

# ADVANCE BOARD CLEANER BY LASER TECHNOLOGY

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## ABSTRACT

*In this paper we gave a special idea of white board cleaning. The proposed work is to design and develop a white board cleaner using laser technology.*

*We demonstrate the idea of advance board cleaner by laser technology. Normally the board cleaners available in the market are not so advanced. In this project we are focussing on the use of board cleaner using laser technology. We have taken a board that is divided in two section on the basis of light sensing. If we want to clean the board from the remote location, for this purpose, we take laser light and to define and the region that want to clean, system sense the region automatically and decide the proper command and do the work.*

**KEYWORDS:** *Laser Technology, Region Sensing ,Cleaning.*

## 1. Introduction:

The history of teaching dates back to the very beginning of mankind and from the early man experience and knowledge were passed down from generation to generation.

Teaching and learning in schools have been done over the years by writing on boards and different methods of cleaning writing boards have been developed in the past. This paper presents the design and construction of a advance white board cleaner by laser technology.

This technique was selected by us by taking into consideration some comfort for Teachers while cleaning the board. . It is seen that while doing this they waste a lot of their as well as students time and it waste a lot of energy of the teachers. By thinking over it we realized that we can really do something for them to save their time as well as labour. So we decided to implement our course study and some extra knowledge to implement this project.

## 2. Literature Survey:

[1]. S.Joshibaamali And K.Geetha Priya

### (A) . Humanoid Robot Learns To Clean A Whiteboard

This humanoid robot was created by Italian and Japanese collaboration between Italian Institute of Technology and Tokyo City University . The robot was concept by the imitation learning. This robot has a different type of control that is upper body control and lower body control.

In upper body control it designs used the concept of kinesthetic learning. This concept will be used at the robot arm. Same with the lower body of robot, but it use to stabilized the position of the robot to keep maintain the robot when upper body doing it work. The ankle and hip of the robot will react with the motion of upper body to keep the balance of robot.

- 1) This machine uses a whiteboard as a prototype. So the area of dimension that it will use is 600mm x 450mm.
- 2) The usage of gripper. This gripper used is a simple one for holding the duster.
- 3) iii. Limitation on movement of duster. Movement of duster will move in two way of direction. Duster can move in horizontal (X-axis) and vertical (Y-axis) directions.
- 4) iv. Sensors are used to know the location of the duster.

### **(B). Whiteboard Erasing Robot:**

It is an autonomously robot, that can erase a written text on a whiteboard completely autonomously. Without human interface, the robot easily finds the text on whiteboard with the process that were programmed. There are three cases of study on how the robots function. First is method for the robot to find the written text on whiteboard. Next step is defining a way for mechanism to move the text written. Last step is to enable a robot to erase the text.

So in the first step robot is to find the written text on whiteboard. This step was divided into two parts.

First part is mechanism of the robot. Its consist a base with two wheels which ride on the whiteboard track. This base it use to move on the X-axis of the whiteboard. To make a robot move in Y-axis direction robot arm slider was constructed. These sliders move the robot in up and down directions on Y-axis. At the end of the arm the duster is attached to do the cleaning process.

The second part is robot vision. This robot use webcam and computer base control station that located at the opposite side of whiteboard. This vision use to find place of text written and make sure the robot clean at that place. The vision capture with a webcam will be processed with vision software, Robo Realm. This software use to find center of gravity of text. The image color will be converted into negative image, black and white using gray-scale filter. Once the center gravity of text was defined, it will convert the center gravity of text into coordinate plane. Then using basic math program, it will tell the robot which location is must move using motor command.

### **( C). Whiteboard Cleaning Mobile Robot:**

Whiteboard cleaning mobile robot was fabricate by Stefan Diewald, VMI, TU Munchen. The concept of cleaning task is the same with whiteboard erasing robot that were an autonomously robot that clean text on their own without human interface. But the different between these two projects is the mechanism.

Mobile robot used the suction concept to make the robot attached to the whiteboard, different with whiteboard erasing robot that used two parts of motion X-axis and Y-axis. The mechanism of mobile robot is quite simple, but the suction concept that make we difficult to build. Suction concept is also noisier when mobile robot doing its task.

For a vision part, the concept is the same with whiteboard erasing robot but the software that they used is different. This project used the Robot Operating System as the software to process the vision.

