

SMART SOIL TESTING FOR FARMERS

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Abstract: At present soil ingredients are being tested only at Soil Analysis Centre, where they use primitive method. At present Government survey department is tedious in surveying the farm lands. So that farmers are suffering much. Many toll-free Agriculture call centers are there but without testing soil they simply advise to the farmers about the usage of fertilizers which is improper. To overcome these problems, the proposed project helps the farmers to test the soil themselves easily.

Key Words – Sensor, GSM, Microcontroller, Embedded-C

I. INTRODUCTION

For ages, agriculture has always had a very special place in the life style of an Indian Agriculture and its associated activities contribute about 5.7% of Indian gross domestic products. However, in spite of all the development, the agriculture methods that Indians use are still way old. Soil fertility is the measure factor to be looked for getting better yield. Measure constrain in promoting balanced use of fertilizers includes inadequate soil testing facilities, wide gap in dissemination of knowledge, lack of awareness among farmers about benefits of balanced fertilization. As this era is digital, automated, application oriented in each and every field. It depends on the day to day needs of people for comfort and time. More over to comfort, the time plays an important role, everyone wants their work to be done in or on time. Especially in case of government works, it takes much time to complete their tasks. By this, people may get disappointment. Due to some technical imbalance at government office, the work is not executing within specified amount of time. If the allocated task doesn't executed within given time then completion of task will take much more time. Because of this many automated projects have come into existence in this world.

Here in this project we give each and every information regarding agricultural activities including soil testing, land surveying, diseases detecting, seed germination etc. As we know that

Indian economy is maximally depends on agricultural, 60% land is used for agriculture. We know that farmers get gambled by rain every year, once we get heavy rain and once total drought. Thus our farmers get scared of rain for their desired yield. If this condition occurs every time, then a lot of problems arise to farmers. So as to get high yield in crops, the farmers are misguided by others and they are forced to use chemical fertilizers. Due to this, for a limited period, it may provide high yields but when it reaches to peak, the land slowly loses its fertility. Due to this reason the government is providing many schemes to develop the fertility of land for helping the farmers through tele-services.

II. LITERATURE SURVEY

Agriculture is an emerging research field that is experiencing a constant development. In agriculture area problem of efficient knowledge exploitation and acquisition is very popular. In agriculture decision making process is play an important role. The decision tree is one of the common modeling methods to classify. In this paper, we present the basic knowledge of soil nutrients, how affect and related with crop. In this research, Steps for building a predictive model of crop health that have been explained. A large data set of soil nutrient database of Bt Cotton is extracted from the Soil Micronutrient & Agriculture department, Ananad. The outcome of this research could improve crop production and identify crop disease that help soil systems, uses throughout a large number of fields or area that include environment, agriculture, horticulture and land use management.

In this paper a new four electrode sensor for water conductivity measurements is presented. In addition to the sensor itself, all signal conditioning is implemented together with signal processing of the sensor outputs to determine the water conductivity. The sensor is designed for conductivity measurements in the range from 50 mS/m up to 5 S/m through the correct placement of the four electrodes inside the tube where the water flows. The implemented prototype is capable of supplying the sensor with the necessary current at the measurement frequency, acquiring the sine signals across the voltage electrodes of the sensor and across a sampling impedance to determine the current. A temperature sensor is also included in the system to measure the water temperature and thus compensate the water conductivity temperature dependence. The main advantages of the proposed conductivity sensor include a wide measurement range, an intrinsic capability to minimize errors caused by fouling and polarization effects and an automatic compensation of conductivity measurements caused by temperature variations.

III. METHODOLOGY

A. Microcontroller:

The W78E054D/W78E052D/W78E051D series is an 8-bit microcontroller which can accommodate a wider frequency range with low power consumption. The instruction set for the W78E054D/W78E052D/ W78E051D series is fully compatible with the standard 8052. The W78E054D/W78E052D/W78E051D series contains 16K/8K/4K bytes Flash EPROM programmable by hardware writer; a 256 bytes RAM; four 8-bit bi-directional (P0, P1, P2, P3) and bit-addressable I/O ports; an additional 4-bit I/O port P4; three 16-bit timer/counters; a hardware watchdog timer and a serial port. These peripherals are supported by 8 sources 4-level interrupt capability. To facilitate programming and verification, the Flash EPROM inside the

W78E054D/W78E052D/W78E051D series allows the program memory to be programmed and read electronically. Once the code is confirmed, the user can protect the code for security.



Fig. 1: 8051 Development Board (AT89S52).

B. MT3608 (Step-Up Adjustable DC-DC Switching Boost Converter)

The MT3608 is a constant frequency, 6-pin SOT23 current mode step-up converter intended for small, low power applications. The MT3608 switches at 1.2MHz and allows the use of tiny, low cost capacitors and inductors 2mm or less in height. Internal soft-start results in small inrush current and extends battery life.

