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AUTOMATIC WHITEBOARD CLEANER

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Abstract:
The principal point of our task is to save time. It's exceptionally difficult to invest our energy dependably in cleaning of the white board. This project is implemented to make human work easier and can reduce the use of human power because of its potential applications. The report puts forward a kind of mechanism design scheme; this mechanism keeps the whiteboard clean. The duster which is mounted on a wooden block moves in forward and reverse direction vertically. Duster is mounted on a chain which receives power from a shaft, on which bevel gears are mounted and a hand wheel is attached with it so that effective drive is being done. This appertains to new and useful improvements and more particularly to an apparatus whereby whiteboards can be cleaned in an easy and convenient manner. The object of the present automatic whiteboard duster is to provide an attachment for whiteboards in the form of a power driven erasing apparatus which can be set in operation, thus eliminating the drudgery of manually cleaning blackboards.

Keywords: Smart Classroom Devices, Educational Technology, Ergonomic Classroom Solutions.

Introduction

It is a system that is generally used to clean the whiteboard automatically with the help of duster. By the use of this automatic system we can save our time and energy. It is a new technology that is generally used now a day. A system for cleaning the whiteboard wherein a duster is mounted for longitudinal movement on the board and a hand wheel is mounted that is mechanically interconnected to a drive assembly for producing the movement of the duster in an erasing operation It will use the bevel gear, chain and sprocket mechanism to convert the rotary motion of hand wheel into linear motion of duster. Automation or automatic control is the use of various control systems for operating equipment's such as machinery, processes in factories, boilers and heat treating ovens and other applications with minimal or reduced human intervention. Some processes have been completely automated. The biggest benefit of automation is that it saves labor, however, it is also used to save energy and materials and to improve quality, accuracy and precision. This thesis will contribute to the understanding of some relevant principles of magnetism and how the connection and collaboration between different components affect the outcome. This will be displayed through the resulting motion and interaction with its surroundings. The purpose of the project is to create and build an automatic whiteboard eraser that will systematically work through the whole surface and successfully remove all the ink. For this type of project to become reality, the following research questions must be answered. Due to the limited time the project is running, the scope has initially been reduced with the possibility for further

development. It has been decided that the robot is supposed to run on batteries to facilitate the portability Due to the first research question listed above it is of high interest to keep the weight of the prototype minimized. These weight limitations bring a number of restrictions on the project, for example in form of choice of components. Since the concept is based on magnetism, the intended surface that the prototype operates on is magnetic.

Problem Definition

Hand erasing requires human power thus wastage of human energy

Objective of the project:

There are two main objectives of doing this project. First objective is to design a low cost and user friendly whiteboard cleaner machine which can erase the board easily. This machine was created as a convenience to the user to erase the whiteboard. Second objective is to enhance the efficiency and accuracy of the movement of duster. The purpose of this objective is to make the movement of this machine accurate although has been used many time. Though the use of smart boards is increasing, many institutions in the developed and developing world still make use of white boards. The objective of this work is to design a device that will reduce the man-power involved in cleaning white boards after use. 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 automated whiteboard cleaner
(iv) performance testing of the automated whiteboard cleaner.