**[2]. Mr Sunil R. Kewate, Mr Inzamam T. Mujawar, Mr. Akash D. Kewate, Mr.Hitesh R. Pant.S.nithyananth, A.Jagatheesh, K.Madan, B.Nirmalkumar**

Mr. Sunil R. Kewate, Mr Inzamam T. Mujawar, Mr. Akash D. Kewate, Mr.Hitesh R. Pant has explained in their paper that the design and principles of sliding type wipe mechanism also carried out the implementation and experimentation for motion analysis. The paper puts forward a kind of mechanism design scheme, the mechanism can automatically detect the blackboard chalk stains, and erase the font, keep the blackboard clean. The further research work is based on computer processing i.e on two parts of information processing unit and motion control unit. This system consists of two motors, three guide rails, and three sliders. The construction of mechanical structure is slider 1 and slider 2 are connected by cross guide rails C and is installed on them, can be moved in parallel with the slider 3, power driven provided by two motors A, B. Motor A drives the left and right movement of cross rail beam C and motor B drives the vertical movement of slider 3 (wipe system) to rub the blackboard surface for cleaning by moving the wipe system along the rail C together. The sensor is fitted at right most of the blackboard to sense the right end position and signal passed to return the wipe system along the rail C in different position.

S.nithyananth, A.Jagatheesh, K.Madan, B.Nirmalkumar has explained about rack and pinion mechanism with the application of steering mechanism. This mechanism is used in automobiles to convert the rotation of steering wheels from left to right or right to left. A rack and pinion is generally used to convert the rotational motion into linear motion. Pinion engages teeth on rack. In the steering mechanism the author is trying to tell that the rotational motion applied to pinion will cause rack to slide upto the limit of its travel.

Dong Yeop Kim, Jae Min Lee, Jongsu Yoon, Tae- Keun Kim, Bong Seok Kim, and Chang-Woo Park have researched a gondola typed robot system for wall shape recognition using limit switch. In this the author 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 are attached to other place of the gondola, the sensor data is need to send to this limit switch module process algorithm. The main point of the limit switch module is that two limit switches have different purpose and setting. There is the limit switch for wall that has longer stroke and senses the window areas. And there is the sensor for obstacles has shorter stroke to sense only obstacles which is closer than ordinary wall.

**[3]. Ms.Jadhav Vaishali, Ms.Chavan Mukteshvari , Ms.Jadhav Dhammapooja , Ms.Waghmare Anita, Prof. Soumitra Das**

They propose a framework to interface the mechanical parts of the mechanical erasing framework with micro controllers to upgrade it into automation as opposed to manual. They utilized small scale controller to interface the board deleting component. The principle segments of the framework can be recognized as 8051 Microcontroller, encoder and decoder (remote transmission) and L293d engine driving IC. The beginning stage incorporates the switches which was utilized for course of the duster with the encoder IC in order to encode the given input by the client into appropriate configuration for transmission. The microcontroller utilized was 89C51.The yield created by encoder at the transmitter was after it gives to the microcontroller port. Whenever someone presses the switch then it gives the data to the encoder which encodes it into legitimate arrangement. The sign was transmitted to the collector segment. The info was then decoded utilizing decoder. The location lines of encoder and decoder were set at 0 in order to empower the data exchange between them. The decoded bits

were after gives to microcontroller which then correct it for the course given by the client and produces appropriate yield for the L293d to execute. The L293d then gives the supply to the engines as indicated in the yield of the microcontroller and the development begins. Whenever someone give the voice command then it gives the data to the encoder. The command was then decoded utilizing decoder. The decoded command was after gives to microcontroller and swapper can move.

Automatic blackboard erasing mechanisms was examined and actualized for eradicating the blackboard consequently. It gives a superior answer for the health issues, time limitations in the learning halls. They can take in the principle philosophy to utilize DC engines to start development of shaft and microcontroller to control the development of the pole. Future Scope of the Project can be further changed into a gesture controlled eraser by utilizing camera and DSP processors in order to recognize the development of the clients hand and make the duster do as such. This venture can likewise be changed to clean glass as present on high structures which is an extremely dangerous employment for any human to perform.

#### [4]. Amit Tiwari

##### (A). Construction

In the construction of automatic blackboard duster the board was supported on a iron frame. Two steel rods are placed at the top and bottom of frame in horizontal direction supported by bearings, at the both end of the steel rods two sprockets are fixed. Two sprockets of upper side are connected to other two sprocket of lower side with the help of chain. A duster was mounted horizontally on these two chains. One extra sprocket was used on upper steel rod which was connected with another sprocket which was fixed on the motor. These both sprockets was also connected by a chain.

