

E-Farm- Automatic Device for Sprinkler Mechanism

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Abstract— The farm house is started developing among the business. The recent developments in farm house are by having the greenhouse effect and the recent advancements in the embedded systems are also used in the farm house like having the sprinkler mechanism. This paper describes how the sprinkler mechanism is used and how the nutrition's of the soil is analyzed for the further crop cultivation in the farm house. Analysis of the soil nutrition and along with the temperature and the acidic nature of the soil in order to prevent the crops due to over usage of fertilizers by using PH sensor and to provide the proper temperature to the crops using the soil temperature sensor.

Key words: Sprinkler Mechanism, e- farm

I. INTRODUCTION

In today's world real-time embedded systems square measure everywhere. Often a lot of or less neglected they fulfill the task to management the behavior of technical systems in our homes, cars, offices, in the hospitals and at various alternative places. In all these cases the complexity and variety of functions accomplished in computer code is increasing quickly. Often these systems square measure still developed exploitation older computer code engineering technologies. As a consequence, it does not fulfill our expectations regarding the required quality for the period of time systems expressed in terms of responsibility, security, timeliness, maintainability, reusability etc. Furthermore, it often suffers from a separation of information and functions as well as from dearth of defined scheme boundaries with exactly documented interfaces. Because of the on top of, object-oriented and component-based methods square measure currently a day's a lot of or less accepted suggests that for the development of embedded period of time system computer code. These methods promise to facilitate the deployment, development, and reuse of computer code parts with well outlined interfaces.

This line of development in embedded have made USA to reach the appliance development within the recent farm house irrigation techniques like having the economical managing of the water sprinkling technique on the regular time intervals and to take care of the crops with the correct water so as to avoid the loss of the crops attributable to the improper provide of water. Also the fertilizers employed in the farm house square measure to be used in correct| the right| the correct} mixture and to avoid wasting the crop by adding proper nutrition to the soil if any nutrition is analyzed to be low.

II. METHODOLOGY

A. Role Of Sensors:

To attain our proposed system need to use PIC16F877A, controller to monitor the field. In this nutrition sensor, Soil moisture sensor, PH sensor water level sensor is used to monitor the field environment. If any abnormalities means send SMS to the owner. Nutrition sensor used to identify the nutrition level in the soil. The power source to the field is

given through solar panel. The RTC is used to make automatic water pumping and seed spraying mechanism. Controller status and everything is displayed in LCD. The whole process is controlled by microcontroller.

B. Role of PIC16F877A Controller:

The PIC16F877A - 8-bit microcontroller based on CMOS FLASH is upward compatible with the PIC16C5x, PIC12Cxxx and PIC16C7x devices. It features two hundred ns instruction execution, 256 bytes of EEPROM data memory, self-programming, an ICD, 2 Comparators and 8 channels of 10-bit Analog-to-Digital (A/D) convertor, 2 capture/compare/PWM functions, a synchronous serial port which will be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port.

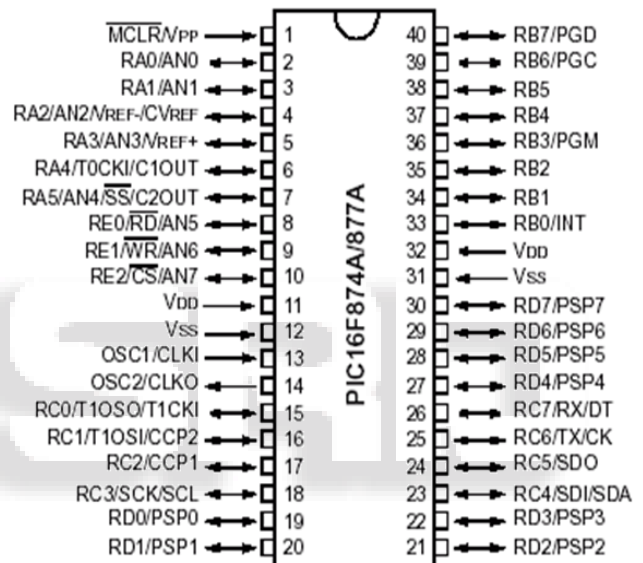


Fig. 1:

C. Block Diagram:

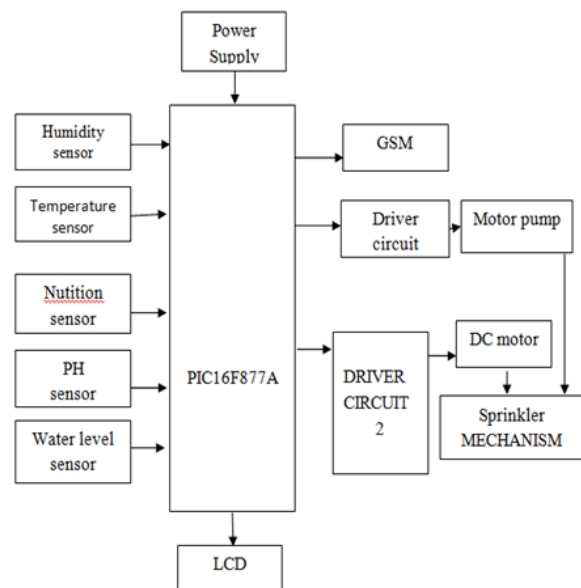


Fig. 2:

