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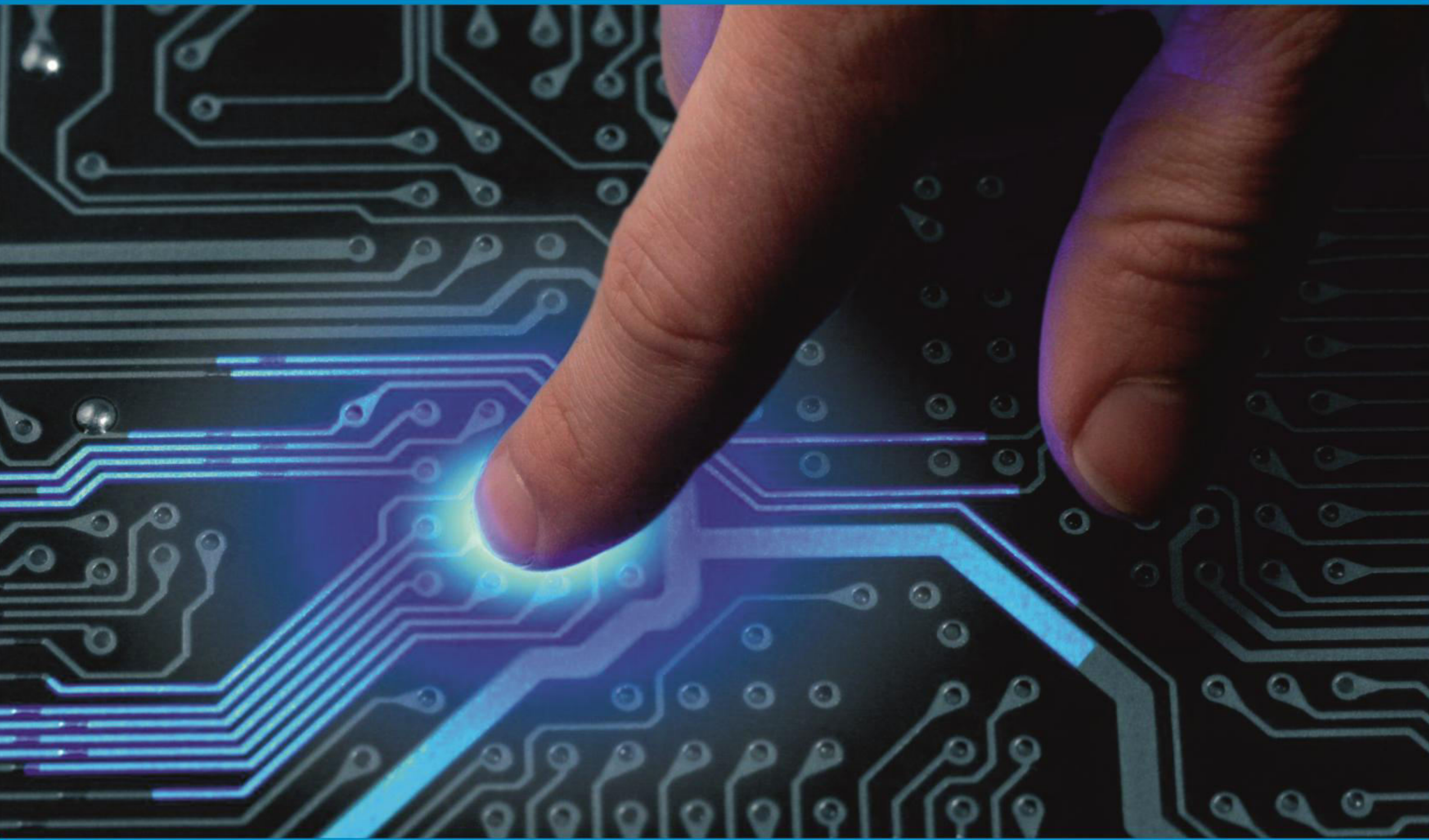

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Innovative Irrigation Method for Agriculture

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ABSTRACT: A brilliant irrigation framework was created to guarantee appropriate utilization of water for agricultural crops. The framework has two detecting units each having a dirt dampness and temperature sensor. These sensors were set close to the foundations of the crop. The edge upsides of temperature and soil dampness were modified to control supply of water. The framework was controlled utilizing managed power supply. Irrigation booking could be monitored utilizing an Android Application.

KEYWORDS: Irrigation System, Agriculture, Sensors and Croping.

I. INTRODUCTION

Irrigation is the course of application of water to a land or soil. It is utilized for upgrading the development of agricultural crops, keeping up with scenes, and revegetation of debased soils in dry regions and times of deficient precipitation. Irrigation in India incorporates a wide network of major and minor channels from streams, groundwater very much based frameworks, and other rainwater gathering projects for agricultural exercises. Of these the groundwater framework possesses the significant part. In 2010, the complete agricultural land in India that was appropriately inundated represented just 35%. In India, around 2/third of the developed land relies upon downpours. Irrigation assists with further developing security of food, decrease dependence on storms, increment crop efficiency and upgrade provincial open positions. Dams utilized for irrigation projects help in the age of power and transport offices, likewise they give drinking water supplies to a developing populace, control floods and forestall dry seasons. There are various techniques to get water reserve funds for various kinds of crops. Different boundaries are considered to determine the irrigation needs of a crop. For instance, in one framework the conveyance of covering temperature was considered for planning the irrigation for the crop [1].