##### (B). Working

In the working of automatic blackboard duster as the power was supplied to the motor the shaft of the motor starts rotating. A sprocket was connected to the motor shaft which was connected by another sprocket of the steel rod with the help of a chain. Thus movement of the sprockets rotates the steel rod by which both the upper and lower sprockets start rotating. By the rotation of the sprockets, the chain which was mounted on these sprockets in vertical direction also starts rotating. A duster which was mounted on this chain starts reciprocating up and down, thus clean the board. A switch was provided for to and fro motion of the duster.

In the fast growing world there are different new technologies adopted to increase work rate in minimum time period. Thus, automatic blackboard duster was also a new technology for cleaning the board automatically in minimum time period. In this advanced world the competition is increasing day by day, thus the time of every person is most precious. As automatic blackboard duster clean the board in less time and saves the time of student which is too important.

In their project , there was a great scope to modify it in different ways like increasing its operation like vacuum cleaner, a form of spray of water whenever required by applying pump for better finishing adopt, different mechanism in place of chain and sprocket to reduce noise and so on, so that more better result can be obtained.

### 3. Proposed Work:

Teaching and learning in schools have been done over the years by writing on boards and different methods of cleaning writing boards have been developed in the past. This paper presents the design and construction of a advance white board cleaner by laser technology.

This technique was selected by us by taking into consideration some comfort for Teachers while cleaning the board. It is seen that while doing this they waste a lot of their as well as students time and it waste a lot of energy of the teachers. It also causes the students to loose their concentration. By thinking over it we realized that we can really do something for them to save their time as well as labour. So we decided to implement our course study and some extra knowledge to implement this project.

### 3.1 Working:

This work will be done in different modes-

- **Region sensing mode:**

In this mode we take light sensitive sensor that sense the proper region that signifies the cleaning.

- **Cleaning Operation:**

For cleaning operation we use motor and brush(sponge).

This configuration operates and cleans in different axis:

- **X-axis cleaning:** Upper motor rotates in 180 degree clock-wise and anti-clock wise direction. Right motor rotates in 90 degree rotation and left motor rotates again in 90 degree rotation .
- **Y-axis cleaning:** Lower motor rotates in 180 degree clock and anti-clock wise direction. Right motor in 90 degree rotation and left motor rotates again in 90 degree rotation.

### 3.2. Software used:

Four types of software are used in Advance Board Cleaner By Laser Technology.

- Proteus software is used for circuit designing.
- Kiel software is used for coding.
- Top win is used for programmed IC.
- ARES is used for PCB design.

