Auto Cleaning Mechanism for White Board

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ABSTRACT
A whiteboard, duster, and marker are essential tools in the teaching profession. Using a duster to physically erase text off large-sized boards takes a lot of time. It causes both lecturers and listeners to lose focus. The automatic whiteboard cleaner's design and construction are presented in this paper. A microprocessor, DC motor, driving module, wooden shaft, electrical switch, and mobile make up the system. Two switches will be present, one for moving ahead on the board and the other for moving backward. The time and effort needed are decreased with the automatic whiteboard cleaner.

Keyword:-*whiteboard, duster, switch, automatic*

INTRODUCTION
The delivery and reception of information and knowledge by the teacher and the learner is the primary focus of the teaching and learning process. Currently, educators employ a variety of techniques to impart knowledge to their students, including the use of computers, notepads, and, of course, whiteboards or blackboards. Erasing the blackboard is one of the issues we are having in our classroom. Chalk is a calcium carbonate compound that resembles a stick. Although it was cozy, using a duster to wipe the board produces dust.

An instrument called a duster is used to remove writing from a board. Despite this, the chalkboard is still in high demand and is utilized extensively worldwide. Extreme annoyance is caused by chalk dust dispersal, particularly for those with asthma, skin rashes, and other major health issues. Whiteboards are more in demand since blackboards take a long time to clean. The initial whiteboards were constructed of enameled steel, which was quite expensive. However, as the market for whiteboards grew, less expensive versions made of steel with a white polyester or acrylic covering were introduced.

Here, a piece of cloth or a foam duster is utilized as the duster and a marker pen serves as the pen medium. Because the marker pen comes in many colours, using the whiteboard is incredibly comfortable and doesn't produce any dust—it simply gets the duster dirty. The whiteboard has become the most effective writing surface in the world. There were several varieties of whiteboards, such as high-pressure laminated boards, porcelain boards, and laminated chipboard.

Nowadays, practically everything is mechanized, and this means that any arrangement may be made easier and require less human labour. Adjustments were also made to the ways that whiteboards were cleaned and rubbed. In order to minimize the amount of human labour needed for cleaning, remote control motorized cleaners were developed. This kind of cleaner is switch-operated and

powered by motors. Part II of this paper discusses the Related Work, which has been mentioned in a number of earlier works. Part III of the paper explains the technique and presents the many components of the automatic whiteboard cleaner, including the motor drivers, DC motor, and NODEMCU. In the publication, the Results & Discussion are covered in Part IV. In Part V, we wrap up the paper and discuss its potential implications. This paper's acknowledgement and references are located at the conclusion.

RELATED WORK

Sonia Akhtar [1] overcome the problem erasing with a system in which only one motor and driver with rack and pinion mechanism are used instead of belts and a large amount of pressure has provided by rack and pinion mechanism with necessary supports. S. Joshibaamali And K.Geetha Priya [2] explained that the cleaning process in three steps as first it cleans the left side of the board, second, it cleans the right side of the board and in the third mode, it cleans the whole area of the board.

The machine uses two stepper motors to move duster in horizontal (x-axis) and vertical (y-axis) direction. To move the duster in up and down through the motor. Four limit switches are used to detect the boundary of the board. Mr. Sunil R. Kewate et. al. [3] explained in their paper the design and principles of sliding type wipe mechanism and also carried out the implementation and experimentation for motion analysis. The mechanism automatically detects the blackboard chalk stains and erases the font. This system consists of two motors, three guide rails, and three sliders. S.nithyananth et. al. [4] has explained about rack and pinion mechanism with the application of steering mechanism. In the steering mechanism, the

author is trying to tell that the rotational motion applied to pinion will cause the rack to slide up to the limit of its travel. Dong Yeop Kim et. al. [5] proposed a limit switch module as a mechanical sensor method. In this system, there are two limit switches. Their combination is translated to building wall shape information. The ARS sensor and the height sensor are used to mapping to 3D localization of the robot. If ARS sensor and height sensor is attached to another place of the gondola, the sensor data is needed to send to this limit switch module process algorithm.

Mojtaba Khaliliana et. al [6] used a direct torque control technique to control the torque instantaneously and improve the performance of the hybrid stepper motor. Then by taking the model reference adaptive system scheme, which uses a hybrid stepper motor itself as the reference model, the speed of the motor is estimated. The sensorless control of a hybrid stepper motor based on MRAS with Matlab software is built and simulated. The results show that the control technology is simple and effective and accuracy is considerably high [7]. The electric board cleaner and the automatic whiteboard cleaner make use of belts. Most belts have low wear and tear resistance and with the frequent operation of the duster (i.e. the cleaning process), the belt is likely to cut and hence makes the device or the cleaner-less useful. In the process of trying to change the belt, the whole components may have to be loosened which is time-consuming.

However, as for the case of the electric board cleaner, the idea of applying manual effort still comes in. The difference being that effort applied is less since it is powered electrically. This project is aimed at modifying the automatic whiteboard cleaner by replacing the belts with chains which will improve the efficiency and effectiveness of the cleaner. The objective

of this project is to reduce the stress of cleaning the board by using an automated duster. This objective would be achieved through the following specific objectives (i) conceptualization of an automated whiteboard cleaner (ii) preliminary and detailed design of new mechanism (iii) Fabrication of the Preliminary Design of an Automated White Board Cleaner automated whiteboard cleaner. (iv) Performance testing of the automated whiteboard cleaner.

METHODOLOGY
The main aim of this project is to design and develop Automatic Whiteboard cleaning system using Microcontroller which can overcome the problems related to discomfort for the teacher, breaking concentration and conceptual link between lecturer and student and wastage of time and energy while erasing the board. Objectives:

• To achieve a general understanding of the technology implicated in using automatic whiteboard cleaner in college.