The MT3608 features automatic shifting to pulse frequency modulation mode at light loads. The MT3608 includes under-voltage lockout, current limiting, and thermal overload protection to prevent damage in the event of an output overload.



Fig. 2: MT3608

C. Soil Moisture Sensor

This is a simple and easy moisture sensor that can be used for the detection of soil moisture. The module outputs a high level, when soil moisture is deficit, the output is low level. Using the sensor produces a watering device automatically, let you don't choose and employ persons to manage the plants in the garden.



Fig. 3: Moisture Sensor

D. Temperature Sensor (LM35)

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 $\pm 1/4^\circ\text{C}$ at room temperature and $\pm 3/4^\circ\text{C}$ 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.

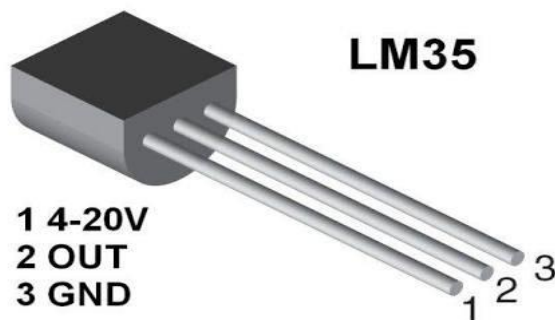


Fig. 4: Temperature Sensor

E. Ultrasonic Sensor

The HC-SR04 Ultrasonic Module has 4 pins, Ground, VCC, Trig and Echo. The Ground and the VCC pins of the module needs to be connected to the Ground and the 5 volts pins on the MC respectively and the trig and echo pins to any Digital I/O pin on the MC.



Fig. 5: Ultrasonic Sensor

F. Humidity Sensor (HR202)

HR202 is a new kind of humidity-sensitive resistor made from organic macromolecule materials, it can be used in occasions like: hospitals, storage, workshop, textile industry, tobaccos, pharmaceutical field, meteorology, etc.

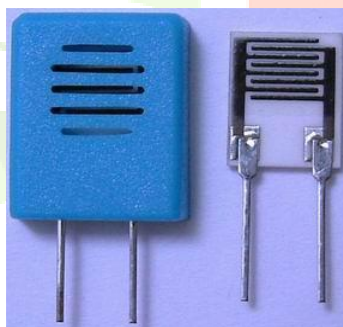


Fig. 6: Humidity Sensor

G. Solar Photovoltaic Module

A single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes an array of photovoltaic modules, an [inverter](#), a [battery pack](#) for storage, interconnection wiring, and optionally a [solar tracking](#) mechanism. The most common application of solar panels is [solar water heating](#) systems.



Fig. 7: Solar Panel

H. GSM



Fig. 8: GSM Module

GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services.

GSM (Global System for Mobile communication) is a digital mobile telephone system that is widely used in Europe and other parts of the world. GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1,800 MHz frequency band. It supports voice calls and data transfer speeds of up to 9.6 kbit/s, together with the transmission of SMS (Short Message Service).

I. ADC0809

The ADC0808, ADC0809 data acquisition component is a monolithic CMOS device with an 8-bit analog-to-digital converter, 8-channel multiplexer and microprocessor compatible control logic. The 8-bit A/D converter uses successive approximation as the conversion technique. The converter features a high impedance chopper stabilized comparator, a 256R voltage divider with analog switch tree and a successive approximation register. The 8-channel multiplexer can directly access any of 8-single-ended analog signals.

The device eliminates the need for external zero and full-scale adjustments. Easy interfacing to microprocessors is provided by the latched and decoded multiplexer address inputs and latched TTL TRI-STATE outputs.

