Automatic Board Cleaning and Curtains Operation

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Abstract: Due to the rapid growth in technologies and higher performance humans need high performance machines to perform their task to make their life more comfortable and easy. These advanced technologies can offer a chance to make automatically thinks to fulfill the human's requirement. Moreover, due to the tremendous expansion in electronic devices and technologies, there is added potential for the remote control to control the number of things on it. In this paper, we have put forward the idea of automatic board cleaner and automation of windows operation using IR remote for cleaning the whiteboard and to perform the basic windows operation such as opening and closing of windows or curtains placed in offices, college, school etc. for this we have used the Arduino UNO board as a controller and IR sensor to control the duster through motor drivers to move the duster and window curtains in forward and reverse order.

1. Introduction

With the progress of skill and the nonstop development of people's living standard, people are in search of automated, smart and suitable control systems. When we consider teaching or a learning process, we come across two things, first is the teacher or the person who shears this or her knowledge and second is the person who is gaining that knowledge. There are a number of things through which we can transfer our knowledge of the other persons such as computer, black board, white board and many more. But most of the use is the white board to deliver the information to the student. Thus, many developments or methods of cleaning whiteboard or blackboard were fabricated.

An automatic duster is a machine which is used to clean board mechanically. As it operates automatically it saves the human time and energy to manually clean the board. It consists a device for automatically erasing a whiteboard wherein a duster is mounted for a longitudinal aluminium frame for movement on the whiteboard and plastic gear placed on window side has a motor mounted thereon that is mechanically interconnected to a drive assembly for producing the movement of the duster in an erasing operation.

2. Literature Review

As the technology grows there are a number of ideas implemented to normalize the human effort and to save the energy of human beings. Right now there are many automatic machines present on this topic with similar or different technologies.

In [1] they provide the design and implementation of the automatic blackboard and whiteboard duster by using manual button operation to clean the board. In this they have used mechanical gear such as chain or gear socket to move the duster in forward and reverse order. As the use buttons operate the duster it has some disadvantages like we have to go in front to operate it to clean the board.

A method which is given in [2] uses two DC motors to move the duster in horizontal and in vertical axis. They have used IR receiver or four limit switches to detect the boundaries of the board. This automatic board duster operates in three moves, in the first move, it cleans only the right side of the part, in the second mode it cleans the left side of the path and in third mode it cleans the whole board.

In [3] they present a new technology to control a home appliance using Zigbee module and using GSM module. They interface GSM module and zig-bee module to controller to operate it through user registered mobile.

A different and new method for automatic operation is proposed and implemented which is android based app to control the motor operation for cleaning the white board [4]. An android Bluetooth app which is in mobile phone is getting connected to controller with some interfacing and through this interfacing the operation of the motor is controlled.

The curtain is controlled by the wireless remote control. This activates the motor on the command given by the remote device which starts the curtains moving from the one location to other on

the key press. The motor speed is depending on the weight of the curtain [5].

3. Project Methodology

In this section we present the overall methodology of study. To overcome the number of disadvantages of conventional method used or to reduce the effort of teachers we have designed and implemented an approach called automatic whiteboard duster and curtain operator. As it operates in automatic manner we don't require a special attention to operate it. It uses the IR sensor as receiver to control the operations.
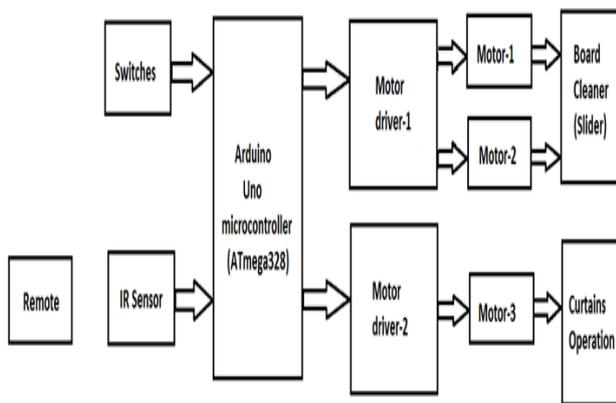

Fig.1 Block Diagram

To implement this approach we have used Arduino UNO as a controller to control the motor operation during the whole process. We have used IR receiver to move duster and curtains in reverse and forward direction. A motor driver is used to supply 12v power supply to run the motor when it receives high at input through the remote button press.

Fig.1 shows the architecture of automatic whiteboard cleaner and curtain operator. It consists of Arduino UNO, Motor Drivers, DC motor, IR sensor. The Motor drive, i.e. motor driver is connected to the Arduino micro controller through which 12 v DC motors are connected. A IR sensor is also connected to Arduino to receive the input from the user. When any button is pressed by the user from remote it transmits a unique decimal value for that particulate button which is then received by IR sensor TSOP1738 connected to an Arduino. The decimal value is received by the IR sensor is then sent to controller to detect which motor is on or off depending on whether the instruction is for duster or curtains it performs the task.

A). Hardware Requirement

1) Arduino Uno: The Arduino UNO is a 28 pin microcontroller of ATmega family having IC number ATmega328. Arduino UNO has 14 digital input/output pins out of which 6 can be used as PWM output. We can also supply power through USB cable to the board.

2) Motor Drive: L293D is a commonly used Motor Drive or Motor Drive IC which allow DC motor to drive in both directions i.e. in reverse or in forward direction. We can connect two DC motors at a time to a single motor drive.

3).DC Motor: A DC motor is a class of rotary electrical machines which converts direct current electrical energy into mechanical energy. Here we use DC motors to move the duster and for curtains opening and closing.

4).IR Sensor TSOP1738: IR sensor component made up of a PIN diode and a pre amplifier which are merging into a single device. Generally the output of TSOP is active low and it provides +5V in off state. When IR remote generates a signal at the frequency of 38 kHz, its output goes low.