• The written can easily clean and not a waste of time.

• To saves our valuable and precious time.

• To do cleaning work, merely by using an automatic board cleaner.

• Make a low cost and user-friendly whiteboard cleaning machine. Outcomes:

• We will successfully clean the whiteboard automatically.

We have attended many lectures on Power electronics, Digital communication, and Digital signal processing and so on. What we always say that teachers need to clean every corner of the board for plotting graphs and writing equations. Teachers more time and energy is wasted in cleaning the board during 60 minutes lecture. So students were getting bored, deviates from the topic and start chatting on mobile. The link of teaching is disturbed. So after cleaning board teachers need to pay more attention to students to get them on track again. This is a very difficult task to do. This motivated us to propose "AUTOMATIC WHITEBOARD CLEANER".

The mechanism of the automated board cleaner entails a horizontal motion. The duster which spans horizontally across the width of the board is to clean the board. The design is such that when the switch is turned on, the motor transmits energy which turns the shaft which in turn, drives the pulley. The duster is fixed to the pulley chains which move to and from (horizontal motion) along its plane, thereby cleaning the board. The first command signal is given to NODEMCU. Then the voltage is given to DC motor through L298N motor driver.

In the Arduino program, there is uploaded for DC motors rotation. After getting instruction from Arduino dc motors are rotate at speed by given instruction in the program. Motors are connected to a mechanical shaft which has also cleaning material of duster is attached. After start rotating of motors in the path the shaft also moves and due to this the cleaning material of duster getting a move and it is closed to the whiteboard surface. So it cleans the written on boards.
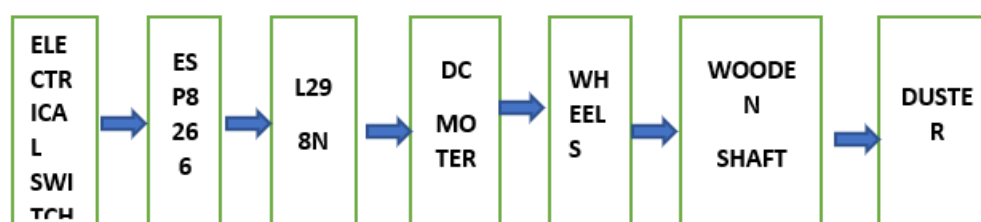
Fig.1:- Block diagram of proposed methodology

RESULT AND DISCUSSION

It is observed that the time of complete cleaning of the board using this system is average 8 sec. On the other hand, while using the manual process the time of cleaning is about 25 sec which is about four times of the machine time. So proposed whiteboard cleaner takes less time than other previous models. It creates less noise than other motorized cleaners. Sufficient pressure has been induced during the operation due to the attachment of brush to the side reels of whiteboard which helps to clean the board very effectively and efficiently. Change of brush is very easy and it does not affect any other parts while changing. This system is only applicable to the whole board cleaning. Partial cleaning of the board is not possible through this system. Though there is some lagging in to start the motor, averagely it is optimum. For controlling the positions of the shaft. The control module has button to move on board in forward and backward position.

1. In the figure below forwarding, the operation is explained. Through the switch forward command is given and Shaft moves in the forward direction and motor running in a clockwise direction.
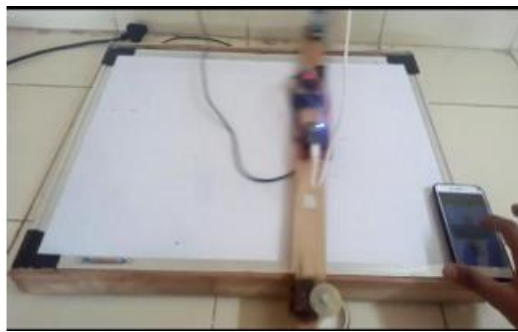

Fig.2:-Forward state of erasing

2. If the command given through switch module is backward, Shaft moves in the backward direction and motor running in the anti-clockwise direction

Fig.3:-Backward state of erasing

3. As and when stop button in the switch module is pressed, the motor stops at the current position due to this Shaft also stops suddenly.

Fig.4:-*Stop condition of the system*

CONCLUSION AND FUTURE SCOPE

This study has partially succeeded in achieving its goal of designing an automatic whiteboard cleaner. Further fabrication work is required. Although the chains and sprocket structures were designed to fit precisely into the cleaning mechanism, insufficient tensioning hindered the automated duster's ability to fullfil its intended role. Variable speed regulators were introduced in place of the gear system, which could have been used to lower the motor's speed but might have added weight to the machine.

The sensor was required to turn off the motor whenever the duster reached the end of the board because of its forward momentum. This can be applied to shield the motor from harm. After two or three sweeps, the automatic duster will finally provide effective cleaning. To ensure efficient cleaning, it is advised that the machine's chain tension be adjusted, and that rollers be positioned at the base directly in front of the duster to create a groove that allows for its movement. In order to lessen the load on the electric motor, the sprocket's bearings are finally properly fitted. The automatic whiteboard cleaner has been effectively designed, it is concluded.

The system's creative features minimize human labour and increase the effectiveness of instruction. Using this kind of whiteboard in schools, colleges, and universities could be highly beneficial because it sparks students' interest in using various forms of technology for their studies. Time and human labour have both decreased with the machine.

The Arduino microcontroller, which is incredibly user-friendly to program, is the building block of the automatic whiteboard cleaning. However, very basic tool work is required to make the primary framework, and the materials used in this project are readily available and reasonably priced. Thus, building this machine is not difficult, and it will facilitate the introduction of an automation system. One way to improve the system would be to incorporate a Bluetooth remote control to operate the switch. This system can be turned into a smart whiteboard by using infrared sensors. The whiteboard's aesthetics can also be enhanced.

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