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DESIGN AND DEVELOPMENT OF ADVANCED SOLAR IRRIGATION SYSTEM USING RAIN WATER DETECTION AND SOIL MOISTURE SENSOR

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ABSTRACT: In this project, the design and development of advanced solar irrigation system using rain water detection and soil moisture sensor. The main intent of moisture sensor, temperature and rain water sensors is to detect the moisture, temperature and water and send the signals to ARM. Here ARM will perform its operation internally and after that an alert message is sent through GSM. By using solar panels the electricity is provided. When the moisture level sensor will get low then water content is constantly judged and a signal is sent by the system to motor to turn on. After reaching to the upper threshold level, the motor automatically stop its operation. When the motor stops, the user will get an indication in the form of message. Hence the proposed system gives effective results.

KEY WORDS: GSM, MAX-232, Temperature sensor, Solar panel, soil moisture sensor.

1.INTRODUCTION

Sun based imperativeness is the most multiplying supply of essentialness inside the world. Daylight based power isn't solely relate degrees were a solution until further notice's essentialness crisis anyway conjointly a natural welcoming sort of imperativeness. Electrical wonder period is a mild methodology for abuse sun situated power [1]. Sun based High-controlled water framework system may be an appropriate unmistakable for farmers inside the gift state of imperativeness crisis. Customized water framework system uses elective imperativeness that drives water siphons to siphon water from bore well to a tank and along these lines the outlet valve of tank is normally coordinated abuse controller. A wet discoverer is used to manage the flood of water from the tank to the water.

Framework field that advances crafted by water. Since our country positions second in agribusiness and getting daylight reliably, it's informed use sun arranged essentialness for water framework limits. The alternative essentialness is absolutely outstanding for use with water framework structures for greenery nooks, lofts, nurseries, etc. Upgrading water framework quality will contribute altogether to decreasing age cost of harvests, making the solicitation give response extra beneficial. Through right water framework progressions, typical vegetable yields may be kept up or extended [2-3].

In certain nations, farming is considered as one of the real wellspring of financial advancement. The pay of numerous nations depends legitimately on agrarian progression. Additionally, the persistent increment in the

number of inhabitants in a nation requests more advancements in nourishment generation innovation. The elements influencing horticultural advancement must be considered altogether to acquire most extreme outcomes. The critical structure square of agribusiness is the water system framework. As such, the productivity of water system framework may initiate adequate consequences for horticulture. Water system procedure ought to give water to soil reliably when it is required and stops water stream too, when soil has drenched enough water [4-5].

The abundance of water in the yields is of nothing more than a bad memory, water is squandered as well as pulverizes crops. Thinking about Pakistan, whose economy is essentially founded on horticulture requires productive and current techniques for water arrangement in the yields fields. The disappointments caused through manual techniques for water system has let us to consider some development strategy which can be depended upon. Anything which is financially savvy, work sparing and vitality sparing is viewed as proficient. Consequently in this proposed framework, a strategy which uses less or no work (keeps running without anyone else) has been suggested, spares power and is anything but difficult to utilize.

The proposed framework is programmed water system framework. The automaticity implies that it turns itself on and off contingent on the dirt dampness necessity. This programmed conduct of water system is accomplished utilizing various sensors which sense and tell the client if water is required or not and how much water will be sufficient for soil with the goal

that water wastage is likewise stayed away from. The blunders which may emerge when manual water system is utilized are likewise corrected generally utilizing this technique. The significant wellspring of power in Pakistan is through hydroelectric power however this source has not paid the nation with imperative measure of electrical power thus there is deficiency of power which isn't useful for procedure of water system as engines need continuous supply of power. As power inadequacy is a noteworthy issue of Pakistan, so the framework is made progressively adaptable through utilizing sunlight based vitality. The framework is free of any work however the status of experiencing procedure will be gotten by client through GPRS.

