# Automatic Protection of Clothes from Rain

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**Abstract**: As the advancement in science & technology is developing, the human comfort & needs are also increasing proportionally. As all the branches of engineering are working on fulfil these needs and among all those the "ELECTRONICS" is one of the most important branches to respond to these needs. This paper entitled "AUTOMATIC PROTECTION OF CLOTHES FROM RAIN" is small step towards the comfort ability and save our time. By considering above views, which encourage us to choose such a project. Though this project is low cost, easy to understand & simple in construction, this project helps for next generation.

**Keywords**: Microcontroller, Driver circuits, Sensor system, Power supply.

## I. INTRODUCTION

Now days it's difficult to predict the changes in season especially during rainy season. In rainy season it's very rare that we can find sun rays to dry our clothes but how it possible to make our clothes to expose to sun rays as soon as it available. So there is need for human intervention who continuously monitors this. Keeping a person continuously watching for sun rays is too much stupidity as a waste of time.

Hence there exists an electro mechanical system which continuously monitors the sun rays and rainy season and automatically take back the clothes from sun rays to protect from wet. In this project there exists tray which opens & close based on sun rays. Tray is fixed on roof and controlled through 8 bit microcontroller which recognizes this status of weather. This paper is based on the project which is an embedded system consisting of 8 bit microcontroller and sensing system. Sensing system is implemented using LDR with 555 timers. The sensing system is fixed on roof and tray is fixed just below the roof. Tray is controlled by driver circuit via relay

## II. LITERATURE SURVEY

Survey played a very vital role in this project, we analyzed the existing products for cloth protection during rain, there were many demerits which we noticed during the survey, some of them are the existing products are to be operated manually, and if incase there's no one in the home to operate the switch then the clothes easily get wet and the product will be of no use, and secondly if there's a disabled person in the house then he/she will not be able to operate the system and this kind of system needs knowledge regarding the operation. The drying rack (Existing product with no sensors in it) in the market is the mounted drying rack. It is a compact and versatile spin on traditional collapsible dryer rack. This apparatus just hang anything from towel to intimates, without cluttering your precious our space. So, we chose to do automatic system which doesn't require any manual operation, which has rain sensors which get activated during anytime of the day

or night. In this project, the drying rack is enhanced with the use of sensor to detect water. The sensor used is water sensor. When water sensor detects no rain, the motor will rotate clockwise and the rack will be pulled out. The motor will rotate anticlockwise the rack will protect the clothes.

### A. Motivation
We decided to make an Automatic based project which protects clothes from being wet during without any human being, We chose this project as it is a basic problem in the region where it rains heavily. It consists of microcontroller and some other sensors based on the embedded program we are going to frame a controller that fulfills our automation work of our project.

### B. Problem Statement
To develop and implement a system which protects the clothes automatically by detecting rain without the need of human beings. So, this project entitled AUTOMATIC PROTECTION OF CLOTHES FROM RAIN is small step towards the comfort ability and save our time. By considering above views, which encourage us to choose such a project

## III. CONCEPTUAL DESIGN

The concept behind this design is to combine both software and hardware. Software being the Keil micro vision and Hardware is microcontroller based sensor unit. In software part we have developed code for microcontroller for controlling moving tray. Sensor circuit, DC Relays ULN 2803 driver are to be added in hardware part. Below is the description of each module used.

### A. Software Requirements
**1] Keil software:**
Keil Micro Vision is free software which solves many of the pain points for an embedded program developer. This software is an integrated development environment (IDE), which integrated a text editor to write programs, a

compiler and it will convert your source code to hex files. The source code is written in C-language .It is saved as C-file with an extension of .c. The C- file is converted into hex file using keil software. Hex file is dumped into micro controller using BURNER KIT. Once the file is dumped and the ROM is burnt then it becomes an embedded one.