Working

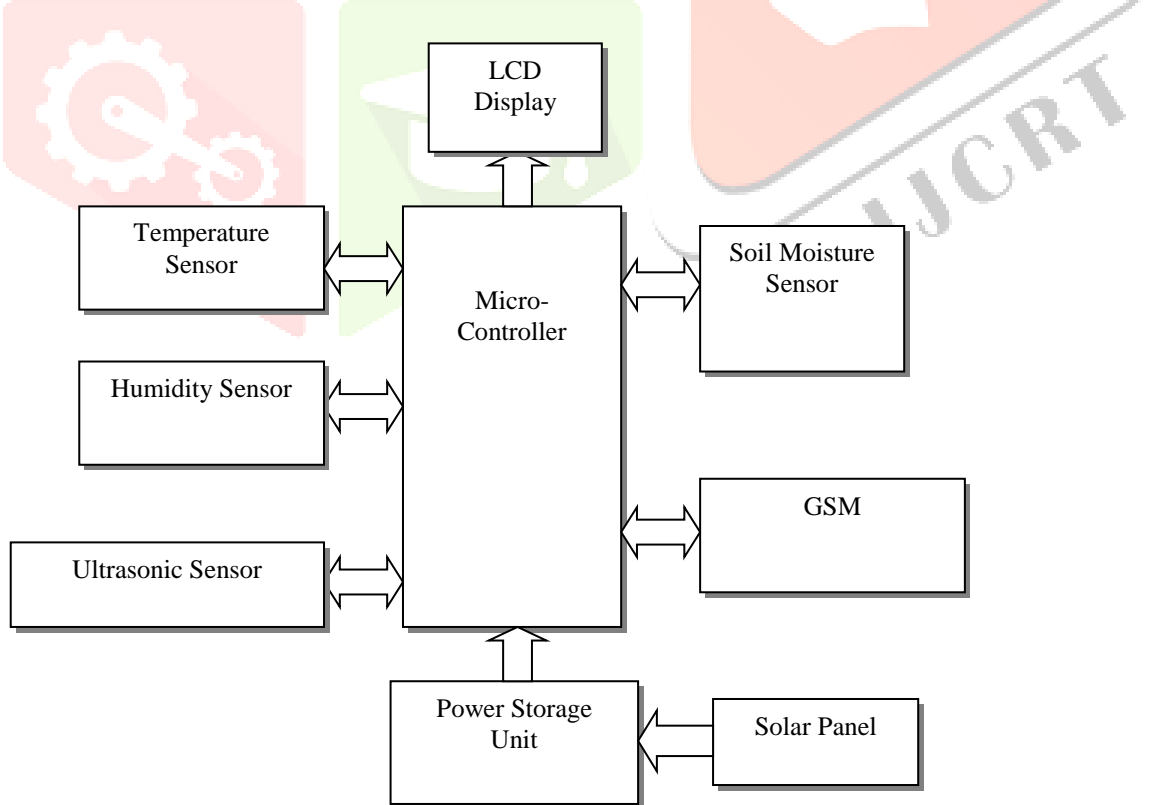


Fig. 9: Block Diagram

This project makes use of microcontroller, where microcontroller is used to test soil for its humidity, temperature, moisture etc, which is also used check land area by finding distance of length. LCD is used to get visual display of all the above calculation. Thus microcontroller is also used to control necessary machines like conveyer for harvesting, Grass cutter and sprinkler at one

touch. As supply for these we are making use of three alternate ways that are wind energy, solar energy, AC main supply, which work simultaneously to provide continuous power for its working through control circuitry. There are many physical arrangements which are difficult to explain but through visualization one can get detailed understandable concept which is used in this project. This software is easy to use and guide in very simple method ever before which is understandable to farmers. This software tells each and everything related to agriculture such as how much fertilizers should be used for specific land area, which fertilizers to be used for each crop, Guidance regarding new techniques in ploughing land, plant leaf disease detections, details of recent instruments in agriculture etc.

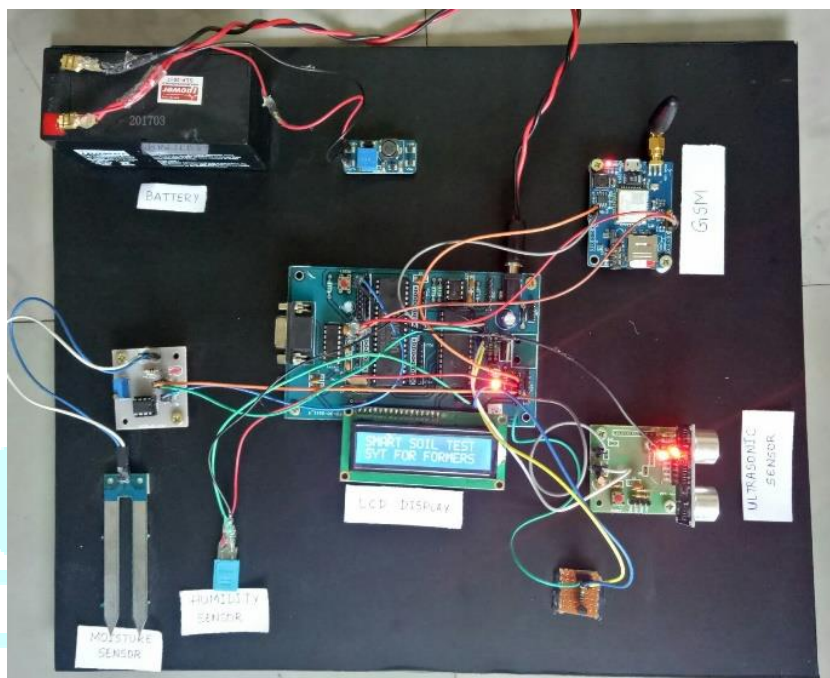


Fig. 10: Experimental Setup

IV. CONCLUSION

This module helps the farmers to know parameters like temperature, moisture, humidity and growth of the plants at instant of time without visiting the fields. The proposed module describe the integration of new technologies offering ease of maintenance, time saving and gives approximate results instantaneously.

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