METHODOLOGY

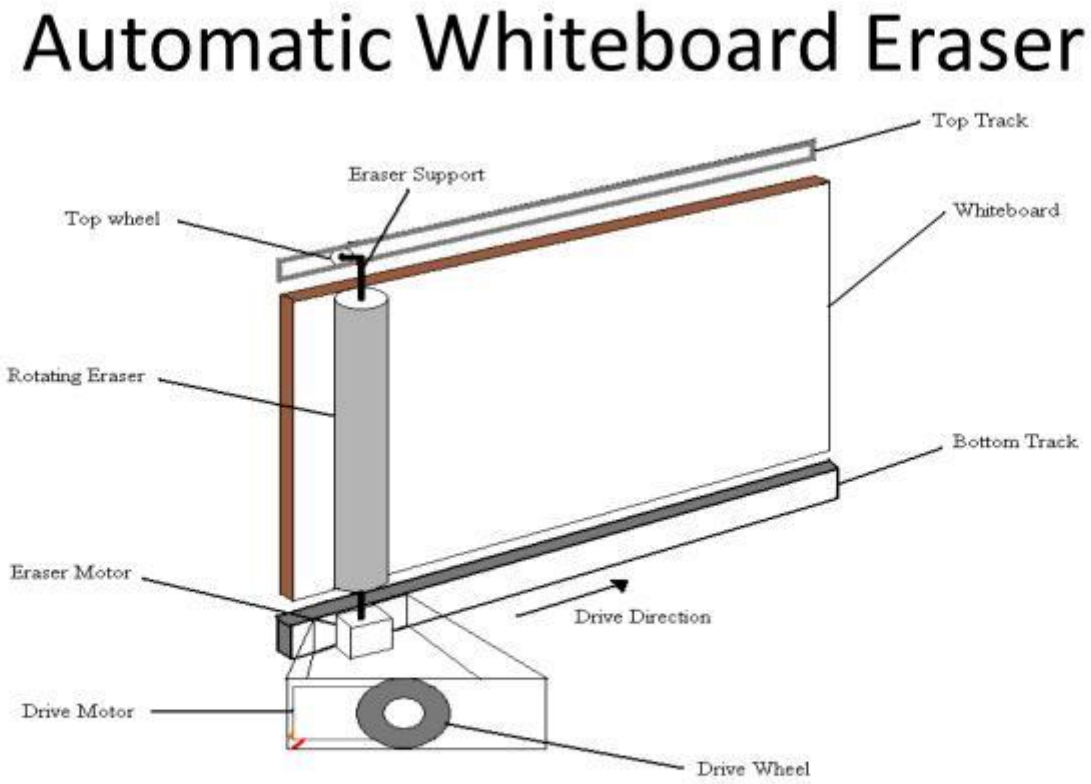
In the working of automatic whiteboard duster as the power is supplied to the gear the shaft of the gear side starts rotating. Two sprockets are connected at both the end of gear shaft and gear shaft is connected by another shaft which also contains two sprockets at its both ends, with the help of a chain. Thus movement of these sprockets rotates the chain by which both the upper and lower sprockets of supporting shaft start rotating By the rotation of these sprockets, the chain which is mounted on these sprockets in horizontal direction also starts rotating. A duster which is mounted on this chain starts reciprocating to and fro, thus clean the board. The main aim of this project is to design and develop Automatic Whiteboard cleaning system using Micro controller 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:

1. To achieve a general understanding of the technology
2. implicated in using automatic whiteboard cleaner in college
3. The written can easily clean and not a waste of time.
4. To saves our valuable and precious time.
5. To do cleaning work, merely by using an automatic board cleaner.

6. Make a low cost and user-friendly whiteboard cleaning machine.Outcomes:
7. We will successfully clean the whiteboard automatically.
8. We will operate this project from long distance by mobile.

Design and design consideration of the project



Introduction:

Project design may be defined as the iterative decision making activity to create a plan or plans by which the available resources are converted, preferably optimally, into systems, processes or devices to perform the desired functions and to meet human needs. In fact project design has been defined in many ways but the simplest ways to define project design as An iterative decision making process to conceive and implement optimum systems to solve society's problems and needs Project design is practical in nature and must be concerned with physical reliability, or economic and financial feasibility Design is essentially a decision-making process. If we have a problem, we need to design a solution. In other words, to design is to formulate a plan to satisfy a particular need and to create something with a physical reality

5.1.2 Basic concept of project design:

Decision making comes in every stage of design. Consider two cars of different makes
different. The designers consider different factors and come to certain conclusions leading to an optimum design. Market sirvey gives an indication of what people want Existing norms play an important role. Once a critical decision is made, the rest of the design features follow For example, once we decide the engine capacity the shape and size, then the subsequent course of the design would follow. A bad decision leads to a bad design and a bad product Design may be for different products and with the present specialization and knowledge bank, we have a long list of design disciplines eg. ship design, building design, process design, budge design, clothing or fashion design.

5.1.3 TYPES OF PROJECT DESIGN:

There may be several types of design such as

1. Adaptive design

This is based on existing design, for example, standard products or systems adopted for a new application. Conveyor belts, control system of projects and mechanisms or haulage systems are some of the examples where existing design systems are adapted for a particular use

2 Developmental designs

Here we start with an existing design but finally a modified design is obtained. A new model of a car is a typical example of a developmental design

3. New design

This type of design is an entirely new one but based on existing scientific principles No scientific invention is involved but requires creative thinking to solve a problem Examples of this type of design may include designing a small vehicle for transportation of men and material on board a ship or in a desert. Some research activity may be necessary.