Additionally, there are different frameworks that have been created to improve water utilization by considering crop and water stress index (CWSI) [2]. Rather than a predetermined timetable of irrigation, the frameworks can get data on volumetric water content of soil and be mechanized [3]. When contrasted with manual irrigation framework in light of direct soil water estimation, the mechanized irrigation ends up being important for cotton fields [4]. One more boundary that can be thought about for deciding the irrigation needs of a specific crop is the plant evapo transpiration (ET). ET is impacted by a few elements. Frameworks in view of ET have permitted up to 42% water investment funds [5]. In one of the frameworks, an electromagnetic sensor was utilized to quantify soil dampness. Water saving of around 53% were accomplished as contrasted and the ones utilizing sprinklers [6]. Decrease in water use have been accomplished, utilizing sensor based planning of irrigation. A dirt sensor and an evaporimeter were integrated in this framework [7]. The utilization of computerized irrigation framework to diminish water utilization was done in a framework that made out of a disseminated wireless network of soil dampness and temperature sensors set close to underlying foundations of plants [8].

In this paper, the plan and advancement of a shrewd irrigation framework it is introduced to utilize sensors and microcontrollers. The point of the execution was to upgrade water utilization by crops in an agricultural field and further develop supportability. The framework comprises of soil dampness and temperature sensors inserted in the root zone of the plant. Every wireless sensor hub is contained a dirt dampness test, a temperature sensor test, a microcontroller for obtaining of information, and a radio handset. The receiver unit contains an expert microcontroller, radio handset, Global System for Mobile Communication (GSM) module and a siphon. The correspondence connects between the transmitter and receiver units are through the ZigBee convention [9]. The dirt and temperature levels are graphically shown through an Android application interface. This empowers the booking of irrigation as per prerequisites of crop. The framework can be utilized to dispose of weeds as water will be provided distinctly to the crops and not the whole field.

II. PROPOSED IRRIGATION METHOD

In the brilliant irrigation framework thusly revealed, included two significant units (Fig.1), wireless transmitter units (WTUs) and wireless receiver unit (WRU), connected by radio handsets. The handsets permit the trading of information between the two units utilizing ZigBee innovation. The WRU has a GSM module utilizing which the sensor values and engine condition is monitored utilizing an Android Application.

2.1 Wireless Transmitter Unit

A WTU is contained a dirt dampness sensor, a temperature sensor, a microcontroller, a RF handset and power source. A few WTUs can be integrated in field to frame an appropriated network of sensors. Every unit comprises of the microcontroller PIC16F877A (Microchip Technologies, Chandler, AZ) that controls the radio modem XBee S2 (Digi International, Eden Prairie, MN) and cycles data got from the dirt dampness sensor YL-69 (JMoon Technologies), and temperature sensor DS18B20 (Maxim Integrated, San Jose, CA). These parts are fueled utilizing managed power supply. The power utilization is least as could really be expected.

PIC16F877A: A 8-cycle microcontroller with 40-sticks that works in a reach 2.0 to 5.5 V. It has 8 info channels of 10-bit simple to-advanced converters (ADC), 2 sequential fringe interface modules (SPI), 8 KB of FLASH memory, and 3 clocks. The microcontroller is appropriate for this application, on account of its low-power working current, which is under 0.6 mA at 3 V at 4 MHz, 20 µA at 3 V at 32 kHz and under 1 µA for reserve current.

ZigBee Modules: ZigBee (over IEEE 802.15.4) innovation depends on short reach networks and it was chosen for this application due to its minimal expense, low power utilization, and more prominent valuable reach in examination with other wirelesstechnologies. The ZigBee gadgets work at 2.4-GHz radio band.

Sensors: There are two soil sensors specifically dampness and temperature that are embedded in the root zone of plants. The YL-69 test was chosen to determine the dirt dampness in view of its minimal expense and accessibility. The test estimates the obstruction of the water content in the dirt which is conversely corresponding to the dampness present in the dirt. The test was controlled at 5 V utilizing ADC port of the microcontroller.

The soil temperature estimations were finished utilizing computerized thermometer DS18B20. The sensor switches temperature over completely to 9-12-cycle advanced word. The temperature is obtained utilizing a read order and communicated utilizing 1-Wire transport convention carried out in the microcontroller utilizing one computerized

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port. The sensor has ±0.5℃ precision over - 10℃ to +85℃ temperature range and an extraordinary 64-bit chronic number.