## B. Hardware Requirements

1] microcontroller- 8051:

A micro controller is an integrated circuit or a chip with a processor and other support devices like program memory, data memory, I/O ports, serial communication interface etc integrated together. Unlike a microprocessor (ex: Intel 8085), a microcontroller does not require any external interfacing of support devices. Intel 8051 is the most popular microcontroller ever produced in the world market. Now let's talk about 8051 microcontroller in detail.
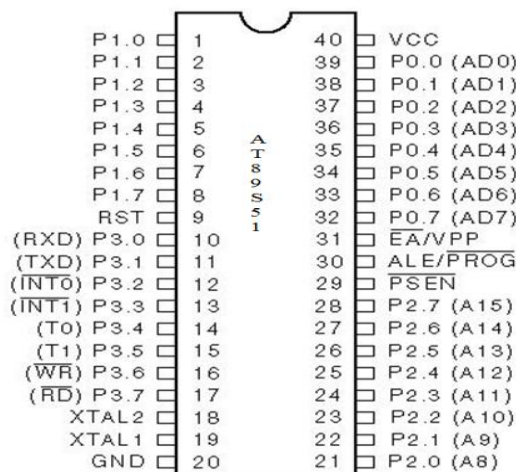


Fig.1 IC-8051 pin description.

The microcontroller used is AT89S51 which is the product of Atmel Pvt. Ltd. 8052 microcontroller is better than 8051 because it has more memory i.e. storage capacity is more compared to that of 8051 which is required for the project. The AT89S52 is a low-voltage, high-performance CMOS (COMPLEMENTRY METAL OXIDE SEMI-CONDUCTOR) 8-bit microcomputer with 8K bytes of Flash programmable memory. The device is manufactured using Atmel's high density non-volatile memory technology. The on chip flash allows the program memory to be reprogrammed in system or by a conventional non volatile memory programmer.

2] Power supply:

In our project we need different voltages for different circuits. So we need to construct different power supply of different voltages employing different voltage transformers, rectifier circuits, filter circuits and regulator circuits. This type of construction requires many components (transformers, capacitors, regulators ……..etc). So the size of the power supply becomes bulky and costly. To overcome above problem by using regulator IC's of different voltages (12v, 9v, 5v…..etc) can be obtained with only one transformer.
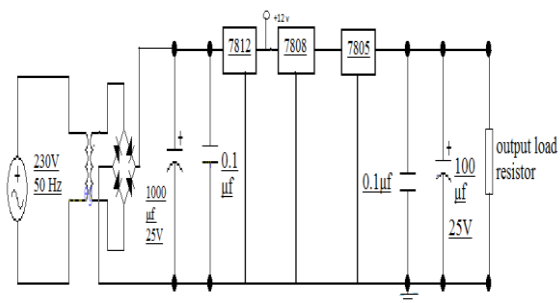


Fig.2 power supply stage.

The above figure shows circuit diagram of power supply section, which produces the different voltages.

3] Line Driver-ULN 2803:

The ULN 2803 is high voltage, high current device. The device consists of eight npn Darlington pairs that feature high-voltage outputs with common-cathode clamp diodes for switching inductive loads. The collector current rating of each Darlington pair is 500 mA. The Darlington pairs may be connected in parallel for higher current capability. Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED and gas discharge), line drivers, and logic buffers. The ULN2803A has a 2.7-kΩ series base resistor for each Darlington pair for operation directly with TTL or 5-V CMOS devices.
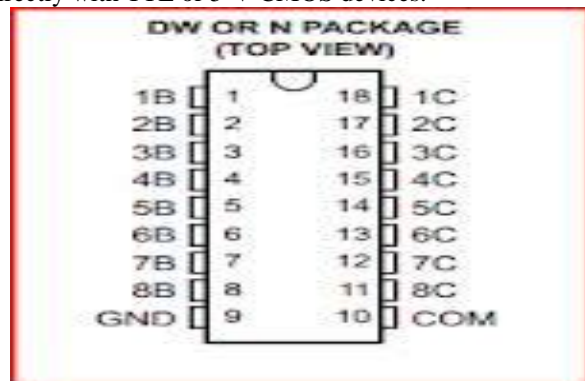


Fig.3 Pin diagram of ULN 2803

ULN 2803: It is used to control relay. It is totally 18 PIN IC among those Pins we are use some Pins and they are Pin1 it is used as input. The input is taken by the microcontroller (AT89S51) Port 2 pin. In Port 2 P1.0 is fed as input to pin1 of the line driver. And also a 4.7 K Ohm resister is used which is called as fully resister. From which +5V is taken from 7805 regulator. Pin18 is used as output. It is connected to one pin of the relay. The main purpose of using line driver is that it provides Ground connection to relay. And Pin9 is connected to ground and Pin10 is connected to 12V (+VCC). It is connected to +12V regulator.

