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SOIL MOISTURE MONITORING - AUTO IRRIGATION

Abstract: This project aims to develop an automated irrigation system for agriculture that uses sensors to detect soil moisture levels and weather conditions, and accordingly adjust the irrigation schedule. The system will consist of a microcontroller unit, moisture sensors, weather sensors, and irrigation valves. The microcontroller will process the data from the sensors and control the irrigation valves to ensure optimal soil moisture levels and water conservation.

Objectives:

1. To design and develop an automated irrigation system using sensors for agriculture
2. To monitor soil moisture levels and weather conditions using sensors
3. To develop a microcontroller unit to process sensor data and control irrigation valves
4. To optimize irrigation schedules to conserve water and improve crop yields

Methodology:

1. Research existing sensor-based irrigation systems and technologies
2. Select appropriate sensors for soil moisture and weather monitoring
3. Develop a microcontroller unit to process sensor data and control irrigation valves
4. Design and build a prototype of the automated irrigation system
5. Test and optimize the system to achieve optimal irrigation schedules and water conservation

Deliverables:

1. Automated irrigation system prototype
2. Microcontroller code for data processing and irrigation control
3. Sensor data analysis and optimization report

4. User manual for system operation and maintenance

Timeline:

1. Research and sensor selection: 1 Week
2. Microcontroller development: 2 Weeks
3. Prototype building and testing: 3 Weeks
4. Optimization and report preparation: 2 Weeks

Budget:

1. Sensors and components:
2. Microcontroller development and programming:
3. Prototype building and testing:
4. Miscellaneous expenses:

Risks:

1. Technical challenges in sensor integration and data processing
2. Unforeseen weather conditions that could affect the system performance
3. Limited availability of irrigation valves and components

Mitigation Strategies:

1. Work with experienced engineers to address technical challenges
2. Incorporate weather forecasting data into the irrigation schedule to reduce the impact of unforeseen weather conditions
3. Identify alternative sources for irrigation valves and components in case of limited availability.

SAMPLE BLOCK DIAGRAM

Auto Irrigation Using Soil Moisture Sensor for Agricultural needs - Introduction

The project is intended to provide proper amount of irrigation to agricultural fields by observing the moisture content of soil. The project automates the process of manually irrigating the fields by switching the pump ON/OFF. It is implemented by using an 8051 series microcontroller, programmed such as to collect input signals that measures moisture content of soil through sensing arrangement. Sensing arrangement is made by inserting two stiff metallic rods into the field at some distance. An op-amp is used as a

comparator that interfaces microcontroller and the sensing arrangement. On receiving the signal, the microcontroller produces an output that drives a relay and operates the water pump. Also LCD is used which is interfaced with microcontroller for displaying the moisture content of soil and water pump status. Hence the system reduces human intervention and provides required irrigation to field.

The concept in future can be enhanced by integrating GSM technology, such that whenever the water pump switches ON/OFF, an SMS is delivered to the concerned person regarding the status of the pump. We can also control the pump through SMS.

