ADVANCEMENTS IN HIGH-TECH AGRICULTURE SYSTEM IMPLEMENTATION

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ABSTRACT:
Irrigation system in India has given a highest priority in economic development. Many new concepts are being developed to allow agricultural automation to increase and deliver its full potential. To take full advantage of these technologies, we should not just consider the implimentation of developing a new single technology but should look at the vast issues for complete development of a system. Usage of Hi-tech Agricultural Solar Fence Security with soil Humidity Based Automatic water system and voice alert on PIR live Human Detection is been actualized in this undertaking for protected and secure agriculture water system. Additionally it diminishes human endeavors. Electric wall can be utilized to ensure farmhouses, farmlands, woodland, bungalows, and so on… from animals. In this way, these simulate the job of forest guard. Already popular in many countries where manpower is expensive, electric fences are slowly getting popular in India as well. This control an animal by giving them a minor, sharp and safe shock that teaches them to stay away from the fence as well as crops. Hence Electric fences are economical and practical solutions to maximize the field production through controlled grazing. Electric fencing is safe as its output is not continouse. There is a certain time duration between two pulses which prevents prolonged shocking to animals or people as well.
Keywords: Solar panel, AT MEGA 328 microcontroller, DC motor, fence circuit, sensors.

I. INTRODUCTION

Agriculture in India is in a predicament situation due to many reasons. Paramount of them are inadequate irrigation system in addition to wrectiage of field due to invation of animals in fields, hence ruin the yield. Water use efficiency is very low. Unsustainable practices such as flooding or canels and pumping ground water resources are depleting the country"s aquifers. Our project "Implementation of Hitech Agriculture" is established on self executing fencing structure along with irrigation system. The water for irrigation purpose must be used wisely hence we have dipped soil moisture sensor which will convey the required moisture in soil to the "micro-controller" on which the

micro controller will send signal to the motor to ON/OFF respectively. Likewise the fence system is link to the controller which will dispense a sharp and safe shock which will keep them away from fence as well as crops.[1-3] This paper provides a brief idea about the construction, working and components used in "Hi-tech Agriculture" which is totally solar based and provides a 100% solution to water scarcity and animal invasion issues.

II. PROBLEM STATEMENT

In present scenario, agriculture sector in India is worst hit by two major problems like actrocious irrigation system and distortion of fields due to cattle invasion. Prolonged periods of dry climate conditions due to fluctuations in annual

precipitation may appreciably reduce the yield of cultivation. Apart from which cattle invasion in fields almost destroys the yield produce. Hence disturbing the whole food cycle and loss of farmers which leads to miserable situation of agriculture sector in India.[4,5]
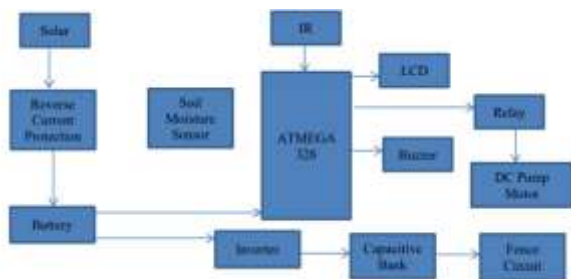
BLOCK DIAGRAM

Fig. 1: Block Diagram of Fence Circuit and Automatic Irrigation System.

III.   COMPONENTS & RATINGS
DC Motor

A DC motor is any of a class of rotational electrical engines that changes over direct current electrical energy into mechanical vitality. The most common types relay on the forces produce by magnetic fields. Almost a wide range of DC engines have some inside mechanism, either electromechanical or electronic, to occasionally alter the direction of current in part of the motor.

Ratings of DC Motor: 12 volt

Solar Panel

The solar cells which we see are also called photovoltaic cells which convert sunlight directly into electricity. Solar panel pumps electricity into a battery which is used for storing purpose, but the solar panel has no control over how much it does or how the battery receives it. The charge controller situated

between the solar panel and the battery directs the voltage and the current and basically ends charging action transiently when important.

