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## Automatic Whiteboard Wiper

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### Abstract

Nowadays universities and schools are no longer using blackboard as a medium of teaching and learning. They are using whiteboard because it feels that it is much more conducive and clean rather than using a blackboard. Questionnaires and interviews were conducted and found that educators are often faced with problems in cleaning and wiping the whiteboard. A questionnaire and interview have been conducted and found miscellaneous issues related to using the whiteboard. From the analysis that has been made, result showed that educators have problems in cleaning up the whiteboard and it takes quite some times to clean the whiteboard. The proposed time should be used effectively for teaching and learning in classrooms. Issues regarding to losses of whiteboard duster always happen and the management has to buy the duster repeatedly and it will increase the management expenses. As a result, a product was designed to overcome this problem. This product has been designed by innovating manual whiteboard wiping techniques. Motor and 'toggle switch' have been used to make it easier to clean it. The limitation of this product is that it can only wipe in x axis direction based on the rail that has been installed. Duster can also be opened and switched if it was damaged and can't be used anymore. An analysis has been conducted and found that, by using this product, the wiping time to clean the whiteboard can be saved up to 50%. Therefore this product is suitable to help educators to save time, energy and improve the quality of teaching and learning.

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*Key-word:* - Whiteboard, Automatic, Wipe, Teaching and Learning, Educators.

### 1. Introduction

Technology in today's world is increasingly moving forward. Similarly, the education system of education in our country is increasingly improved with various innovations made by educators. Various methods and tools are being designed to make the learning process nowadays becomes more interesting. This can be seen and experienced in the education system in Malaysia. The paradigm shift in the education system demands and urged the teachers to create change where one of the key elements of changes is in the study of creativity (Haji Mohd Ali, 1994). A teacher must be creative in making the teaching and learning process interesting and fun to learn while students can be motivated. (Haji Mohd Ali, 1994). It is supported by Yong & Biramiah (1996) which is a creative teacher will act as motivators in learning for students. The teachers have to make innovations whether in teaching methods, tools that have been used, tone of voice and others.

Up to now both schools, universities, colleges and other educational institutions are still using the whiteboard and blackboard as a medium to convey information to students. The interactive whiteboard is seen as the first choice of students during the learning process as set out in a workshop seminar for ministers in conjunction with The British Educational Technology Show (BETT 2007). Based on the priority, BETT workshop participants from various countries were asked about their expectation in technology available in school. The results of the questionnaire found that nearly 70 percent said *interactive whiteboard* or interactive whiteboard (IWB) should be a priority in every school (Nazrul Azim, 2009). The use of multimedia in teaching and learning can enhance the understanding of students and this causes them to be more interested in interacting and focusing in classrooms. By using educational software that provides various forms of image and picture in the classroom.

These can help them to facilitate students' understanding of the subject and reduce dependence on the existing system. Efforts need to be implemented so that teachers can improve their skills in using the latest technology in teaching and learning (Star, 2011). The diversity in the use of teaching aids can create a more interactive and thus attract more students and that should be a priority. (Mohamad, 2011) The use of audio, visual, graphics and speed of simulation technology have a significant impact to the students. It shows that the use of technology in teaching and learning are indispensable nowadays (Mohd Amri, 2009). According to Muhammad Zulfadhli 2012, use of technology actually simplifies the process of teaching and learning in schools. The use of digital technology is indeed a different method of teaching and learning (Lim Kok Siong, 2001). Thus, many developments in the use of technology such as cleaning the whiteboard also occur. As we all know, normal whiteboards need to be self-erased using human labor. The issue of losing the whiteboard duster also occurred. The management had to replace the new one. This will lead to increasing the operating costs and at the same time disturbing the smoothness in the classroom.

This study aims to design products that can clean the whiteboard in automatically process. The product is known as Automatic Whiteboard Wiper. This tool is designed in accordance with the process of Teaching and Learning (T & L) during the small classroom. It can be used in any condition, whether in the tuition classroom or in small spaces such in laboratory. This product does not require any high skilled labour to operate. The product is designed solely to meet the needs of users with low costing but using durable and strong materials. The product is also affordable and does not need a lot of space. By using this tool, it can save time and energy while the process of learning takes place. The product uses a user-friendly concept and design which are easily understood by users. The product is easy to maintain and also the system used is easy to operate and maintain. Users only need to press the switch 'toggle' so that the duster can moved to the x axis by using the rail that have be installed as a movement guideline. This product is environmental friendly which it does not use ingredients that are harmful to consumers and does not pollute the environment.