5).Aluminum Frame: An aluminum frame is used to make a frame for the physical support of the operation of the system. A 6 by 4 aluminum frame with a longitudinal frame is used to support duster for cleaning process.

B).Software Requirement

1).Arduino IDE Software: In this project we have used Arduino IDE for compiling the program into the microcontroller. For the coding purpose we have used C language as the programming language.

2).Proteus Software: The Proteus Design Suite is a design tool including schematic capture, simulation and PCB Layout modules. By using this software, we can load a hex file of a program into simulation part and can test operation of the system before the actual hardware implementation.
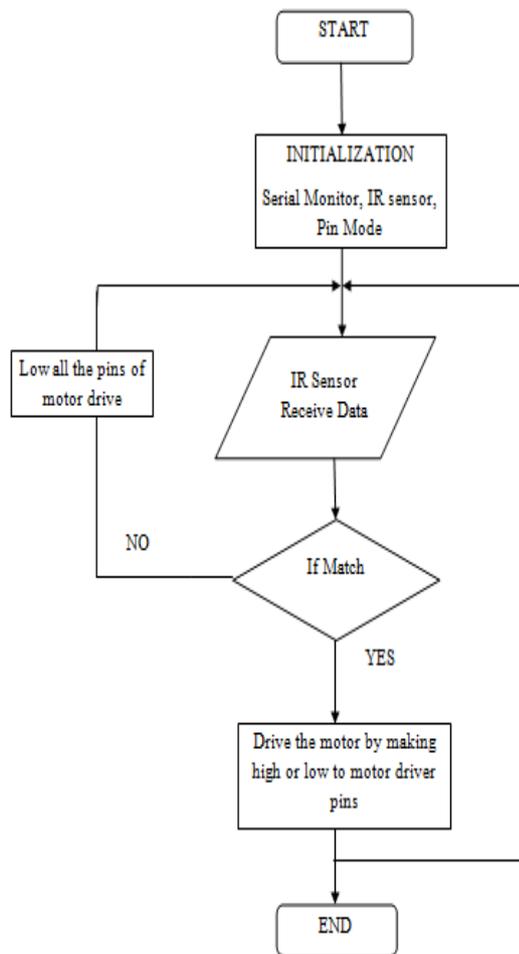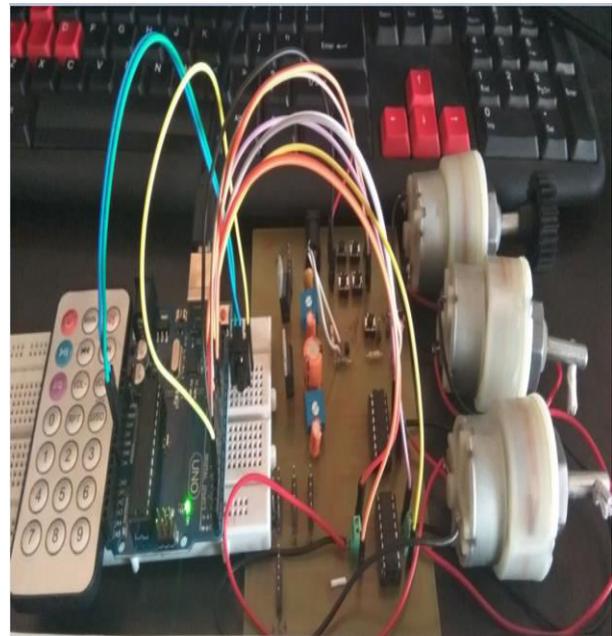
4. Flowchart

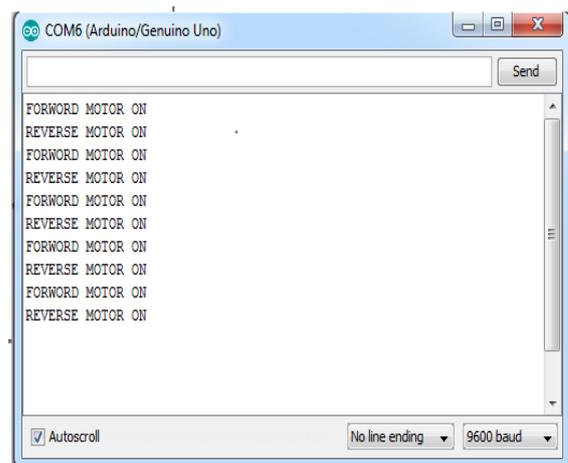Fig.3 Flow Chart

6. Result

Fig4. Serial Monitor (Output of system)

The above fig.4 shows the result of the system. It contains a serial monitor output window to show the respective operation. It will show which motor is working at that time. Also, it will show whether it is moving in a forward direction or in reverse direction

7. Conclusion

The given Automatic whiteboard cleaning system is implemented and tested successfully. It started cleaning board as we press the forward button on the remote and moves the duster in the forward direction and in reverse if we press the button of reverse direction. We have also implemented one motor to open and close the curtains in the classroom.

5. Implementation

The first method to give input to the system is by using remote. When we press dedicated button on the remote then the particular action will takes place. If we press the forward button which is dedicated for forward motion of the motors which are used for move the slider. Duster or cleaning material is mounted on the slider which is going to clean the board. This sane procedure is followed for the reverse motion of the slider. In case of curtains operation we are using single motor which is operated using specific buttons of remote. If sometimes the remote is not working properly then the second input method is useful. In second input method we use switches to give the input command to the controller. Due to using two input method the system failure reduces.

For the future scope, we can extend this project to operate other appliances present in classroom, such as fan, light, etc. we can make it in advance mode that it can erase all the data present on the board in every one hour so there is no need to operate it using remote control.

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