II. LITERATURE REVEIW

In GSM based Automated Irrigation Control utilizing Raingun Irrigation System by R.Suresh, S.Gopinath, K.Govindaraju, T.Devika, N.Suthanthira Vanitha [1], framework is computerized microcontroller based downpour weapon water system framework. Water system is done just when it ends up important to water the fields in this manner sparing huge amount of water. Android based cell phone is utilized. Applications are created on android stage utilizing instruments from android SDK in java programming language. The GPRS highlight of cell phone is utilized for demonstrating answer for water system control issue. Adequate measure of water can be given to the fields. The framework sends messages utilizing GSM.

In Automated Wireless Watering System (AWWS) by Chetana A.Kestikar, Rutuja M.Bhavsar [2], the framework is encouraged by

giving PC control and versatile control for checking and controlling watering action. Likewise the wiring wreckage is decreased. The framework is separated into two sections, one is PC side and the other is the equipment parts on the site/field. The GUI interface is created on .NET programming language. Writing computer programs is utilized to send message to GSM modem on location through PC and the other way around.

In Solar Powered Smart Irrigation System by S.Harishankar, R.Satish Kumar, Sudharsan K.P, U.Vignesh, T.Viveknath [3], the sun powered vitality from sun based boards is used to siphon water consequently from drill well straightforwardly into a ground level stockpiling tank. Aside from the customary procedures, the framework utilizes sustainable power source. For the water system module to be programmed, the water outlet valve of the tank is constrained by soil dampness detecting circuit.

In Smart Irrigation System Autonomous Monitoring and Controlling of Water Pump by Using Photovoltaic Energy by Dhana Lakshmi.N, Gomathi K.S [4], the power supply for entire framework is taken from inexhaustible photovoltaic cells vitality; it lessens the expense of intensity. The water supply, temperature and pH estimation of the dirt are observed independently. The water level in fields is detected by utilizing drifting ball sensor and the pH esteem by utilizing pH sensor.

In Modern Solar Powered Irrigation System by Using ARM proposed by Basava Sidramappa Dhanne, Sachin Kedare, Shiva Sidramappa Dhanne [5], the plan philosophy of robotized water system framework in this paper

incorporates the segments, sunlight based board, ARM processor, sensors, dc engines, hand-off, and battery. The principle stress is laid on producing force supply by outfitting sun based vitality and decreasing force utilization for water system reason. The dc current is created by utilizing sun based board. This dc power is put away in a battery to work the siphon not withstanding during the evening.

In Solar Panel Based Automatic Plant Irrigation System proposed by Prof. Rupali S.Sawant, Shreejit Gubre, Swathi Pillai, Monica Jain [6], the dampness sensor unit alongside the processor, GSM modem and sun powered board is practically same as the past proposed works for field water system.

III. PROPOSED SYSTEM

The below figure (1) shows the block diagram of proposed system. In this soil moisture sensor, temperature sensor, rain water detection sensor, crystal oscillator, ARM, solar panel, LCD display, water sprinkler, fan, motor shelter, RS-232 and GSM devices are used. Solar based water system is to be utilized for sparing enormous amount of water from going wastage. The moisture sensor unit detects the dampness level in the dirt. The GSM and the ARM are associated by methods for IC MAX232. The water level sensor is utilized to decide if the water level away tank is adequate or not for watering the fields. Temperature sensor is used to detect the amount of temperature present in water. The below shows the detail view about all the devices:

