Automatic Blackboard Erasing Mechanism

Dr. S. Nallusamy

Dean, Mechanical Engineering, Dr. M.G.R Educational and Research Institute, Chennai

Abstract: The automatic blackboard erasing mechanism is mainly designed for cleaning board without any manual effort. Cleaning board manually may some medical problems likes coughing because of allergy to the chock dust, asthma may be developed because of inhaling of chock dust and several other problems. At the same time cleaner need to put some effort to clean the board perfectly.

Keywords: Automated Blackboard, Cleaner

1. INTRODUCTION

Automatic blackboard dusters are made so as to ease the tedious job of erasing blackboards by teachers or students. Chalk dust or the marker ink may prove hazardous to health to both the teacher as well as student. So to reduce such problems Automatic Blackboard dusters are one of the alternatives. The manual method of erasing has one more disadvantage 'TIME'. The time wasted during the blackboard erasing can be utilized for much better purposes like teaching or attendance. So by doing this we are simply making things better for ourselves and the future generation. India being a country emphasizing on education since ages. But the chalks we use on blackboards or the markers on whiteboards need to be erased if next thing is to be taught. This black or whiteboard erasing method is a tedious job. So to reduce a little bit time and energy of the teachers who shall raise the next generation we have tried to design the automatic blackboard erasing mechanism. The main reason for the use of wiper motor is that it high torque at low speed. For our design low torque is required because at low torque only the efficiency of the design is high. Whereas at high speed torque is low the cleaning device will move quickly hence the erasing mechanism is not achieved perfectly. To achieve complete cleaning we need high torque but low speed which is provided by wiper motor which is mainly used in cars for cleaning glasses during rain.

2. EXISTING DEVICE

There were some boards cleaner available which completely use electrical components to achieve cleaning operation. Our design also contains electrical components but not more in numbers, that means cost is reduced. The main advantage of our device is that it can be fabricated at cheap cost.

3. PROPOSED MECHANISM

In our design we use a bevel gear to transmit the rotating motion of wiper motor into the rotating motion of shaft which moves on linearly by means of rack and pinion attached to it. The rod is attached to two bearings. Both bearings and shaft is attached to wooden board

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(plywood) of dimension-4.5*1 feet. Below the wooden board sponges of dimension-4*0.5 is attached by means of glue in two columns at the right and left end. At the four corners of the wooden board rollers are attached. Roller fixed wooden board move on hollow rectangular aluminium plate which top surface has been sliced off. Rack of six feet have been fixed at top of the black board. Pinion attached to shaft moves on rack at the same time wooden board moves on aluminium plate. Hence the sponge attached at the back of the wooden board erase the board. By connecting wiper motor input to positive and negative input forward and backward motion can be obtained.

We propose a system to interface the mechanical aspects of the mechanical erasing system with micro controllers so as to enhance it into automation rather than manual. We are using PIC micro controller to interface the board erasing mechanism. Basically it is a simple Duster attached on a vertical Shaft. The movement is done by the use of 2 DC motors and they can be controlled via switches given. The Duster shall be placed in the midsection of the board so to reduce time to move towards any side of the board easily. Thus the teachers will be able to erase 50% of the board easily. Block diagram for the proposed model is as shown in Fig. 1.
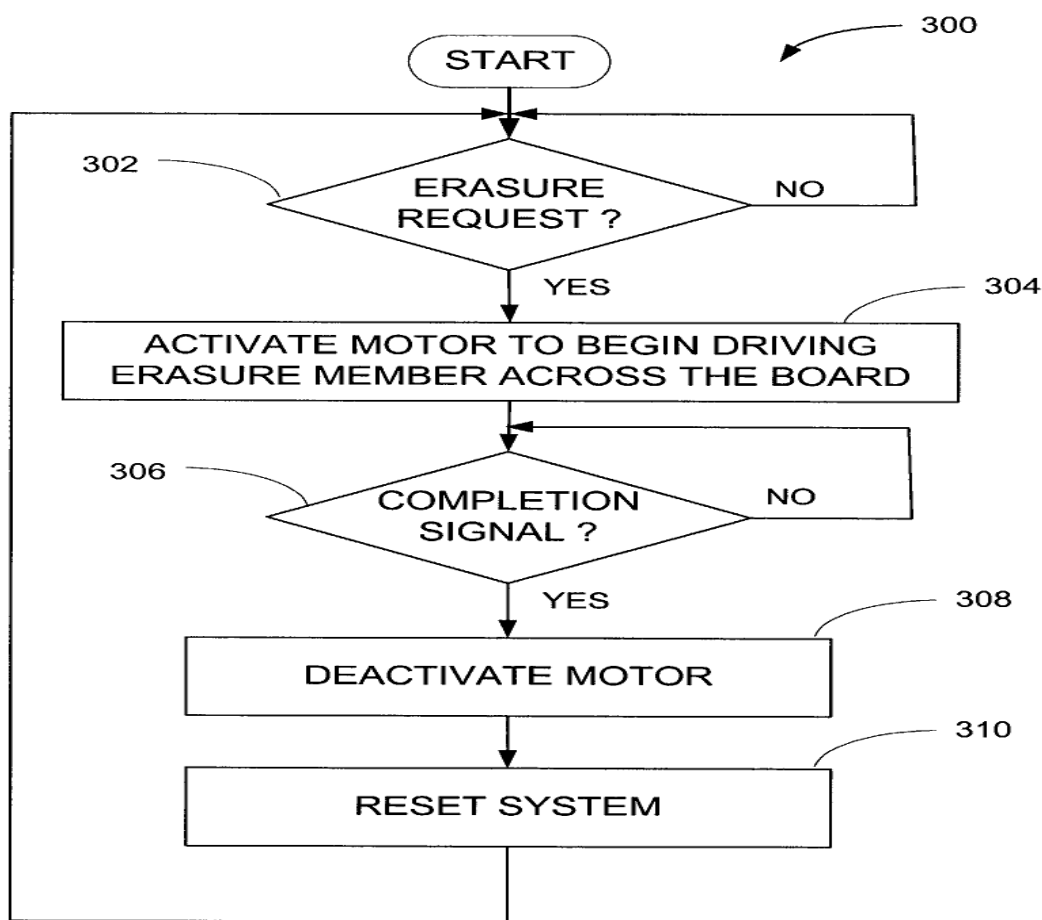