**Table 1:** Analysis of product.

No	Equipment	Price (RM)	Function	Ref.
1	Automated Whiteboard Eraser: Teaching Aid Equipment; Mobile Whiteboard; Malaysian Technical University Conference On Engineering And Technology (MUCEET).	2000	Whiteboard eraser use DOS computer system, ultrasonic sensors and uses the power of the motor.  - too expensive	(Mohd Amri, 2009)
2	Blackboard Wiper	300	- Just erase the blackboard	(Albert, 2010)
3	Smart Board	in 1500	-Whiteboard eraser use DOS computer system, ultrasonic sensors and uses the power of the motor. It's expensive.	(Mechling, 200)
4	PROPOSAL 'Automatic Whiteboard Wiper'.	300	This product uses a motor to move the duster. The wiper is controlled by using 'toggle switch' which can be moved to the left or right. The wiper can only be moved to one axis only (x axis). The roller is installed on the rail so that to ease the movement of the wiper by using electrical power source.	

Product analysis in Table 1 was made because to obtain more information of the product that was available in the past study. Four products were analysed and found that the first product is costly and called 'Automated Whiteboard Eraser: Teaching Aid Equipment; Mobile Whiteboard' and the paper has been presented during the Malaysian Technical University Conference on Engineering and Technology (MUCEET) (Mohd Amin, 2009).

This is because it uses the DOS computer system, ultrasonic sensors and motors. 'Smart Board' tool is worth RM 1500.00 and also using the same software and the product consists of DOS computer system, ultrasonic sensors and motors. (Mechling, 2007). Blackboard wiper is only a product which consists of blackboard and chalk. This product is not suitable nowadays and used manpower, every time the erasing operation is carried out (Albert, 2010). The function of 'Automatic Whiteboard wiper' is to erase and clean the whiteboard. It is cheap and easy to control. It only requires little energy because it uses motor to move the wiper. This product is controlled using the 'toggle switch' to move the wiper to the left or to the right. It is also moving in one axis (X axis) only. The roller is installed on the railing to ease the movement of the wiper by using electrical power source.

## 2. Methodology

The concept of this product is using user friendly concepts that will focus on environmental and human factors such as easy to operate, save energy and save time. The conceptual design of the product is easy to understand by users. It is created so that users can identify the problems if there is any damage of the product while using it. It is also easy to maintain. The operations of the product are easy, fast and simple. This product does not use harmful substances that can pollute the environment. The resulting residue is also not harmful to humans. It's easy to operate and the user only needs to press the switch 'toggle' that can be moved from the x axis. The system works simply by pressing the switch 'toggle'. Methods or procedures used for carrying out the project are as details below:

### 2.1 Product Design

Product Design analysis begins with a literature study, analysis, design, product development process, and testing the product. Rough sketch was made to get an idea of the conceptual design. Technical drawings by using AutoCAD software was used to obtain the exact dimensions of the product like figure 1.



Figure 1: Automatic Whiteboard Wipe

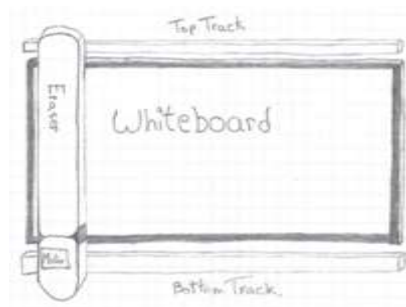


Figure 2: Sketch of the Project

### 2.2 Procedure of Project

Next is the process of preparing and modifying existing white board (see Figure 3), from manual wiping process to product white board motor controlled and tracked. Motor is placed on the left side of the whiteboard to move the duster to x-axis in which to move the 'wiper' to the left or to the right. The wire is used to be a conduct of electricity and a cable hose is used to protect wires from any shock and tidying products. Toggle switches' are installed to control the movement of the machine wiper.



**Figure 3:** The original design before customization

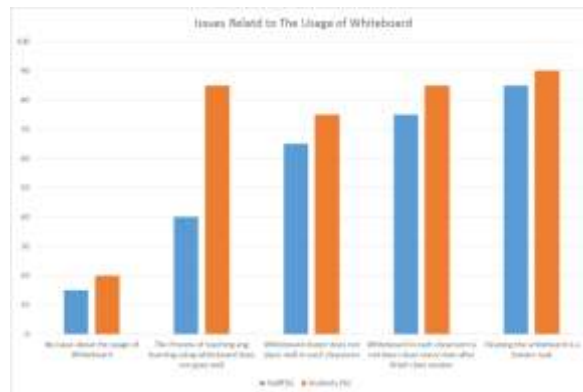
### 3. Data analysis and discussion

Questionnaires were distributed to the staff including lecturer, Lab Assistant, Technician and students of the faculty of Mechanical of Polytechnic Sultan Salahuddin Abdul Aziz Shah as the sample respondent. From the analysis showed that majority of staff and students agreed that the main issue related to the whiteboard is, cleaning the whiteboard after they use are very burden to them. They need easier method of cleaning the whiteboard. Because of these burdens, it shows from the analysis that the whiteboard in the classroom is not been clean after they use.