Ratings of Solar Panel:

1. Power- 3w

2. Voltage- 8.5v

Atmega 328

- ATmega328 is an 8-bit and 28 Pins AVR Microcontroller, manufactured by Microchip, follows RISC Architecture and has a flash type program memory of 32KB.
- It has 8 Pin for ADC operations, which all associates to form Port A (PA0 – PA7).
- It also has 3 Timers; two of them are 8 Bit timers while the third one is 16-Bit Timer.
- Arduino UNO is based on atmega328 Microcontroller. It"s UNO"s heart.
- It works going from 3.3V to 5.5V however ordinarily we utilize 5V as a norm.
- It is ordinarily utilized in Embedded Systems applications. You ought to examine these Real Life Examples of Embedded Systems; we can plan every one of them utilizing this Microcontroller.

Fig. 2: Atmega 328 Microcontroller.

Soil Moisture Sensor

The term humidity and moisture is not interchangeable. Humidity refers to the water content in gases such as in the atmosphere. Moisture is the water content in any solid or liquid. It consists of a connecting probe, which is laid down in the soil while Moisture sensor is used to sense the moisture available in the soil and sends the signals to the controller. If the moisture level touches the under the preset value, then the water is sent to the ground. These sensors have no moving parts; they are precise and work under many environmental conditions as they are not expensive and quite easy to use.
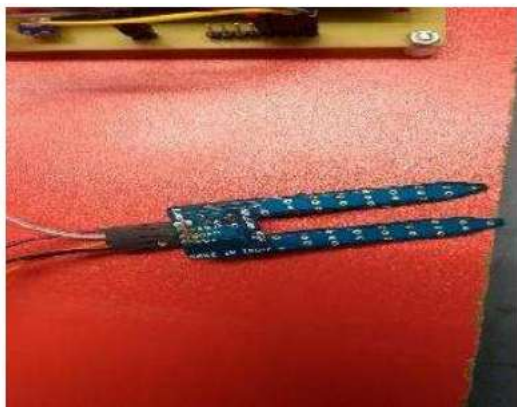

Fig. 3: Soil Moisture Sensor.

IV.   WORKING

- The fence is like barbed wire fencing with multiple strands of plain wires and metals to hold the strands in position. The wires carry high voltage current. The solar power fence gives a sharp but non-lethal shock to the intruder and creates phychological fear against any tampering.
- This fence system is powered by a 12V rechargeable battery. A solar panel is connected to the battery to charge on day time. The battery is connected to the inverter. This inverter is used to convert the 12 Volt D.C to the 230 Volt A.C.
- This 230 Volt A.C voltage is used to activate the loads. We are also using Conventional Battery Charger Unit to recharge the battery. ARM7 microcontroller is the heart of the circuit as it controls all the functions. A voltage sampler is interfaced with the system using ADC 0808 to get the DC voltage generated from solar panel stored in battery as a display on a 16×2 LCD.
- We add soil sensor in this project. The soil moisture sensor uses capacitance to measure the water content of soil by measuring the dielectric permittivity of the soil, which is the function of water content.
- These soil sensors are used to detect dryness of soil, if soil is dry motor get automatically on using relay. If soil sensors detect soil is wet, motor get off.
- A 12 V DC lead acid rechargeable battery is used for storing the energy. We are using conventional battery charging unit also for giving supply to the circuitry.
- The Conventional power source uses regulated 5V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

Fig. 4: Prototype Model.

V. CONCLUSION

Our project "Implementation of hi-tech Agriculture" has been propitiously developed and has achieved its aim and objective successfully. The electric fence surrounded to the farm works effectively on solar panel and so is the automatic plant watering system that was a soil moisture sensor.

The solar panel is used to generate the electric supply and store it to the battery. The fence circuit is powered by the battery and is further connected to „AT MEGA 328" which is heart of the circuit as it controls all the functions. A DC motor will get switched ON/OFF depending on the soil moisture condition and status of the motor can be displayed on the LCD. This motor will be operated using RF communication. Whenever the dry condition is detected then the motor goes to ON condition. Level sensor is used to indicate the level of water. If water level is low or high it will give buzzer indication.

For further development, addition of wifi shield and use of twitter library could be implemented which will tweet from your plant side to send message like, "I need water, the tank is empty, refill the tank, and so on……."

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