Fig. 1 Proposed Diagram

4. IMPLEMENTATION OF AUTOMATIC BLACK BOARD

The main components of the system can be identified as PIC 18F458 Microcontroller, encoder and decoder(wireless transmission) and L293d motor driving IC. The initial stage includes the switches which will be used for direction of the duster with the encoder IC so as to encode the given input by the user into proper format for transmission. The received signal will then be decoded by the decoder and then it will give the information to the PIC 18F458 microcontroller. PIC will then convert the data given by the user into formats as specified for the motor driver IC L293D for the movement of the motors. The input given to the L293d will then give the supply to the motor for the specific movements.

The microcontroller used is PIC 18F458.The output generated by encoder at the transmitter is then given to PORT C of PIC. The user when presses the switch gives the input to the encoder which encodes it into proper format. The signal is transmitted to the receiver section. The input is then decoded using decoder. The address lines of encoder and decoder are set at 0 so as to enable the data transfer between them. The decoded bits are then given to the microcontroller which then checks it for the direction given by the user and generates proper output for the L293d to implement. The L293d then gives the supply to the motors as specified in the output of the microcontroller and the movement starts. Power Supply As we require a 5V we need LM7805 Voltage Regulator IC. The current rating of the transformer depends upon the current required for the load to be driven. The input voltage to the 7805 IC should be at least 2V greater than the required 2V output, therefore it requires an input voltage at least close to 7V. So 6-0-6 transformer with current rating 500mA (Since 6*√2 = 8.4V) was selected.

Micro controller is the heart of our circuit. It acts as an interface between Switches and motors. In this project we have use PIC18F458 microcontroller,which is a product of Microchip Corporation. L293d It is a quadruple high current half H-drivers. They are designed to provide voltages from 4.5-36V and currents of up to 1A.They are used in our project so as to drive the 2 motors present as L293d has capacity to drive up to 2 motors at once. DC Motors We are using DC motors here for the movement of the shaft of the duster. The DC motors are primarily devices used to convert electrical energy into physical or mechanical energy. HT12E encoder The 212 encoders are a series of CMOS LSIs for remote control system applications. They are capable of encoding information which consists of N address bits and 12N data bits. Each address/data input can be set to one of the two logic states. The programmed addresses/ data are transmitted together with the header bits via an RF or an infrared transmission medium upon receipt of a trigger signal. MPLAB is a free integrated development environment for the development of embedded applications on PIC and dsPIC microcontrollers, and is developed by Microchip Technology. It supports project management,code editing,debugging and programming of Microchip 8-bit,16-bit and 32-bit PIC microcontrollers. When the user gives the command using the push buttons placed on the transmitter side the encoder will encode the command in a proper format so as to be transmitted. Once the data reaches the decoder and gets decoded, it gets sent to the microcontroller to identify the direction to move and appropriate output is generated so as to make L293d understand in which directions the motors need to move. Once the motor moves it again returns to the middle of the board

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5. RESULT

Low Cost: In our design other than wiper motor no other parts have high cost . Hence cleaning of board can be achieved at low cost .As the cost is low this design can be implemented in various schools colleges.

Reduction in Human Effort: In our country most schools and colleges uses blackboard for writing and teaching purposes. The main problem is wasting of time in cleaning the board instead of spending more time for teaching. Not only time is wasted at the same time health is also affected by means of inhaling chalk. All these problems can be avoided by means of using wipe of duster.

Efficiency : As the wooden board along with shaft, bearing, wiper motor is placed against the board vertically, at the same time wooden board is placed in rectangular plate in the manner it doesnot move away from its vertical postion. As the wooden board is fixed rigidly, a thrust force act on along the direction of the board. When the wooden board moves sponge fixed along two column behind the wooden board erase the board with the aid of thrust force. Thus cleaning of black board is obtained at good efficiency. For high efficiency low torque is required hence wiper motor is used.

CONCLUSION

Automatic blackboard erasing mechanisms have been studied and implemented for erasing the blackboard automatically. It provides a better solution for the health problems, time constraints in the class rooms. We learned the basic methodology to use DC motors so as to initiate movement of shaft and microcontroller to control the movement of the shaft.

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