

# Automatic Chalk Board Cleaner and Energy Harvesting for Smart Class Rooms

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**Abstract:** Now-a-days many schools and colleges have different methods of cleaning writing boards, but these methods are injured to many staff and students like skin allergy, skin cancer, dust allergy etc.,. The design and usage of a remote control to motorized the white board cleaner. These researches consist of four modules the remote control and transmitter module, the receiver module, pulse generator/ control module and the cleaner module. The operation of the system is centred on PICDEM MC LV microcontroller. This microcontroller helps the cleaner to clean the board within the range of 20 meter when the remote is pressed. The remote control unit is used to control the speed and direction of the cleaner. The system is more efficient and flexible. . By using PIC microcontroller electric lighting is controlled and energy can be consumed. By introducing new lighting technologies, decrease the amount of electricity consumed and energy costs in the class rooms. When somebody enters into the room the light in the room will be switched ON. The light will be only switched OFF until all the Persons in the room go out. The microcontroller does the above job. The microcontroller senses the IR rays falling on the receivers to detect the obstacles.

**Keywords:** Microcontroller, LDR Sensor, PIR Sensor, D.C. Motor, Dimmer

## I. INTRODUCTION

The main aim of our project is to save time and energy. In earlier days writing is done by sand, slate, walls, and chalkboards. It's highly impossible to spend our time always in cleaning of the white board and absorbing dust. Instead of this, we can control the D.C motor so that the white board to be cleaned. This indeed saves our valuable, precious time. We can do this huge work, merely by using forward/reverse switch control. It is highly useful, as it possess various advantages. The white board has been largely adopted into many other sectors of person attempt besides teaching because of its many advantages over the chalk board. In the most recent times, processors have found great applications in the field of electronics engineering and automation. The automation of the cleaning process easing and dropping the task of clearing the board as it cleans itself via a processor control mechanism.

This is an era of automation where it is broadly defined as replacement of manual effort by processor power in all degrees of automation. The wastage is the major problem faced by us. Lighting can be controlled by PIR sensors to allow operation whenever someone is operation remains an essential part of the system although with changing demands on physical input as the quantity of automation is increased. Now a days Power within the area being scanned. When motion can no longer be detected, the lights shut off. The best applications for passive LDR, PIR sensors are open spaces with a clear view of the area being scanned.

## II. METHODOLOGY

### A. Automatic board cleaner:

The block diagram of Automatic board cleaner is shown in (Fig 1), it consist of a 2V battery, D.C. motor, pulleys and

frame stand. The forward and reverse switch is used to control the D.C motor so that it's run in both the direction. The motor and pulley driving mechanism is used to clean the board with suitable arrangement.

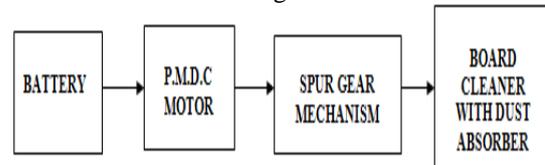


Fig. 1. Block diagram of automated board rubbing with dust absorber

The entire system is designed to reduce the eventual error and troubleshooting problems. when the remote control button pressed the circuit get activated, start the cleaning process. When the remote button is press the receiver receives the low signal (0V) and these signals send to the input port of microcontroller. Then the motor gets activated then drive the cleaner to clean the board. When the cleaner reaches the end portion the IR sensor gets activated and it gives the input to the microcontroller. Then the microcontroller reverse the direction of the motor, finally it reaches the middle portion of the board which is the initial portion of the cleaner.

### B. Automatic dust absorption:

While rubbing the board the dust spreads and flows in the air. It sometimes flows into human nostrils and causes various breathing problems. This can be avoided by these dust absorption sensors. This patent is for an automatic chalkboard eraser which consists of a span of rotatable mounted erasers with dust absorption sensors held against the board. Electric motors power the body of the system side to side and turn around the erasers which span the length of the board. Rollers at the top and bottom of the

system make possible oblique motion. There is a manual and automatic switch on the front which controls the mechanical motion. The sensors present on the front side of the duster absorb the dust which is spread due to duster action. It automatically senses the dust which is spread over its side and absorbs it automatically

**C. Energy harvesting method:**

The method is used to save the power or energy used in colleges, classroom, library etc. Lighting is more important for the students in the libraries to read the books. When the students are not presents in that place the lighting will automatically off by using dimmer in these energy harvesting method.