4] Continuity sensor-LM 324:

LM324 is a 14pin IC consisting of four independent operational amplifiers (op-amps) Compensated in a single package. Op-amps are high gain electronic voltage amplifier with differential input and, usually, a single-ended output. The output voltage is many times

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higher than the voltage difference between input terminals of an op-amp. These op-amps are operated by a single power supply LM324 and need for a dual supply is eliminated. They can be used as amplifiers, comparators, oscillators, rectifiers etc. The conventional op-amp applications can be more easily implemented with LM324 interfacing with microcontroller:
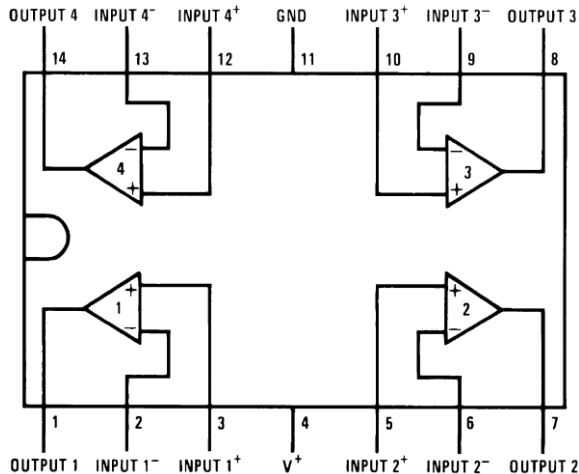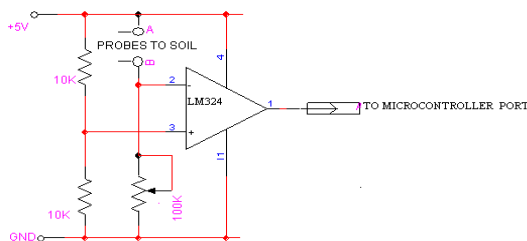


Fig 4. LM324 comparator.



Fig 5 interfacing of the comparator LM324 with microcontroller.

## IV. DETAILED DESIGN

In this section we are trying to explain the block level specifications and engineering design approach to achieve end results.

*A.* Block Diagram:
Figure below shows the block diagram. The microcontroller used is AT8051 which is the product of Atmel Pvt. Ltd. The 8051 which is required for the project. As microcontroller Uses 5v for its operation, regulated 5v should be provided to the microcontroller which is done by the power supply stage.AC should be converted into DC and voltage must be stepped down from 230v to 5v. So this work is done by the power supply stage. We are using rain (water) sensor. Rain sensors are the sensors which are placed on the roof, whenever the rain comes then the probes of the sensors will be shorted and the microcontroller will be provided with the input 0. Rain (Water) sensors are used in house on top of the roof. They are used to know whether rain is coming there or not. These all sensors are the inputs to the microcontroller. The outputs of the microcontroller are the relays and the tray which works based on the contacts of the relays. Tray works underthe condition of our sensor.
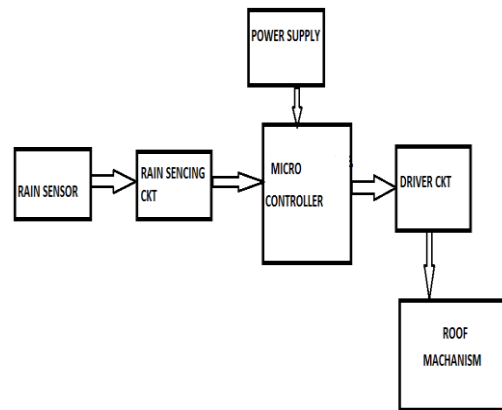


Fig.6 Block Diagram

*B.* Engineering Design approach
Engineering design is an effective way to solve any kind of engineering problems. Engineering design problems are "Open Ended and Ill-structured". Hence we make use of this approach to solve this problem.