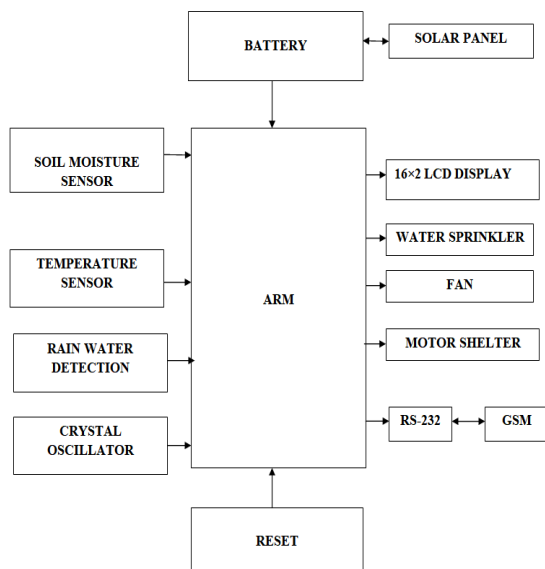


Fig. 1: PROPOSED SYSTEM

A) ARM

The ARM microcontroller is a main stream microcontroller in the computerized inserted framework world and a large portion of the enterprises favor just ARM microcontrollers since it comprises of tremendous highlights to actualize items with a propelled appearance. The ARM microcontrollers are cost touchy and elite gadgets which are utilized in a wide scope of utilization, for example, mechanical instrument control frameworks, remote systems administration and sensors and car body framework and so on. The ARM represents Advanced RISC machine with 32-bit diminished guidelines set PC (RISC) microcontroller. An ARM processor is one of a group of CPUs dependent on the RISC (diminished guidance set PC) engineering created by Advanced RISC Machines (ARM). ARM makes 32-bit and 64-bit RISC multi-center processors. ARM processors are totally founded on the RISC design. This methodology lessens the expenses of equipment and it creates less warmth than conventional x86 models subsequently it is

control effective. It has exceptionally enhanced guidance sets.

B) POWER SUPPLY

A power supply is an electrical gadget that provisions electric capacity to an electrical burden. The essential capacity of a power supply is to change over electric flow from a source to the right voltage, flow, and recurrence to control the heap. Subsequently, control supplies are in some cases alluded to as electric power converters. Some power supplies are isolated independent bits of hardware, while others are incorporated with the heap apparatuses that they control. Instances of the last incorporate power supplies found in personal computers and gadgets. Different capacities that control supplies may perform incorporate constraining the flow attracted by the heap to safe dimensions, stopping the flow in case of an electrical blame, control molding to forestall electronic clamor or voltage floods on the contribution from achieving the heap, control factor rectification, and putting away vitality so it can keep on fueling the heap in case of a brief intrusion in the source control (uninterruptible power supply).

C) LCD DISPLAY

A liquid crystal display (LCD) is a thin, level showcase gadget made up of any number of shading or monochrome pixels exhibited before a light source or reflector. Every pixel comprises of a section of fluid gem particles suspended between two straightforward cathodes, and two polarizing channels, the tomahawks of extremity of which are opposite to one another. Without the fluid gems between them, light going through one would be obstructed by the other. The fluid precious stone

winds the polarization of light entering one channel to enable it to go through the other.

A program must collaborate with the outside world utilizing info and yield gadgets that discuss straightforwardly with a person. A standout amongst the most widely recognized gadgets appended to a controller is a LCD show. Probably the most well-known LCDs associated with the controllers are 16x1, 16x2 and 20x2 showcases. This implies 16 characters for each line by 1 line 16 characters for every line by 2 lines and 20 characters for every line by 2 lines, individually.

Numerous microcontroller gadgets use 'savvy LCD' showcases to yield visual data. LCD shows structured around LCD NT-C1611 module, are modest, simple to utilize, and even conceivable to create a readout utilizing the 5x7 specks in addition to cursor of the showcase. They have a standard ASCII set of characters and numerical images. For a 8-bit information transport, the presentation requires a +5V supply in addition to 10 I/O lines (RS RW D7 D6 D5 D4 D3 D2 D1 D0). For a 4-bit information transport it just requires the supply lines in addition to 6 additional lines (RS RW D7 D6 D5 D4). At the point when the LCD show isn't empowered, information lines are tri-state and they don't meddle with the activity of the microcontroller.

D) OSCILLATOR

An oscillator gives a wellspring of tedious A.C. motion over its yield terminals without requiring any contribution (aside from a D.C. supply). The flag produced by the oscillator is more often than not of steady sufficiency. The wave shape and sufficiency are controlled by the plan of the oscillator circuit and decision of segment esteems. The recurrence of the yield wave might

be fixed or variable, contingent upon the oscillator structure.