**Table 2:** Table Of Issue Related To The Usage Of Whiteboard.

Issue Related to The Usage of Whiteboard	Staff(%)	Students (%)
No issue about the usage of Whiteboard	15	20
The Process of teaching ang learning using whiteboard does not goes well	40	85
Whiteboard duster does not place well in each classroom	65	75
Whiteboard in each classroom is not been clean every time after finish class sessi	75	85
Cleaning the whiteboard is a burden task	85	90

**Table 3:** Analysis Of Issue Related To The Usage Of Whiteboard.



A time-tested analysis of the product was conducted and found that the whiteboard user needs 20 seconds to manually clean the whiteboard instead of 10 seconds by using 'Automatic Whiteboard Wiper'. This showed that the lecturer or users can save 50% of their time. From the prediction analysis it shows that the user of the whiteboard can save 165 minute in one semester. This extra time can be used to focus on teaching and learning in classroom.

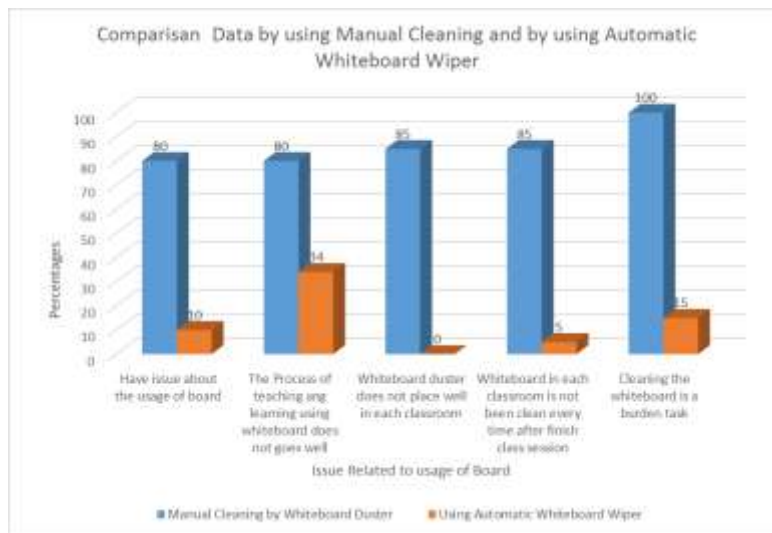
**Table 4:** Analysis Of Comparison using manual method and Using Automatic whiteboard Wiper

Time	Method Manual	The usage of Automatic Whiteboard Wiper
1 whiteboard	20 seconds	10 seconds
1 day (10 uses)	200 seconds (3 minutes)	100 seconds (1.5 minutes)
1 week (5 days)	1000 seconds (15 minutes)	500 seconds (7.5 minutes),
1 month (22 days)	4400 seconds (66 minutes) to	2200 seconds (33 minutes)
1 semester (5 months)	22000 seconds (330 minutes)	11000 seconds (165 minutes)

### 3.2 Market Review

The product has been tested for market review survey and a preliminary study. Lecturer of Politeknik Sultan Salahuddin in Mechanical Department has been chosen as a respondents to test run the product. The results showed that 15% of students and lecturers agreed that when using the ‘Automatic Whiteboard Wiper ’ cleaning the whiteboard is not a burden task. Therefore is related to cleaning the whiteboard have been overcome. Majority of the respondents said that it is easy to use the product and it will solve problems related to the loss of the white board duster in classrooms.

**Table 5:** Results of the comparative analysis of the questionnaire



### 4.0 Conclusion

Automatic Whiteboard Wiper is specially designed to help lecture in teaching and learning process while in a small class. It can be used in any situation that uses whiteboard as medium of learning. This product does not require any complicated human skilled to operate. The product is designed solely to meet the needs of users by using low cost materials but have durable and strong properties. It also has a high level of resistance, easier to control compared to the products available in the market nowadays. The tool is also designed to facilitate the task of the educator.

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