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Implementation of Hi-Tech Agriculture with Soil Humidity Based Automatic Irrigation System

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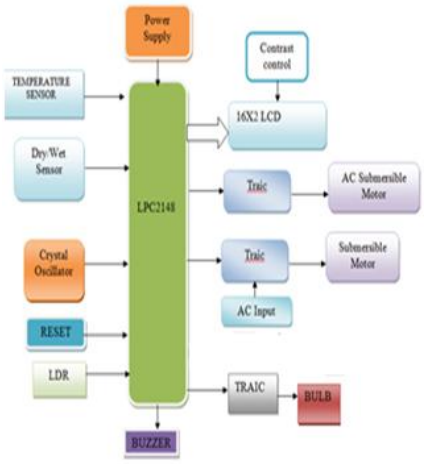
Abstract:
Irrigation system in India has given a high priority in economic development. Many new concepts are being developed to allow agricultural automation to flourish and deliver its full potential. To take full advantage of these technologies, we should not just consider the implication of developing a new single technology but should look at the wider issues for complete development of a system. The project irrigation control using LPC2148 is designed to tackle the problems of agricultural sector regarding irrigation system with available water resources. Prolonged periods of dry climatic conditions due to fluctuation in annual precipitation, may appreciably reduce the yield of the cultivation. The expenses in establishing many of these crops and their relative intolerance to drought make an effective irrigation system a necessity for profitable enterprises.

Introduction:
Agriculture plays the major role in economics and survival of people in India. Nowadays Indian agriculture faces a two major problem. They are as follows; know government has promoted a free supply of electricity for farmers to run their motors and pumps for irrigation purpose. But it is found that the farmers misusing the electricity to run their home appliances such as radio, TV, fans, etc. This misuse of electricity has brought a considerable problem for government to supply free electricity. Since most of the farmers have less knowledge about the nature of their soil and its fertility, they cannot find the right seeds for their fields to be sowed.

Existing System
In this project we are using LPC2148, Moisture sensors, 2 AC submersible pump, 3traic boards in combination with MOC 3021 based opto coupler which acts as a driver, Temperature sensor, LDR. A submersible motor will get switched ON /OFF depending on the soil moisture condition and also when the temperature increases. The status of motor can be displayed on 16X2 LCD. To check the status of day and night mode we are using LDR sensor, Traic with bulb. The status of LDR can be displayed on LCD.



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Draw Back

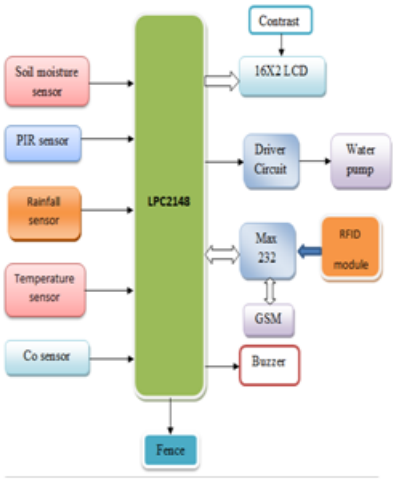
Here PIR sensor and CO sensor are not there to identify human and dangerous gas. There is no remote alert using GSM.

Proposed System

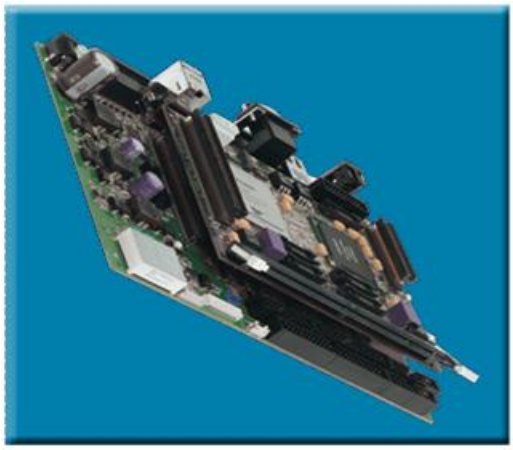
In this project we are using LPC2148, Moisture sensors, submersible pump. A submersible motor will get switched ON/OFF depending on the soil moisture condition and status of motor can be displayed on 16x2 LCD. There is also a rain sensor, so whenever this sensor detects the rain then also the motor will be off irrespective of soil condition. The temperature and dangerous CO gas is also verified using different sensors which are interfaced to the controller. In case, abnormal condition is detected through these sensors then a SMS is sent to the authorized person. An electric fence is also included to keep the strangers away from the field by it's slight shock.