Engineering Design approach involves different steps. Initially we listed different types of design attributes required for our project. We categorized these attributes into Objectives, Functions, Means and Constraints. Then we designed a tree of objectives. From the tree and pair wise comparison chart we found that the product must be user friendly. After this we found multiple solutions to achieve the goal. By analysing the attributes and using different processes used in Engineering design we arrived at a best suited solution which was developing a c-code to control the movements of tray. Then we developed black box and glass box to understand how we can implement the above said project effectively and efficiently.

*C.* Tools used
To meet both software and hardware requirements we have made use of different software tools. Those are keil micro vision, welpro software

1] keil micro vision:
Keil MicroVision is free software which solves many of the pain points for an embedded program developer. This software is an integrated development environment (IDE), which integrated a text editor to write programs, a compiler and it will convert your source code to hex files.

2] welpro software:
In our project WELPRO software has been used. This WELPRO is used to burn the program on the microcontroller chip.

3]Steps to burn program on microcontroller:
**Step1:** Firstly erase the old or previously written program in the chip.
**Step2:** Then blank the memory inside the chip .
**Step3**: The program must be loaded from hex file.
**Step4**: After loading from the hex file burn the program into the microcontroller chip.

## V. RESULTS

In this section we have provided the results we have got after interfacing and combining software and hardware. Fig.7 and Fig.8 are the picture of prototype of the project.
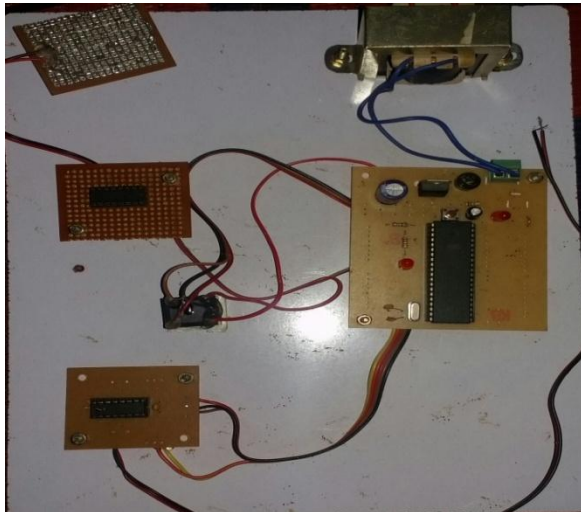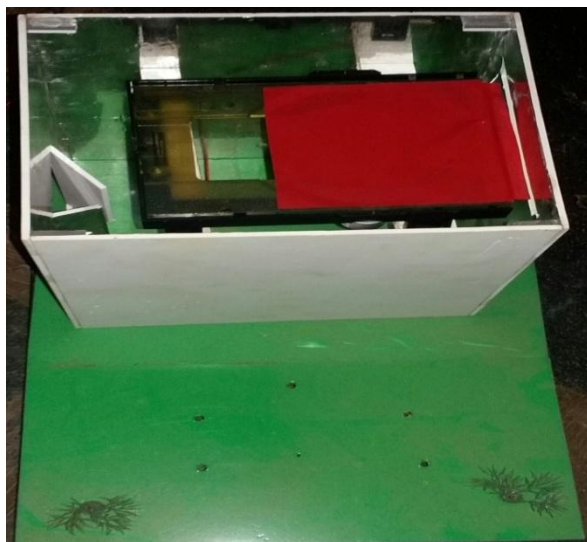


Fig.7 overview



Fig.8 Prototype

## VI. CONCLUSION

At the end of this project we were able to design a system, which can solve the problem better idea for drying wet clothes especially in rainy season. If Clothes are washed and dry by the washing machine there will be wetness in the clothes because of that bad smell is occurred. So that irritated and disturbing themselves. And there may be skin problems. Finally this system avoid above problems and gives good result. This Project enables us to carry towards the new technology. In this project we protect our clothes in rainy season automatically without need any human inwalvament. So it provides the comfort ability, reduces the human effort and saves the time. We can easily used in home, office and wherever it can be used based on our requirement .So it makes life easy to our next generation.

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