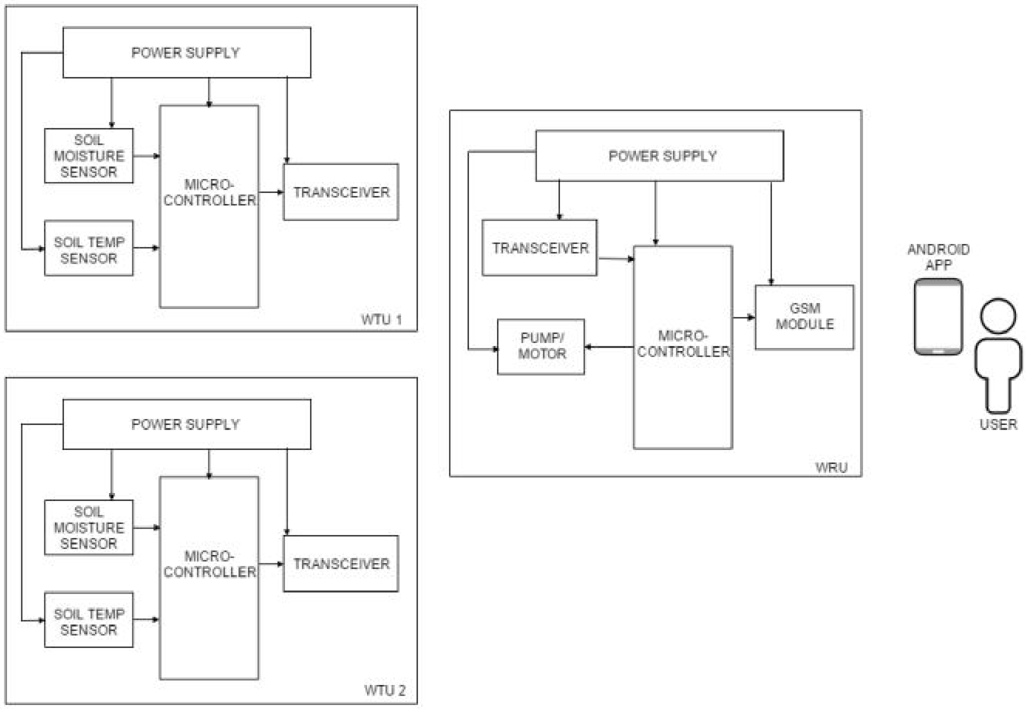

Figure.1 Innovative Irrigation Method

2.2 Wireless Receiver Unit

The soil moisture and temperature information from every one of the detecting units are gotten, recognized, recorded, and examined in the receiver unit. The WRU comprises of an expert microcontroller PIC16F877A, a RTC DS1307, a XBee radio modem, a GSM module, a RS-232 interface MAX3232, two 12V electronic transfers, engine/siphon, and power source. 1) Master Microcontroller: The expert microcontroller secures the data from both the sensor units. The dirt dampness and temperature information are contrasted and modified upsides of least soil dampness and greatest soil temperature to initiate the watering module for an ideal time frame period. 2) GSM Module: The GSM sim900 module incorporates an implanted transmission control convention/Internet convention stack to bring Internet availability, a UFL recieving wire connector, and endorser personality module (SIM) attachment. 3) Watering Module: The irrigation is performed by controlling a siphon through transfers associated with the microcontroller.

2.3 Android Application

A graphical user interface programming was created for continuous monitoring of irrigation in view of sensor information. The product empowers the user to keep a mind the information from sensor units.

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III. RESULTS AND DISCUSSION

The aftereffects of examination are dissected utilizing Android Application intended for the framework. Figure 2 and 3 are the screen captures of Android Application working. It shows the sensor values and status of engine. These qualities are seen on the Android Application. It additionally shows the date and time at which the engine was turned on or off.

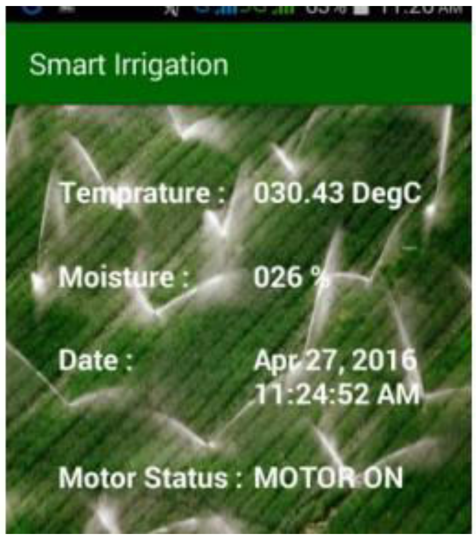

Figure.2 Screenshot of Android App when Motor is turned ON

Figure.3 Screenshot of Android App when Motor is turned OFF

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IV. CONCLUSIONS

The irrigation framework carried out was viewed as compelling in limiting water utilization in fields. As the water is provided uniquely close to the foundations of the crops and not the whole field, the issue of weeds is annihilated. The Android application empowers the user to monitor the upsides of sensors. The protection of regular asset should consequently be possible.

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