E) GSM

The information over to the user via SMS by using general packet radio service (GPRS) which can provide data rates. Microcontroller gives GSM libraries to their authority GSM shield has well which permits the GSM shield to make/get a call, send/get SMS and go about as a customer/server. The GSM shield has been programmed to get SMS instant messages from the parent cell phone. The essential purpose behind utilizing GSM shield as the method of correspondence over ZIGBEE was that this wearable was gone for being available to any cell phone client and not really a costly advanced mobile phone client. Additionally, to make the innovation as easy to use conceivable so a client who is innovatively tested can likewise utilize it effortlessly.

F) TEMPERATURE SENSOR

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature it is low cost and small size sensor. Its temperature range is -55° to $+150^{\circ}\text{C}$.

G) MAX-232

The MAX232 is a dual transmitter/dual receiver which is conventionally introduced to provide the RX, TX, CTS, RTS signals. It generates TIA-232 voltage level outputs (about ± 7.5 volts) with a single 5-v input voltage applied by on-chip voltage generators and external capacitors. The utilization of MAX-232 to change over Transistor Logic (TTL) voltage level to RS232 and the other level of R232. The RS232 is the technique for exchanging information utilizing

serial communication. MAX 232 is a double receiver or driver consist of a capacitive voltage generator so as to supply, RS232 voltage levels from a solitary supply of 5V.

H) SOLAR PANEL

A solar cell or photovoltaic cell is a device that converts solar energy into electricity by the photovoltaic effect. The collection of solar cells is called a solar panel or solar array. Solar panel is placed on top of the tracker board which absorbs the maximum sunlight which is used as supply to the motors or stored in the battery for future use.

D) SOIL MOISTURE SENSOR

This Moisture Sensor can be used to recognize the sogginess of soil or judge if there is water around the sensor, let the plants in your greenhouse interface for human offer help. They can be anything other than hard to use, just implant it into the soil and a short time later per used it. With the help of this sensor, it will be achievable to cause the plant to remind you hi I am dry currently, if it's not too much trouble give me some water. The moisture sensor which can be used to perceive the clamminess of the earth. Exactly when the soil sogginess setbacks, the sensor yield regard will decrease. You can know whether a plant needs water or not by viewing the results that the sensor yields. Soil moisture sensor in perspective on soil resistivity estimation.

IV. RESULTS

The below figure (2) shows the output of proposed system. Here light and fan will be in off position based on the solar panel. The solar panel will transfer sufficient amount of power to the entire system when it is needed.

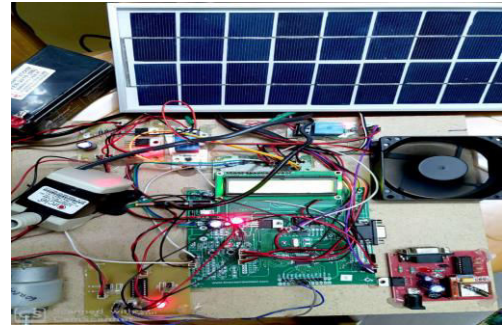


Fig. 2: OUTPUT-1

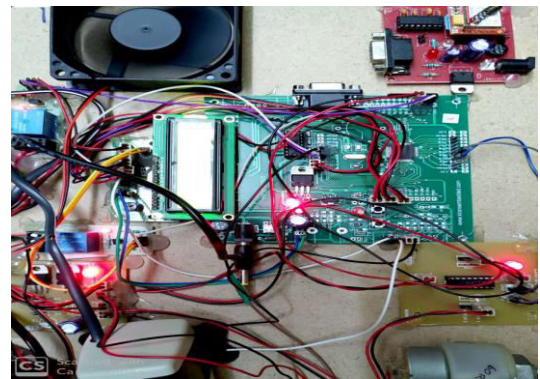


Fig. 3: OUTPUT-2

V. CONCLUSION

In this project an advanced solar irrigation system is introduced which gives effective and reliable results. The system will operate automatically and tested automatically depend on the sensors. The moisture sensor will determine the water content in different plants. The corrective action is taken when moisture level exceeds below the desired level. The proposed system will give accurate changes and this does not allow the user to reduce the human power in wireless field.

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