a solitary goal to erase the board.

Literature Survey:

Billie R. Crisp[2] proposed a framework in 1971,an programmed duster deleting device for classroom utilize. The development of the pole settled with the eraser was fundamentally done by manual switches. However, the most unmistakable piece of the component was the plural dusters inserted on the pole in order to expand the duster run and cleaning the slate turned out to be much less demanding. The electric engines length the entire slate in order to move the duster along it. The rollers at best and base do navigate movement.

In 1993 Solomon Forst [3] outlined a board eradicating framework. The board is mounted with the cleaning mechanical assembly fitted to the divider, it incorporates a different duster mechanical assembly instead of the cleaning material which was utilized in the past models. They suggested that somewhat expanding the costs on an intricate component and also custom manufactured vertical erasers we should utilize the typical dusters fitted on a isolate square which then movers around the entirety writing board deleting it.

In 2002 Chirag Shah [4] endeavored to make the slate framework with Sensors to the engines to start engine development. The instrument control switches were with the client. The duster moved back and forth to delete the chalkboard. Once the engine begins moving the apparatus and counter rigging associated with the strung pole which at that point moves the pole.

SUMMARY:

1. The time taken to clean the board manually is more.
2. The issue of residue by hand erasing affect the individual and it leads to respiratory problems and wrist pain to the instructors. So these problems can be overcome by Modelling And Fabrication Of Automatic Board Duster.

PARTS USED IN AUTOMATIC BOARD DUSTER:

- Black board
- Solar panel
- Adapter or inverter
- Lead acid battery
- Rolling wheels
- DC geared Motors
- Duster
- Frame
- Switch

II.METHODOLOGY:

Block Diagram:

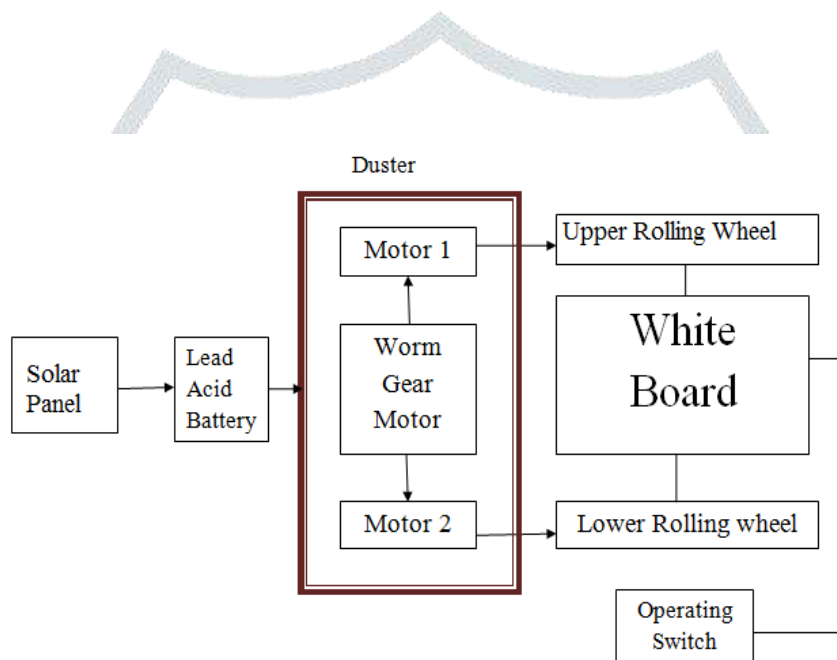


Fig 1: Block Diagram Of Automatic Board Duster

The block diagram shows the entire connectivity of parts used in the system. Solar radiation falls on the panel will be converted by the Photo voltaic effect into Electrical energy. This energy is stored in a battery. The energy fetched from battery is supplied to the motors which are fixed to the duster then the shafts of the motors starts rotating there by causes the rolling of wheels, connected to the shafts of the motors. So the duster starts moving from one end to the other. An operating switch is provided for to and fro motion of the duster.

Specifications: The following specifications of parts had considered for modelling and fabrication of an automatic Board cleaning system.

Parts		Quantity
Board Dimensions		1
Length	3 feet	
Breadth	2 feet	
Weight	3 kg	
Motor		2
Type	DC Geared	
Ampere	2A	
Volt	12V	
RPM	20	
Type	Worm geared motor	1
Duster		1
Length	2 feet	
Width	2 inch	

Battery		1
Type	Lead Acid Battery	
Volts	12V	
Solar Panel		1
Capacity	10 watts	

III.CONSTRUCTION:

In the construction of automatic board duster, the board is supported on a iron frame. Two Iron slots are placed at the top and bottom portion of the board. Two rolling Wheels are connected to the shafts of the motors which were connected together with the help of Duster as shown in fig 2 & fig 3. A duster is mounted Vertically on the left side of the board. Worm Gear Motor is fitted at the bottom of the duster as shown in fig 4, for Zig -Zag motion to improve the cleaning efficiency. A two way switch is provided as shown in fig 5, for the to and fro motion of the duster and this switch is connected to the limit switches which are placed at the bottom of the board.



Fig 2 : Motor 1 connected to the upper Rolling wheel



Fig 3: Motor 2 connected to the lower rolling wheel



Fig 4: Worm Gear Motor



Fig 5: Operating Switch

IV.WORKING PROCEDURE:

In the working of an automatic Board duster as the energy is extracted from the solar Panel and this energy will be converted with the help of Inverter. The output of the energy is stored in a Lead acid Battery. The stored energy is supplied to the motors and the shaft of the motors start rotating. A Rolling wheel is connected the shafts of the lower and upper motors each. Thus the rotation of these shafts causes the rolling motion to the wheels along the provided slots at the top and bottom of board simultaneously. A duster which is mounted vertically on the board starts moving from left to right along the board by clicking on the top button till it reaches the Limit switch. Whenever the duster is in contact with the limit switch, the movement of the duster will be stopped. By clicking on the lower button it will start moving from right to left and again the movement will be ceased when it touches the left side limit switch. So the switch will help for To and Fro motion of the duster Worm gear motor which is connected at the bottom of the duster gives the Zig Zag motion to it so that the cleaning efficiency will be improved.



Fig 6: Automatic Board Duster.

RESULT:

Cleaning efficiency has been improved with the Automatic board eraser system than the manual erasing without any risk to the instructor.

$$\begin{aligned} \text{Speed of the duster} &= \text{Distance/ time} \\ &= 1.05/ 48\text{sec} \\ &= 0.02\text{m/sec.} \end{aligned}$$

ADVANTAGES:

- No chance of respiratory problems.
- Simple in construction and operation.
- Maintenance cost is low.
- High Accuracy.
- Board Automation is economic.
- Solar energy is required for erasing which is of no cost.

DISADVANTAGES:

- Not faster than electronic processor based working system.

V. CONCLUSION:

. Chalk dust or the marker ink may demonstrate risky to wellbeing to both the educator and the students such as respiratory problems also the time required to clean the board manually is more and sometimes it causes wrist pain to the instructors. Hence to overcome these problems An Automatic Board duster is Modeled and Fabricated in an economic Way.

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