### 3.3. Circuit Diagram:

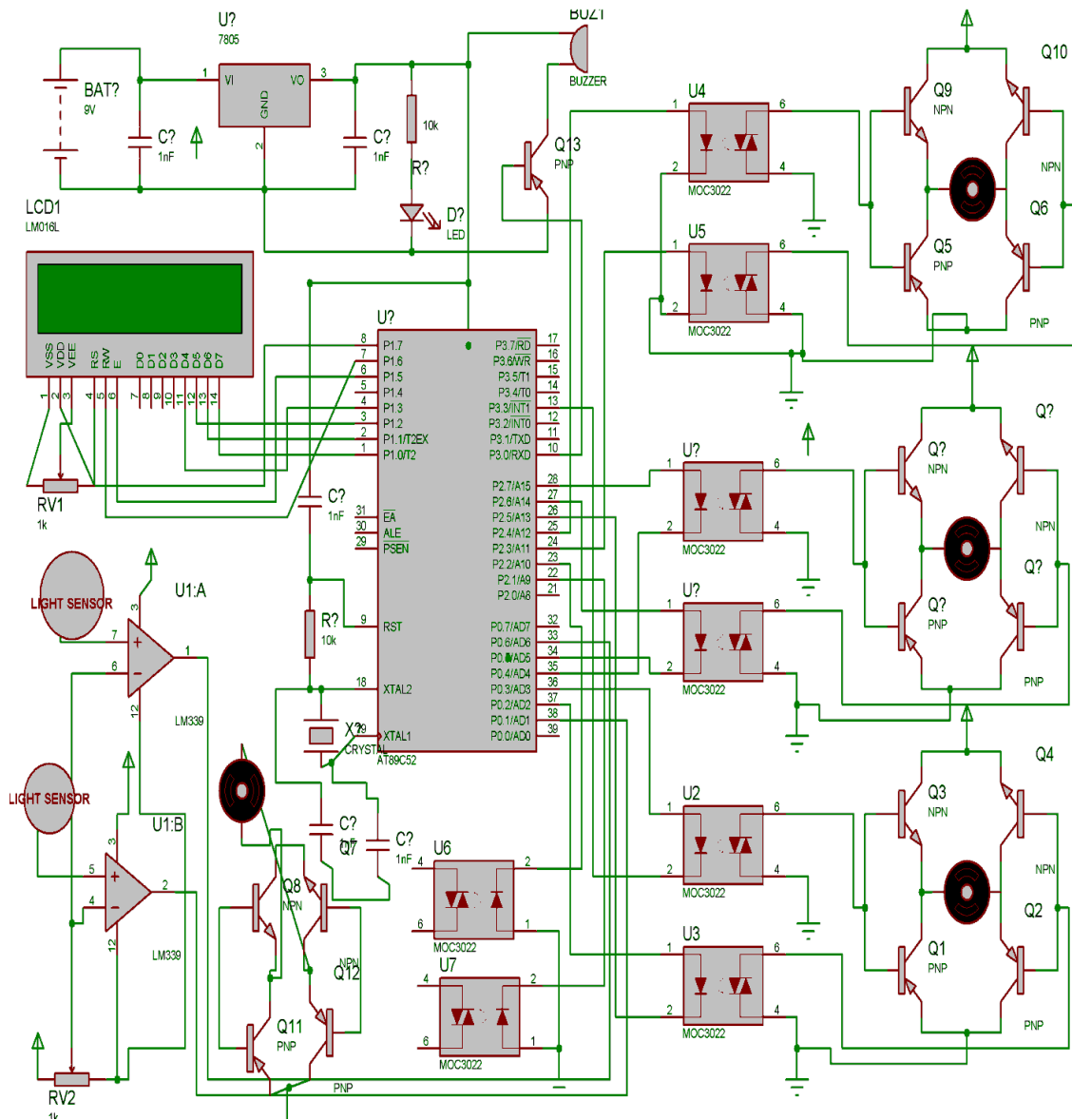
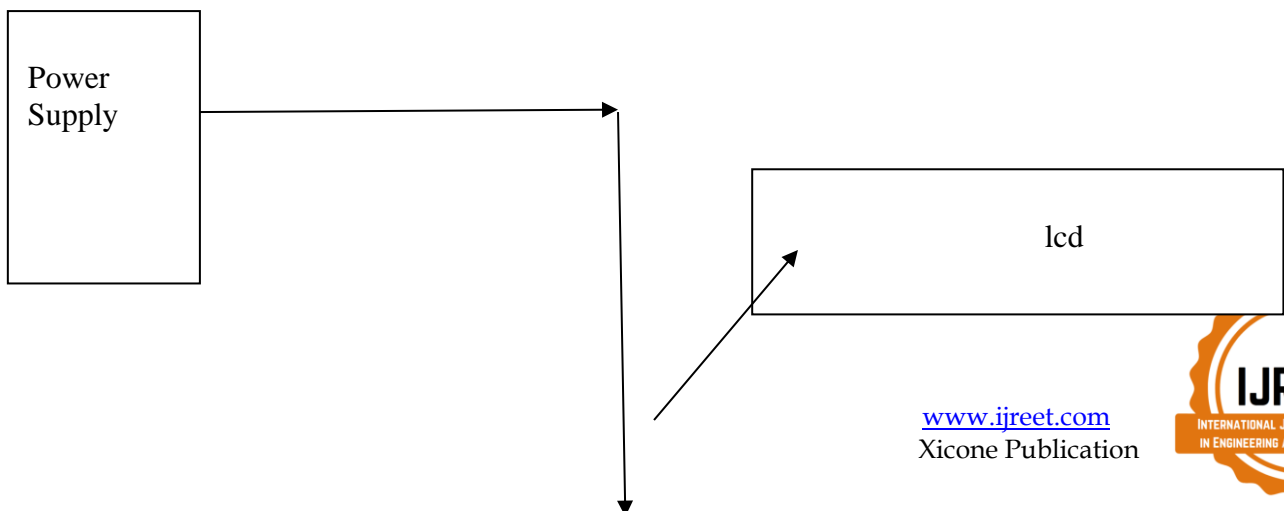