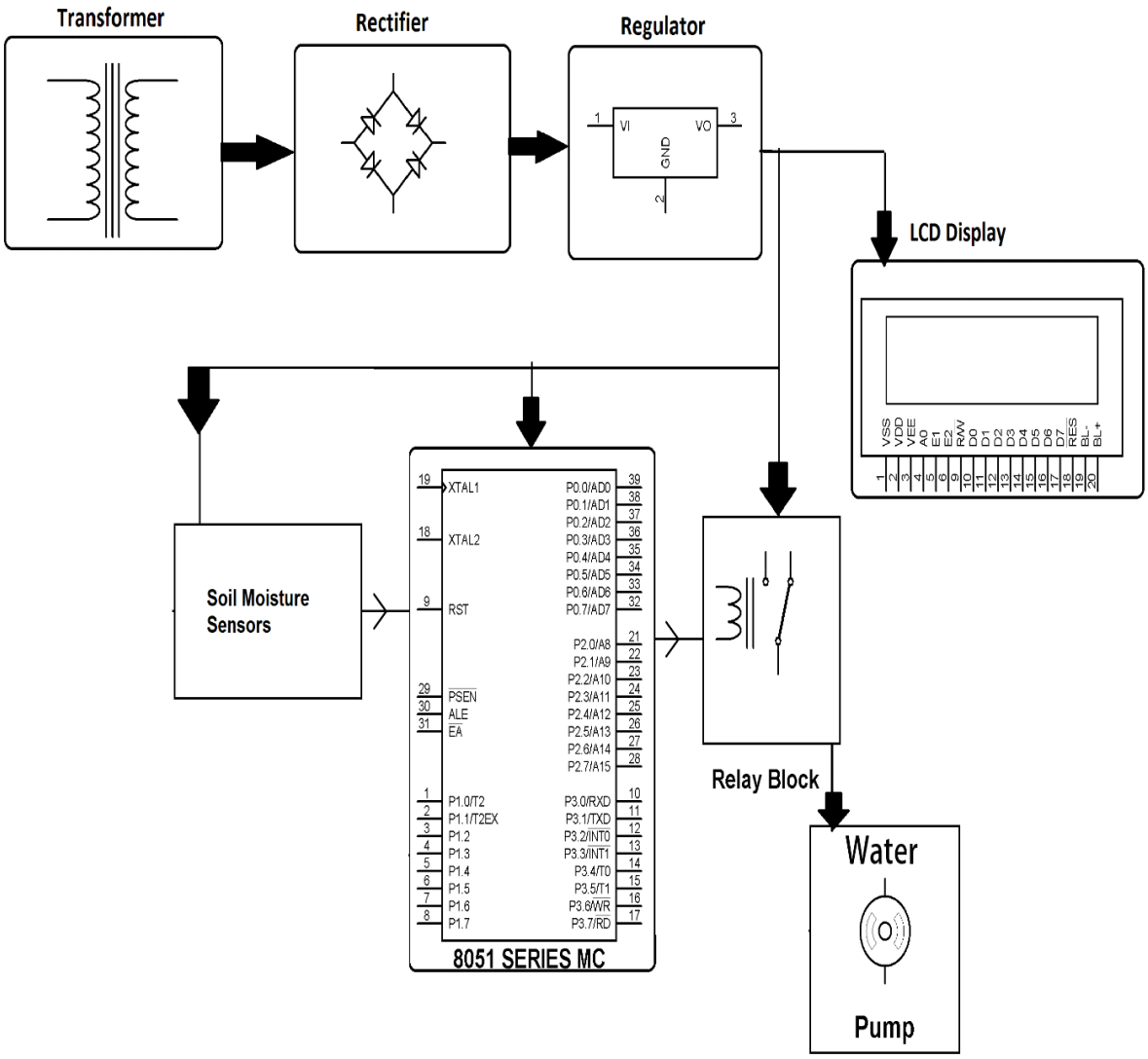
Hardware Specifications

- 8051 series Microcontroller
- Soil Moisture Sensors
- Diodes
- Op amp
- Crystal
- Water Pump
- LCD
- Relay
- LED
- Voltage Regulator
- Transistor

Software Specifications

- Keil µVision IDE
- MC Programming Language: Embedded C

Block Diagram:


Transformer
Rectifier
Regulator
VI
VO
GND
LCD Display
VSS
VDD
VEE
A0
E1
E2
R/W
D0
D1
D2
D3
D4
D5
D6
D7
RES
BL-
BL+
Soil Moisture Sensors
XTAL1
XTAL2
RST
PSEN
ALE
EA
P1.0/T2
P1.1/T2EX
P1.2
P1.3
P1.4
P1.5
P1.6
P1.7
P0.0/AD0
P0.1/AD1
P0.2/AD2
P0.3/AD3
P0.4/AD4
P0.5/AD5
P0.6/AD6
P0.7/AD7
P2.0/A8
P2.1/A9
P2.2/A10
P2.3/A11
P2.4/A12
P2.5/A13
P2.6/A14
P2.7/A15
P3.0/RXD
P3.1/TXD
P3.2/INT0
P3.3/INT1
P3.4/T0
P3.5/T1
P3.6/WR
P3.7/RD
8051 SERIES MC
Relay Block
Water
Pump