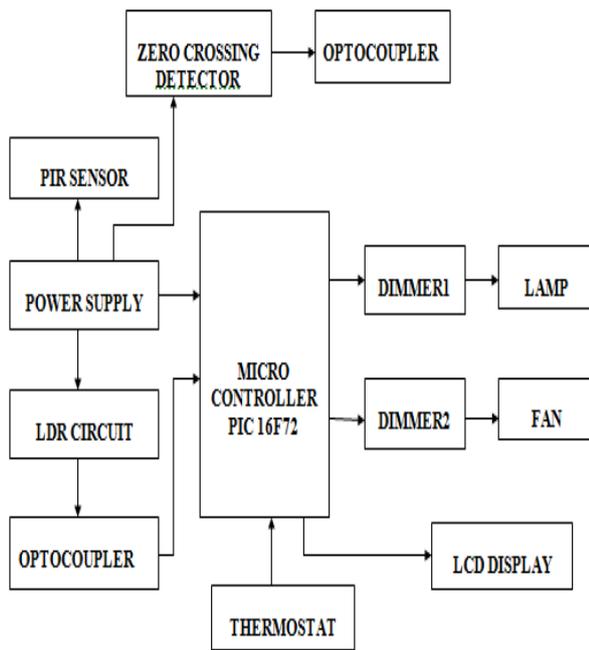


Fig. 2. Energy harvesting block diagram

The block diagram is shown in Fig 2. When a person enters in to that place the PIR sensor send the signal to microcontroller which indicates the person is present. The LCD display indicates that the “PIR ON”.The dimmer circuit gets activated, the light glow for sometimes. The LDR is used to check the condition of lightning in the room. When the PIR sensor goes to an OFF condition the dimmer circuit activate and the light gets OFF.

Similarly, with the help of thermostat sensor the room temperature is measured based on the condition the fan speed varies.

**III. SOFTWARE DEVELOPMENT**

Development of software is an important factor the design to control the sensor and the cleaner to clean the boards. This design is carrier out using keil vision 3 windows coded in embedded c. The integrated development board is used to compile, debug and execute the program. The system flowchart is given in Fig 3.

The systematic flowchart is shown in Fig 4. first initialise the port pin (input port and output port). If the PIR sensor

gets ON then LDR is low dimmer 1 get activated. Next step is used to measure the room temperature using thermostats if the temp exceeds the temperature value the fan gets ON and OFF.

**PORT A**

Port A can acts as a both input as well as output port. It is having 6 pins (A0-A5). In these A0 is connected to Dimmer1, A1 is connected to Dimmer2 and A4 is connected to ZCD output.

**PORT B**

Port B can acts as a both input as well as output port. It is having 8 pins (B0-B7). In these B1 connected to register selection pin(R/S), B2 is connected to read/write(R/W) and B3 pin is connected to enable pin.

**PORT C**

Port C can acts as a both input as well as output port. It is having 8 pins (C0-C7). In these RC3 and RC4 connected to the thermostat pins.12M Hz Crystal Oscillator is connected in between 9th and 10th pins of micro controller. Reset pin is connected to the pin number1 i.e., MCLR/VPP. 8th and 19th pins are connected to ground (Vss).