Presence of a person is detected through PIR sensor and then led indication with buzzer alert will be given in case of unauthorized person's appearance. Authorized person's presence is identified using RFID module interfaced to the controller since the RFID card is being carried by that candidate, in this case electric fence will be deactivated hence doesn't produce any shock. This project works in two modes. One is manual and other one is atomized. In case of atomized mode motor will be operated using sensors. In manual mode this operation can be done using SMS from remote place also.

BLOCK DIAGRAM:



ARM7TDMI Processor Core



- Current low-end ARM core for applications like digital mobile phones
- TDMI
  - T: Thumb, 16-bit compressed instruction set
  - D: on-chip Debug support, enabling the processor to halt in response to a debug request
  - M: enhanced Multiplier, yield a full 64-bit result, high performance
  - I: Embedded ICE hardware

Von Neumann architecture

RFID

Radio-frequency identification (RFID) is the use of a wireless non-contact system that uses radio-frequency

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electromagnetic fields to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking. Some tags require no battery and are powered by the electromagnetic fields used to read them. Others use a local power source and emit radio waves (electromagnetic radiation at radio frequencies).

Global System for Mobile Communication Definition:

GSM, which stands for Global System for Mobile communications, reigns (important) as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area. Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication.

LCD

LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons:

Command	RS	RW	D7	D6	D5	D4	D3	D2	D1	D0	Execution Time
Clear display	0	0	0	0	0	0	0	0	0	1	1.64mS
Cursor home	0	0	0	0	0	0	0	0	1	x	1.64mS
Entry mode set	0	0	0	0	0	0	0	1	I/D	S	40uS
Display on/off control	0	0	0	0	0	0	1	D	U	B	40uS
Cursor/Display Shift	0	0	0	0	0	1	D/C	R/L	x	x	40uS
Function set	0	0	0	0	1	DL	N	F	x	x	40uS
Set CGRAM address	0	0	0	1	CGRAM address						40uS
Set DDRAM address	0	0	1	DDRAM address							40uS
Read "BUSY" flag (BF)	0	1	BF	DDRAM address							-
Write to CGRAM or DDRAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0	40uS
Read from CGRAM or DDRAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0	40uS

These components are "specialized" for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

TEMPERATURE SENSOR

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in

° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling.

PIR SENSOR

A PIR sensor, or Passive Infrared sensor, is a type of detector that is capable of detecting infrared light emitting from objects within its field of view.

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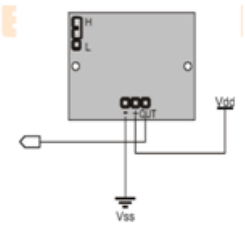
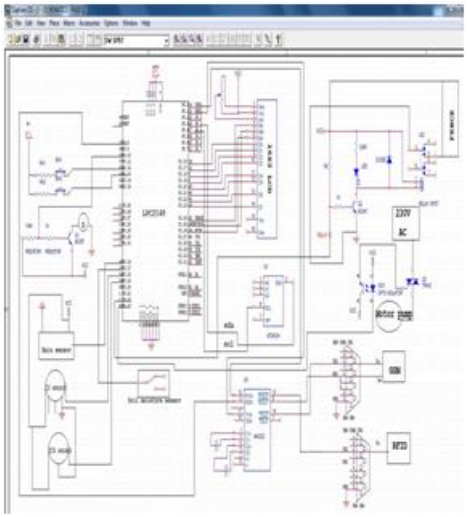
PIR sensors differ from other infrared sensors because they are only able to receive infrared waves rather than being able to emit and receive them. Because all objects emit infrared (electromagnetic waves that travel with heat), PIR sensors are able to detect objects that are in front of them. In fact, PIR sensors can see many things that humans cannot. PIR sensors are used for a number of applications, such as night vision, motion detection, and laser range finding.



CO Sensor:

CO is a colorless, tasteless and odorless compound produced by incomplete combustion of carbon containing materials. It is often referred to as the "silent killer" because it is virtually undetectable without using detection technology and most do not realise they are being poisoned. Elevated levels of CO can be dangerous to humans depending on the amount present and length of exposure. Smaller concentrations can be harmful over longer periods of time while increasing concentrations require diminishing exposure times to be harmful.

Interfacing Diagram



Advantages:

- Reliability
- Ease of Operation
- Useful to detect harmful gases

Applications:

- Gardens
- Farms
- Agriculture

Conclusion:

Irrigation has been the backbone of human civilization since man has started agriculture. As the generation evolved, man developed many methods of irrigation to supply water to the land. In the present scenario on conservation of water is of high importance. Present work is attempts to save the natural resources available for human kind.

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By continuously monitoring the status of the soil, we can control the flow of water and thereby reduce the wastage. By knowing the status of moisture, CO and temperature through GSM with the use of moisture and temperature sensors, water flow can be controlled by just sending a message from our mobile.

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