4. Rational design:

This is based on determining the stresses and strains of components and thereby deciding their dimensions.

5.1.4 Factors to be considered in project design

There are many factors to be considered while attacking a design problem. In many cases these are a common sense approach to solving a problem. Some of these factors are as follows:

1.What device or mechanism to be used? This would decide the relative arrangement of the constituent elements

2 Material

3. Forces on the elements

4. Size, shape and space requirements. The final weight of the product is also a major concern.

5. The method of manufacturing the components and their assembly.

6. How will it operate?

7. Reliability and safety aspects

8. Insensibility
9. Maintenance, cost and aesthetics of the designed product.

Working

As per our reviews and survey, we conclude that the automatic whiteboard cleaner machine will give satisfactory rubbing effect by converting rotary motion of hand wheel in to reciprocating motion of duster In our project the system uses the bevel gear arrangement for cleaning the whiteboard with the help of hand wheel. Hand wheel transfers power to the shaft through bevel gear then it is transferred to the connecting strip with duster attached to it by nut and bolt arrangement on chain The eraser runs on chain and will make it easier for teachers to clean their whiteboard. This project consists of chain and sprocket mechanism, here the sprockets are fitted at both the ends of the two shaft and one of the shaft receives power from hand wheel by means of bevel gear arrangement as described above. In this way whiteboard is cleaned smoothly and efficiently and we will get a desired rubbing effect.

Result

By taking trial of our machine and gathering all information of other methods, we have got following result. The machine shows a desired effect for erasing of board in minimum time with minimum marking remains on board. We also found some of the following results from our calculations as:-

➤ Torque experienced on hand wheel is 4.064 N-m.
➤ Torque experienced on shaft 0.108 N-m.
➤ Time of cleaning is 3 seconds.
➤ No. of turns of hand wheel required to clean the board 2.
➤ Pressure angle of bevel gear is 20°.
➤ Outside diameter of pinion is 122 mm and
➤ Outside diameter if gear is 68 mm.

Advantages, Disadvantages and Application of the project

Advantages of the project

In each of the invention will have advantages and disadvantages. It relies on the idea of designs. Below are some advantages and disadvantages of the project

- Shorten the time and effort used to erase the whiteboard.
- The wiper can be removed easily if it is necessary to clean
- Automatic whiteboard cleaner has a higher demand in market nowadays. No external devices are used in making to control it.

Disadvantages of the project

- Not portable in size and not easily transportable

Application of the project

Our project should use for following various applications like as:
i. Educational Purpose.

ii. Teaching purpose

Future scope

Even though, automatic duster machine successfully fabricated but this machine needs some improvement to add to make this machine in high performance and comfortable to the user. Further research must be done in order to make the machine meet the specification and requirement for commercialized purpose. These are some idea for the future development of automatic white board machine.

1) Redesign the mechanical structure: in this project the design more like a prototype for this machine. To make it become reality this machine must be redesign to make it comfortable and able to apply in real world.

2) Operate in electric mode: it is an advantage when user can control the movement of duster machine by using wireless joystick user can erase the area of white board they want by control it.

3)Operate in schedule: this machine can be set up the time. It can operate automatically when we set up the time we want it work.

4) Eye of machine: we can make this machine operate with detection of dirt in whiteboard. Machine knows the location of dirty and erases it automatically

Conclusion

It is concluded that automatic whiteboard cleaner has successfully designed. The system has designed with innovative features which reduces human efforts and makes teaching efficient. This type of whiteboard could be very effectively used in schools, colleges and universities as it increases the interest of the students to study with different technology. The machine has reduced both time and human effort. The construction of automatic whiteboard cleaner consists of Arduino micro controller which is very user friendly in programming. On the other hand to construct the main structure, very simple tool work is needed, and the materials used in this project is cheap and easily available in market. So it is not complicated to construct this machine and it will help to introduce an automation system. The system can be further developed by integrating a Bluetooth remote for controlling the switch. Infrared sensors can be used to convert this system to a smart white board. Aesthetic looks of the whiteboard can also be improved.

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