Fig. Circuit Diagram Of Advance Board Cleaner

3.4. Block Diagram:



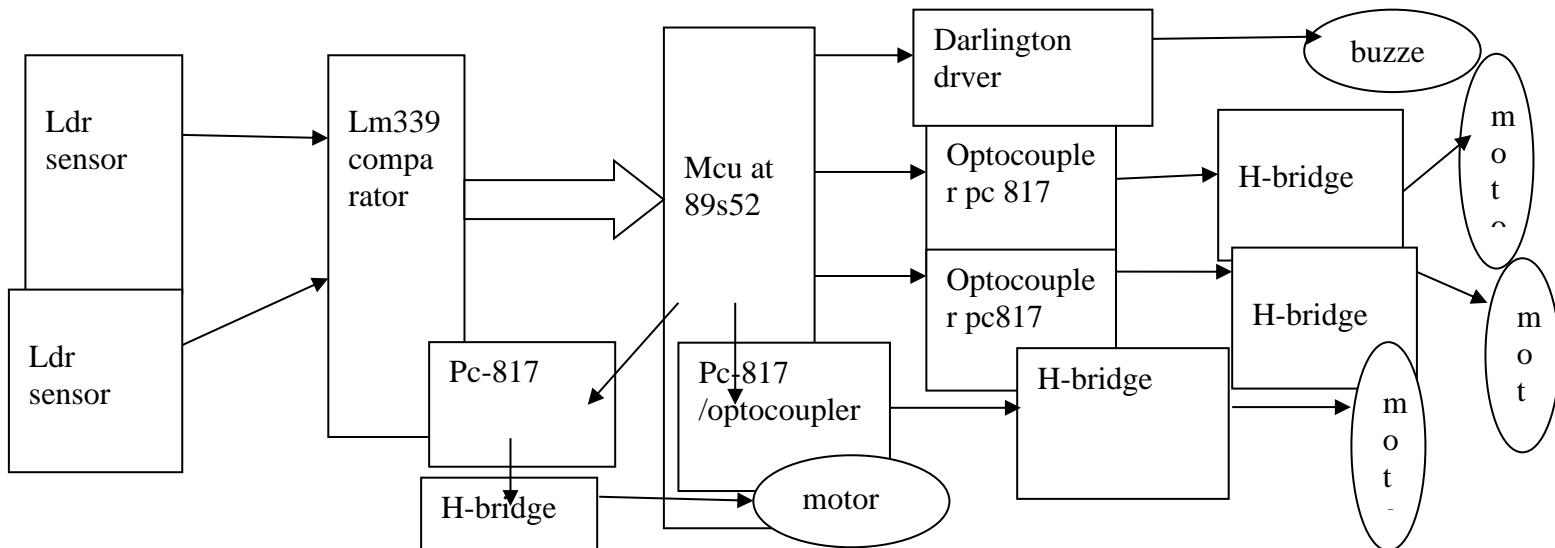


Fig. Diagram Of Advance Board Cleaner

#### 4. Results And Discussions :

The result which we expect from our project is that the Advance Board Cleaner Using Laser Technology can clean the board if a laser light will fall on it, by detecting the light. In this project we tried our best efforts of technical skills. Our project is prediction of new invention that provides new creation and scope in future.

This project demonstrate the proper working and provide complete character. It will save the time of teacher at the time of teaching and also it will save their labour. Time for cleaning process is one of important factor that must be considered. This result will affect the teachers as well as the students. If it takes too long time to clean the whiteboard it will make the teachers and students boring to wait for the machine to finish all the work. So Advance white board cleaner using laser technology was designed to operate similar like human work time.

#### 5. Conclusion:

In new era of technology, people want something new in their life. They want every single thing they look in front of their life look sophisticated. People want something that can improve their lifestyle and help they do their job by use of robot or machine. That is why development of machine and robot nowadays is quite popular and faster in marketing. So to help and give benefit to humankind the research and development of Advance Board Cleaner Using Laser Technology is an alternative technique that can help lecturer, teacher and student to keep their duty to clean a whiteboard by using this technique.

As conclusion, an advance whiteboard cleaning machine is designed and fabricated using low cost material and with user friendly interface. This machine can potentially be used in class rooms to assist the teachers in keeping the whiteboards cleaned.

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