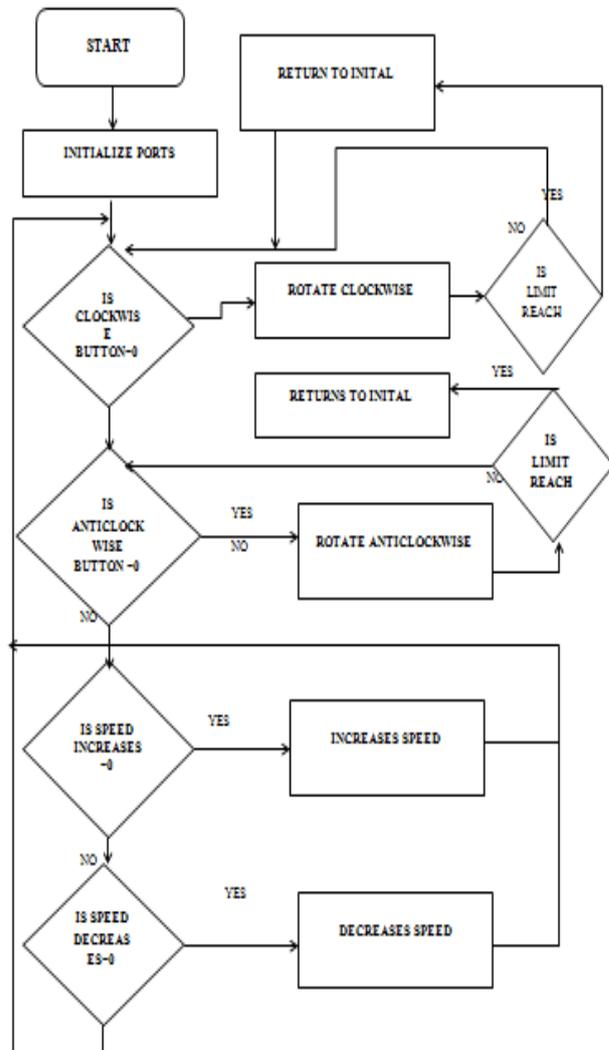


Fig. 3. System flowchart

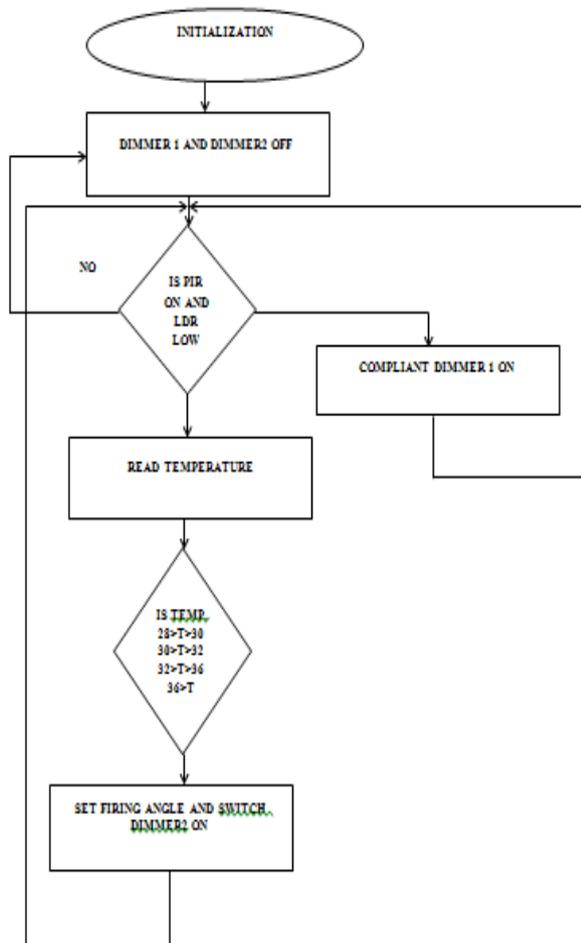


Fig. 4. Software description flowchart for lighting

#### IV. HARDWARE USED

- PICDEM MC LV development board
- PIR sensor
- LDR sensor
- Dimmer
- D.C motor

##### a) PICDEM MC LV development board

The PICDEM MC LV Development Board has two complete firmware solutions. The BLCD control application is installed on the board. These development board has 3-phase BLCD motor support Hall Effect. In addition the proportional-integral-derivative control algorithm also supports using the board.

##### b) PIR sensor

PIR is a passive infrared rays, these sensor is used to detect the person enter in to the classroom. This sensor cannot emit the beam of light and microwave energy instead it detects the person by emitting the infrared light emitted by every living thing.

##### c) LDR sensor

LDR is a Light Dependent Resistors used to switch ON and OFF the light in the classroom. When the LDR receive an active low signal (0v) it gives input and active the dimmer. Sometimes, LDR support 10000000 ohms.

##### d) Dimmer

Dimmer is used to vary the lighting condition. The brightness is adjust by increasing and decreasing the voltage level. The dimmer is general used to control the light in the classroom.

##### e) D.C Motor

The dc motor is used to convert the electrical power in to mechanical power. The relay is used to control the rotation of the motor either clockwise or anticlockwise. The motor is used to control the cleaner move in a correct direction.

#### V. CONCLUSION

The remote control based white board cleaner is designed. The result obtained from this research is operating in the range of 20m. The white board cleaner is placed in classroom, library etc. to decrease the energy and lighting condition. This project is studied and implement in the PIC microcontroller and interface with sensor, motor. This research fully concentrates on the energy saving mechanism.

In future this work is implemented wirelessly. The sensor are placed in different location and data obtained from sensor is controlled wirelessly using any linux based embedded board. The cleaner operation is also controller wirelessly using internet.

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