1) Features

- 33 input and output pins; 5 ports
- Timer 0: 8-bit counter/timer with same bit prescaler
- Timer 1: 16-bit counter/timer with prescaler
- Can be increment during Sleep via external crystal oscillator/clock
- Timer 2: 8-bit counter/timer with 8-bit period reg, pre scaler and post scaler
- Two Capture, Compare, pulse with modulation(pwm) modules
- 16-bit Capture i/p; maximum resolution is 12.5 ns
- 16-bit Compare; maximum resolution 200 ns
- 10-bit Pulse with modulation
- Synchronous Serial Port with 2 modes:
 - SPI Master(protocol)
 - I2C Master and Slave(protocol)
- USART/SCI with 9-bit address detection
- Parallel Slave Port
- 8 bits wide with external CS,RD and WR controls
- Brown-out detection(BOD) circuitry for Brown-Out Reset(BOR)

III. WORKING

A. Role Of Gsm:

GSM (Global System for Mobile Communication) is a public service available at no cost to the user. Nowadays mobile GSM is not new to the farmers. Everywhere farmers can use mobile phones and they are very much conversant with mobile phones. There is no additional cost of communication equipment. Using GSM technology, a motor can be controlled and monitored from each and every side of the country. Has no bar of distance like Bluetooth, Infrared and Radio waves etc. It is a wireless modem that works with a GSM wireless network. The difference between them is that a dial-up modem transmit and receives data through a particular telephone line while a wireless modem sends and receives message through radio waves. The working of GSM modem is based on commands, gsm commands always starts by using AT (which means Attention) and finish with a <CR> character. For example, the dialing command is ATD<number>; ATD3314629080; here the dialing commands sends with (;) The AT commands are given to the GSM with the help of computer or controller. The GSM modem is serially interfaced with the controller with the help of MAX 232. Here max 232 using as driver which converts TTL levels to the RS 232 levels. For serial interface GSM modem requires the signal depends on RS 232 levels. The T1_OUT and R1_IN pin of MAX 232 is connected to the TX and RX pin of GSM modem



Fig. 3:

B. Role of Temperature Sensor:

The LM35 series are small size precision IC temperature sensors, whose output voltage is proportional to the Celsius (Centigrade) temperature. It is small size and low cost sensor. This temperature range is -55° to $+150^{\circ}\text{C}$. You can calculate temperature more accurately than a using a thermistor. The temperature sensor circuitry is sealed and not subject to oxidation, etc. The LM35 generates a more output voltage than thermocouples and may not require that the output voltage be amplified.

C. Role of Humidity Sensor:

There are various devices now a days use to regulate and measure humidity.



Fig. 4:

Advise us edit measure humidity is called psychrometer or hygrometer. A humidity stat is a humidity-triggered switch, often used to control humidity measurement instruments usually rely on measurements of some other quantity such as temperature, pressure mass or a mechanical or electrical change in a substance as moisture of soil is absorbed. By calibration and calculation, these measured quantities can lead to a Measurement of humidity.

D. Role of Nutrition Sensor:

Application of fertilizer in China's production system has caused low fertilizer usage potency (~35% in average, NBS, 2006), very low agricultural production quality and serious environmental pollution, etc. One measure taken was to take a look at soil for developed fertilization. A key in soil testing for formulated fertilization is to confirm the quantity of soil

nutrients, followed by recommendation of nutrient needs and site-specific fertilization. Of the nutrients for crop growth, Nitrogen (nitrate: NO_3^- and ammonium: NH_4^+), Phosphorus (phosphate: PO_4^{3-} , hydro phosphate: HPO_4^{2-} and dihydrophosphate: H_2PO_4^-) and Potassium (potash: K^+) are the most vital components. Conventional soil NPK testing strategies have been typically performed by 3 steps: soil sampling, sample pretreatment and chemical analysis. Soil sampling is manually carried out in a field Electrochemical Sensors for Soil Nutrient measurement. Chance and Challenge 1363 to get representative soil samples at a correct depth (~20cm). A vehiclebased hydraulic soil sampler was reported to succeed half-automated sampling in fields. Soil sample pretreatment is performed for the purpose of soil extracts through sequential processes: crushing, drying, filtering, sieving and extracting. Most processes can be disbursed in batches, but area unit needed to operate and connected by human hand. Chemical analysis is handled by trained operators on special instruments to get the concentrations of soil nutrient. So far, nutrient detection commonly uses optical mensuration. In general, visible / ultraviolet spectroscopy is utilized for police investigation chemical element and phosphorus and flame spectroscopy or atomic absorption spectrometry for metal. The optical methods are unit reliable, but long, complex and high price per take a look at (~150 Yuan/Sample). This resulted in the limitation of the quantity of soil samples tested for the spatial variability of soil nutrient in a field or fields. Therefore, novel soil nutrient detection methods are unit desperately required. This study intended to provide a short review of potential chemical science sensors and an outline of their challenges and opportunities in soil nutrient detection.

