AGRI RAIN ALARM SYSTEM

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ABSTRACT:

Water is a basic need in every one's life. Saving water and proper usage of water is very important. In this project we are proposing an alarm when there is rain, so that we can make some actions for rain water harvesting and also save the rain water for using it later.

We use rain sensor for detection of the rain. It act as a simple switch, where the switch is normally open and when there is rain, the switch closes . The rain water sensor is connected to the circuit and voltage should be passed through the wires.

If there is no rain, the resistance between the contacts will be very high as there will be no conduction between the wires in the sensor. If there is rain, the water drops will fall on the rain sensor, which will form a conductive path between the wires and it also decreases the resistance between the contacts. This action activates the IC and buzzer sounds.

Some of the applications of this rain alert alarm are:

Irrigation field

Home Automation

Communication Automobiles

Casual household chores

APPROACH TOWARDS APPLICATION:

We started with a rain alert alarm and found it very useful in many real life applications and innovated the project completely towards a application: IRRIGATION FIELD.

So we'll be providing a drip irrigation switch which will get deactivated when rain is detected..

BRIEF DESCRIPTION:

Our project is to design a rain alert alarm which is provided in the point of view of approach towards an application: IRRIGATION FIELD. Leveraging the capabilities of a rain sensor, NPN transistors, resistors, LEDs, a buzzer, and a drip irrigation switch, the system aims to detect rain and initiate actions such as visual and audible alerts, as well as control over irrigation systems. This project serves as a practical, cost-effective solution for individuals seeking to automate their irrigation processes and enhance environmental responsiveness.

Introduction

In agriculture and gardening, the timely detection of rain is crucial for optimizing irrigation practices. Traditional irrigation systems may continue to water plants even during rainfall,

resulting in unnecessary water usage and potential damage to plants. The Rain Alert Alarm System addresses this challenge by incorporating a rain sensor and electronic components to detect rain and trigger corresponding actions.

Objectives

1. **Rain Detection:**
    - Develop a reliable rain detection mechanism using a rain sensor.
    - Utilize the rain sensor output to serve as the primary trigger for the system.
2. **Alert System:**
    - Implement a visual indicator using an LED to display the rain detection status.
    - Incorporate an audible alert through a buzzer to notify users when rain is detected.
3. **Irrigation Control:**
    - Integrate a drip irrigation switch to control the irrigation system.
    - Ensure the irrigation switch turns off during rain to prevent unnecessary watering.
4. **Simple and Accessible Design:**
    - Design the system without using a microcontroller, making it accessible to a broader audience with basic electronics skills.

Components and Circuit Design

Rain Sensor

The rain sensor serves as the project's primary input. It detects rain through its sensitive surface, generating a digital signal (1 for rain detected, 0 for no rain) based on environmental conditions.

NPN Transistors and Resistors

NPN transistors are employed as electronic switches to control the state of various components in response to the rain sensor's output. Resistors are strategically placed to limit current flow and protect electronic components.

LED Indicator

The LED serves as a visual indicator of rain detection. When the rain sensor detects rain, the LED is illuminated, providing users with a clear visual cue.

Buzzer

An audible alert system is achieved through the use of a buzzer. When rain is detected, the buzzer is activated, delivering an audible signal to alert users of the prevailing weather conditions.

Drip Irrigation Switch

The drip irrigation switch functions as a control mechanism for the irrigation system. When rain is detected, the switch turns off, preventing the irrigation system from operating unnecessarily.

Circuit Operation

1. **Rain Detection:**
    - The rain sensor continuously monitors environmental conditions.
    - When rain is detected, the rain sensor outputs a digital signal.
2. **Transistor Logic:**
    - NPN transistors interpret the rain sensor signal and control the state of the LED, buzzer, and irrigation switch accordingly.
3. **Visual Alert (LED):**
    - The LED is illuminated when rain is detected, providing a visible indication to users.
4. **Audible Alert (Buzzer):**
    - The buzzer is activated to produce an audible alert when rain is detected.
5. **Irrigation Control (Drip Irrigation Switch):**
    - The drip irrigation switch turns off during rain, preventing unnecessary watering.

Applications

The Rain Alert Alarm System finds application in:

- **Home Gardens:** Provides homeowners with a tool to optimize irrigation practices and conserve water.
- **Agricultural Fields:** Supports farmers in managing irrigation more efficiently.

WORKING:

- **RS:** Rain Sensor input (1 for rain detected, 0 for no rain).
- **LED:** State of the LED (1 for ON, 0 for OFF).
- **Buzzer:** State of the Buzzer (1 for ON, 0 for OFF).
- **Irrigation Switch:** State of the Irrigation Switch (1 for ON, 0 for OFF).

FUNCTIOALITY TABLE:

| RS | LED | Buzzer | Irrigation Switch |

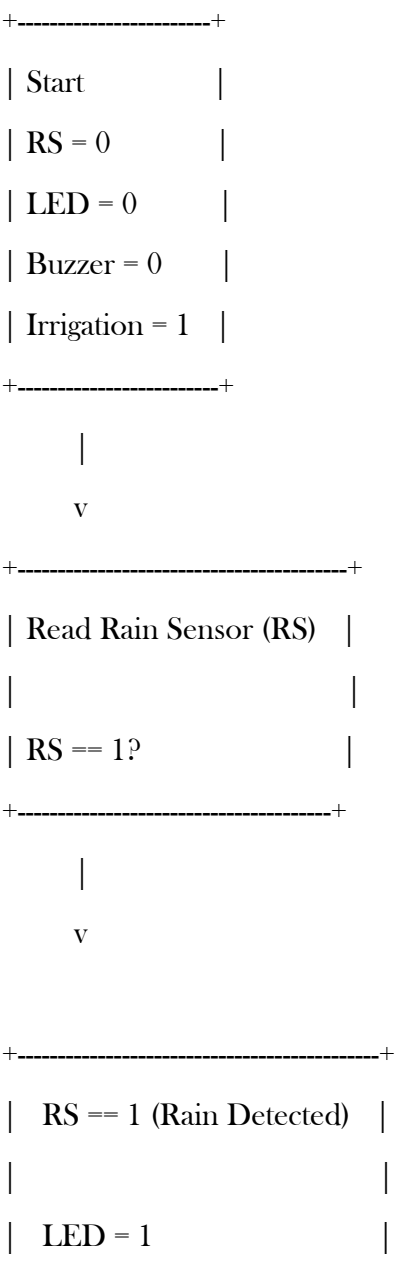
|--- |----- |--------|-------------------|

0	0	0	1
1	1	1	0
0	0	0	1
1	1	1	0

When there's no rain (RS=0), the LED and Buzzer should be OFF, and the Irrigation Switch should be ON (to allow irrigation).

When rain is detected (RS=1), the LED and Buzzer should be ON, and the Irrigation Switch should be OFF (to stop irrigation).

FLOW CHART:



| Buzzer = 1 |

| Irrigation = 0 |

+-----------------------------------+

|

v

+-----------------------------------+

| RS == 0 (No Rain) |

| |

| LED = 0 |

| Buzzer = 0 |

| Irrigation = 1 |

+-----------------------------------+

|

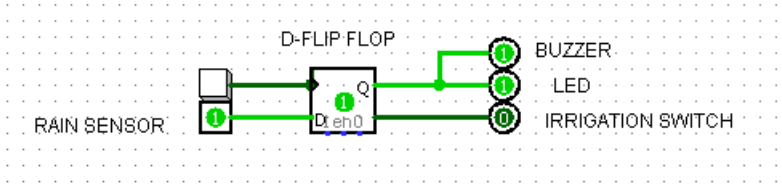
v

+---------------------------+

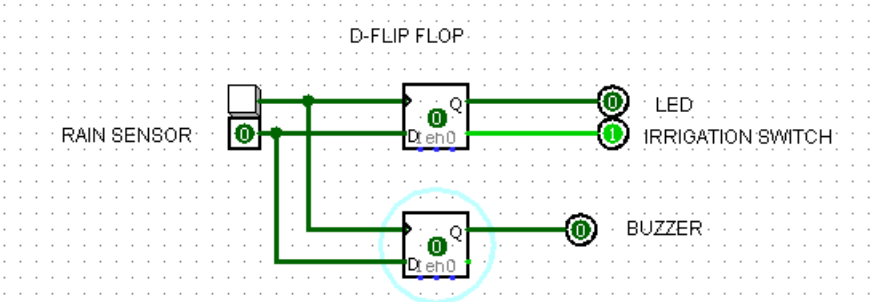
| End |

LOGISIM:

Using 1 D-FLIP FLOP:



Using 2 D-FLIP FLOPS:



VERILOG CODE:

MAIN MODULE:

```
module RainAlert(rain_sensor,led,buzzer,irrigation_switch);
input wire rain_sensor;
output reg led,irrigation_switch;
output buzzer;

always @(rain_sensor) begin
    // Assuming rain_sensor is a simple digital signal (1 for rain, 0 for no rain)
    if (rain_sensor) begin
        led = rain_sensor ; // Turn on LED when rain is detected
        irrigation_switch = ~rain_sensor;
       // Turn off irrigation switch when rain is detected
else begin
        led = rain_sensor ;
        irrigation_switch = ~rain_sensor;
    end
    end
assign buzzer =rain_sensor;// Turn on buzzer when rain is detected
endmodule
```

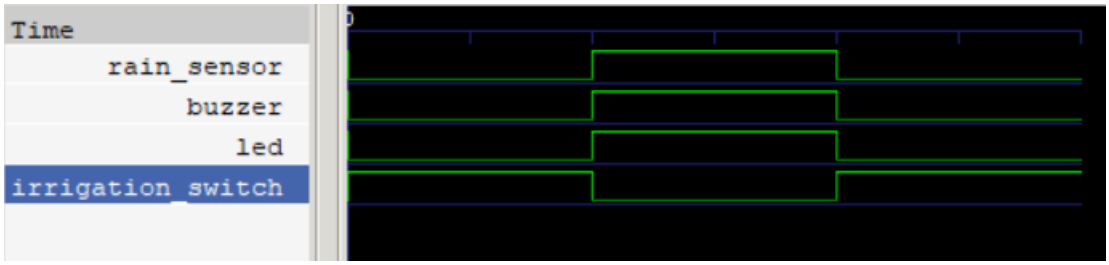
TEST BENCH MODULE:

```
`timescale 1ns / 1ps
`include"p15.v"
module RainAlert_tb;
reg rain_sensor;
wire led, buzzer, irrigation_switch;
RainAlert uut (
    .rain_sensor(rain_sensor),
    .led(led),
    .buzzer(buzzer),
    .irrigation_switch(irrigation_switch)
);
initial begin
```

```
    $dumpfile("p15_tb.vcd");
    $dumpvars(0,RainAlert_tb);
    $monitor(" rain_sensor=%b led=%b buzzer=%b irrigation_switch=%b", rain_sensor, led, buzzer, irrigation_switch);
    rain_sensor = 0;
    #20;
    rain_sensor = 1;
    #20;
    rain_sensor = 0;
    #20;
    $finish;
end

endmodule
```

GTKWAVE:



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