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Automatic Roofing System

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Abstract- Now a days, during the rainy seasons the cultivated crops gets affected due to the heavy rain fall. The main theme of this project is that to prevent the crops from the heavy rain and save the rain water. The rain sensor is used for the working of automatic roof. This system involves protects the crops by the auto roof which covers the whole field. The rain sensor is activated when there is a rain fall. So when the sensor is 'ON', it will gives intimation to the controller it will indicate to the DC motor and it will automatically open the roof. In this project, the roof is open automatically when both the sensor is 'ON'. Our main purpose of project is to develop a system to improve the protection performance and to avoid losses due to atmosphere. It is utilized mainly for the detection of high temperature and heavy rain from the outside atmosphere. This roofing protect the crop from damaging that indirectly increase yield of the crop.

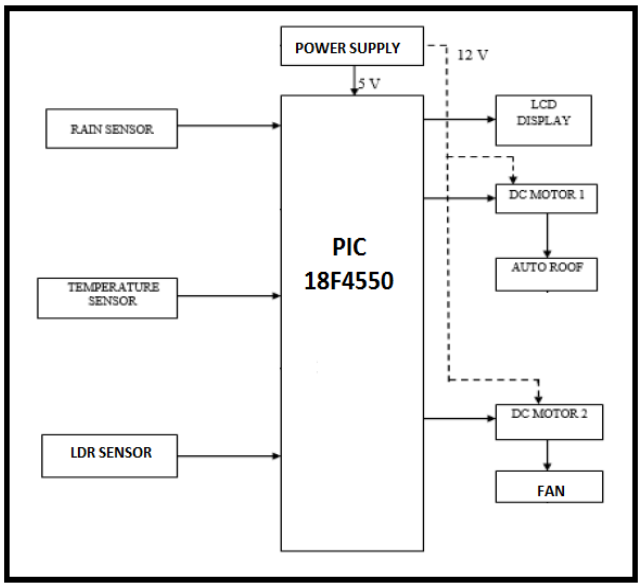
Keywords: *DC motor, PIC microcontroller, Rain sensor, LCD Display, Temperature sensor*

I. INTRODUCTION

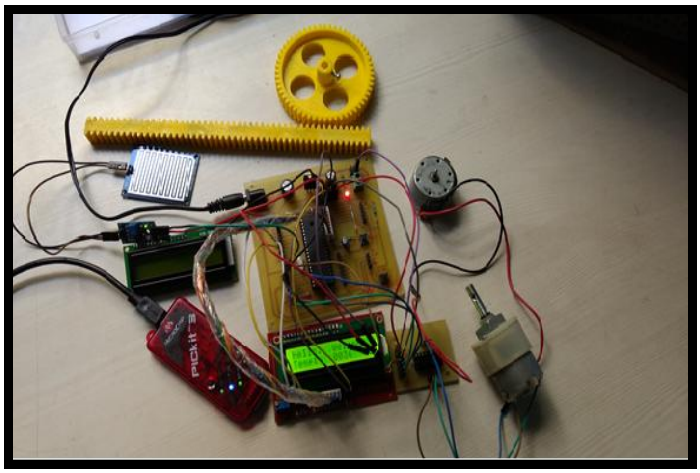
Different approaches for building roof reconstruction have been reported in the literature. In the *model driven* approach, also known as the *parametric* approach, a predefined catalogue of roof forms (e.g., flat, saddle, etc.) is prescribed and the model that best fits the data is chosen. An advantage of this approach is that the final roof shape is always topologically correct. The disadvantage, however, is that complex roof shapes cannot be reconstructed if they are not in the input catalogue. In addition, the level of detail in the reconstructed building is compromised as the input models usually consist of rectangular footprints. In the *data driven* approach, also known as the *generic* approach or polyhedral approach, the roof is reconstructed from planar patches derived from segmentation algorithms. The challenge here is to identify neighboring planar segments and their relationship, for example, coplanar patches, intersection lines or step edges between neighboring planes. The main advantage of this approach is that polyhedral buildings of arbitrary shape may be reconstructed. The main drawback of data driven methods is their susceptibility to the incompleteness and inaccuracy of the input data. Therefore, some roof features such as small dormer windows and chimneys cannot be represented if the resolution of the input data is low. Moreover, if a roof is assumed to be a combination of a set of 2D planar faces, a building with a curved roof structure cannot be reconstructed. Nonetheless, in the presence of high density LIDAR and image data, curved surfaces can be well approximated. The *structural* approach, also known as the *global strategy* or Hybrid approach, exhibits both model and data driven characteristics.