E. Role of pH Sensor:

pH is a live of the acidity or pH of a water resolution. The acidity or alkalinity of a water resolution is determined by the relative range of atomic number 1 ions (H^+) or chemical group ions (OH^-) gift. Acidic solutions have a higher relative number of atomic number 1 ions, while base-forming (also referred to as basic) solutions have a higher relative range of chemical group ions. Acids are substances that either dissociate (split apart) to unleash atomic number 1 ions or react with water to type atomic number 1 ions. Bases are substances that dissociate to unleash chemical group ions or react with water to type chemical group ions.

$$\text{pH} = -\log_{10} [\text{H}^+]$$

pH activity is based mostly on the employment of a pH scale sensitive conductor (usually glass), a reference electrode, and a temperature element to give a temperature signal to the pH scale analyzer. The pH conductor uses a specially developed, pH sensitive glass in contact with the answer, which develops a potential (voltage) proportional to the pH scale of the answer. The reference electrode is designed to take care of a relentless potential at any given temperature, and serves to complete the pH mensuration circuit at intervals the answer. It provides a known reference potential for the pH scale conductor. The difference in the potentials of the pH scale and reference electrodes provides a potential unit signal proportional to pH scale. pH scale livements are unit based mostly on the response of a pH sensing element to the exponent concentration of atomic number 1 ions in resolution and area unit a measure of the

acidity or pH of an answer. There are a range of things that ought to be thought-about for on-line pH scale measurements. These involve the temperature behavior of the solution pH scale, the composition of the process resolution, and the potential for fouling of the sensor by unmelted material within the method. Contemporary pH scale analyzers supply the user activity routines to improve the accuracy of calibrations, as well as diagnostics to notice pH scale sensing element failure on-line.

F. Role of Level Sensor:

Global Water's WL400 Water Level detector submersible pressure electrical device consists of a solid state pressure detector encapsulated in a submersible chrome steel 13/16" diameter housing. The water level gauge uses a marine grade cable to connect the water pressure sensor to the monitor. Each of world Water's pressure transducers contains a 2-wire 4 to 20 mA high level o/p, five full scales ranges, and is fully temperature and barometrical pressure stipendiary. The water depth indicator is available in a very 0-3' full scale vary that is right for activity shallow flows or tiny water level changes. The 0-3' range is nice for activity flows in sewers, storm drains, weirs, flumes, lakes, tanks or any water body that is but 3' deep. The 0-3' water monitoring detector accurately measures tiny changes in water, even when the water's depth is solely many inches deep. Other metal foil kind sensors generally have serious issues at low level ranges as a result of of crinkling, stretching and drifting.

G. Role of Sprinkler Mechanism:

This method of irrigation facilitate U.S. to save water and straightforward to use on uneven land. In sprinkler system, water is piped to more middle locations within the field and provided by hard-hitting sprinklers victimization impact mechanism drive of nozzle. In Conventional farming a crop need irrigation multiple times from cultivation to the gather. Irrigation is required by crops in adverse weather conditions. A farmer has to face plenty of unavoidable issues and hardships whereas doing irrigation work. Water pump houses square measure typically situated aloof from the fields. To stop and start motor a farmer have to be compelled to move to pump house and he remained to and fro between fields and pump house for simply shift ON/OFF the Motor. Sprinkler water pipe lines are needed to alter over manually once a short time to hide all space of crop below irrigation, throughout this method a farmer is needed to take off his garments to avoid water on garments & during winter season it's a cumbersome job for farmer.

Conventional process causes, time wastage, power & water Risk of electric accidents as starter panel's square measure poorly maintained at pump homes and in most of cases aren't earthed properly. At night time and in adverse atmospheric condition a farmer's tendency is to avoid switching off the motor once needed inflicting Brobdingnagian wastage of electrical power and precious water. Saving of time water, Electric power, money & hard labor work. No risk of electrical accidents, wild all animals like snakes etc No impact of adverse weather conditions on farmer.

IV. CONCLUSION

In Farm house technology, more variety of the parameters is to be management as a result of, the varieties of the crop are massive. They are increasing day by day thanks to the event in agriculture technology. In this situation, the wireless sensor network with further hardware Associate in Nursing software package is an economical resolution for inexperienced house management. Experimentally it is tested that the hardware develop by Cypress opposition. is the best solution that works on low power with less quality and high responsibility for greenhouse management.

In future, if parameter still increasing, then for WSN technology with currently obtainable information measure, may not be sufficient. Then WSN with cognitive radio technology could be the answer. This advancement in precision agriculture through Wireless device Network in greenhouse management is very helpful. This has scope in developing countries in globe, where agriculture is the main business.

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