II. IMPLEMENTATION

A. Block Diagram



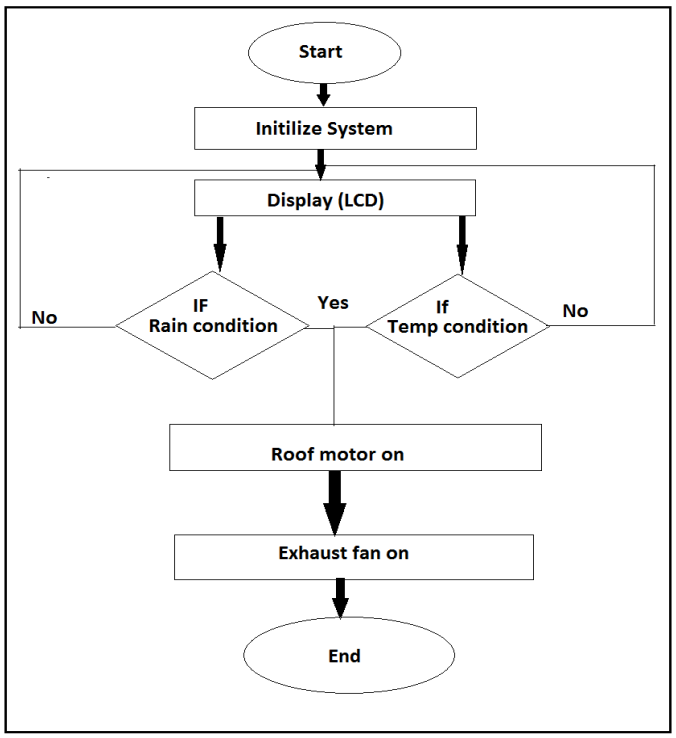
B. Setup



The PIC microcontroller is the principal part of the system. The temperature is displayed on a 16×2 characters LCD. In circuit diagram rain sensor and temperature sensor are used. In first condition when rain sensor is on and temperature sensor is off then roof is close and fan is on. And rain sensor is off then roof is open and fan is off. In second condition when rain sensor is off and temperature sensor is ON, then roof is close and fan is on. And temperature sensor is off then roof is open and fan is off.

III. FLOW

A. *Flow chart*

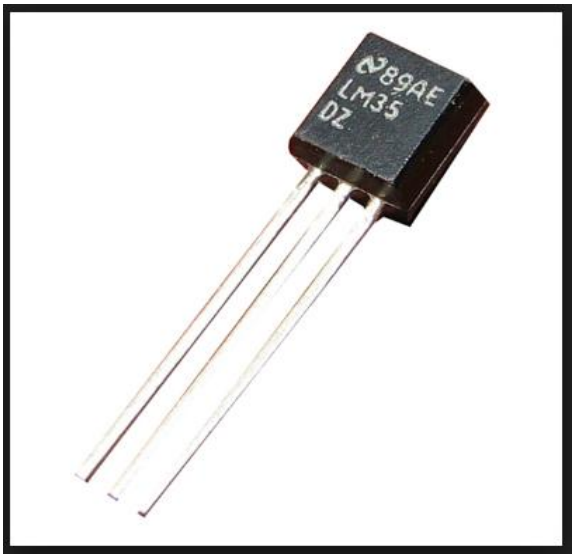


B. *Algorithm*

i) Initialize the system.
ii) Interface rain sensor, temperature sensor, LCD and PC with PIC Microcontroller.
iii) If PIC receives signal from rain sensor or temperature sensor then roof motor starts.
iv) When roof is closed, Exhaust fan is on.
v) Continuously monitor the temperature.
vi) If animal display message and Buzzer ON.
vii) Else, display message and Go back to Start.

IV. SENSORS

A. *Temperature Sensor*



The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full −55°C to 150°C temperature range. Lower cost is assured by trimming and calibration at the wafer level. The low-output impedance, linear output, and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy.

The device is used with single power supplies, or with plus and minus supplies. As the LM35 device draws only 60µA from the supply, it has very low self-heating of less than 0.1°C in still air. The LM35 device is rated to operate over a −55°C to 150°C temperature range, while the LM35C device is rated for a −40°C to 110°C range (−10° with improved accuracy).

B. *Rain Sensor*

The rain sensor module is an easy tool for rain detection. It can be used as a switch when raindrop falls through the raining board and also for measuring rainfall intensity. The module features, a rain board and the control board that is separate for more convenience, power indicator LED and an adjustable sensitivity though a potentiometer.

V. HARDWARE

A. *LCD Display*

16x2 LCD can display 16 characters per line. Each character is displayed in 5x7 pixel matrix. This LCD has two registers, instruction register and data register. It operates in two modes, 4-bit mode and 8-bit mode.

B. *PIC18F45550 Microcontroller*

PIC18F4550 has 32Kb Flash memory, 16384 single word instructions, 2048 bytes SRAM, 256 bytes EEPROM, 10 bit 13 Channel ADC, 4 Timers: 1- 8 bit, 3- 16 bit. It is a 40-Pin, High-Performance, Enhanced Flash, and USB Microcontroller.

C. *DC Motor*

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

D. *DC Motor Driver*

The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads and switching

power transistors. To simplify use as two bridges each pair of channels is equipped with an enable input. A separate supply input is provided for the logic, allowing operation at a lower voltage and internal clamp diodes are included. SOFTWARE

E. MPLAB IDE

MPLAB supports the following compilers:

- MPLAB MPASM / ASM30 Assembler
- MPLAB C Compiler for PIC18, PIC24, PIC32
- HI-TECH C

CONCLUSION

A thorough study has been made about microcontroller PIC18F4550. Using this project atmospheric temperature, relative humidity and rain water presence using the program executed in the microcontroller. This smart roofing system which automatically retract which we done as our mini project is a better development in the field of construction of infrastructures because it has wide application which is relevant in the modern society.

It can be produced in the market in wide range very cheaply. It is very small equipment which can be installed anywhere very easily. By doing this project what we have tried to do is to make just a demo of it. The most difficult part of the project was to calibrate the sensor output. It is done in maximum possible extend. With this we are concluding this mini project.

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