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Smart Agriculture Irrigation System

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Abstract- There is global consensus on food security challenges and increasing crop production to meet the demand across globe, especially in African countries and some parts of Asia and Europe as well. Population growth, increasing water stress and climatic variability, stresses on finding ways of getting more crop per drop to meet our food needs. All these factors increased pressure on natural resources, particularly water and land that leads to complex challenge with land-water-energy which cannot be achieved with traditional approaches and thus needs a multi-dimensional approach. Save energy, manpower and most importantly water to improve the crop production and ultimately profit.

Keywords- crop production, climatic variability etc.

I. INTRODUCTION

1. Working & Concept:

Solar-powered (photovoltaic or PV) pumps save potentially hours of labor daily in rural off-grid areas where water hauling is traditionally done by hand by women and young girls. They are durable and immune to fuel shortages, and in the medium- to long- term cost less than traditional diesel-powered generators (e.g., Kohle et. al., 2002). When used in tandem, these technologies allow for production of market garden vegetables during the dry season, providing a much-needed source of both income and nutrition.

Modernizing the irrigation services, through existing resources to meet the need of gradually growing demand of crop production, is a challenge to researchers. Increasing population stressed pressure on available natural resources to meet the need. Stress on water resources is not far away from this challenge but into the core of all. Over 70% of usable water is used for agricultural production and remaining 30% for domestic purposes. To meet the need of food demand there is need to enhance the crop production either increase in cultivated land or improve agriculture technique. Irrigation is playing major role in agricultural production as well as water resource management.

As one of the best known water-conservation technique in irrigation, drip irrigation technology has been receiving unprecedented attention in the recent past.

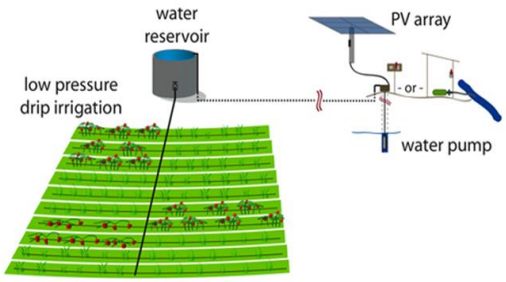

Fig 1. A Schematic diagram of Smart Agriculture Irrigation System.

II. BLOCK DIAGRAM

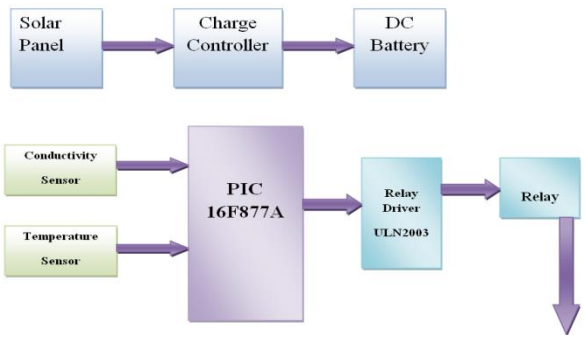

Fig 2. Block Diagram.

The device is responsible for supplying power to the computer. In short, we could say that the main function of the power supply is to convert alternating voltage (AC), which is supplied by the electrical power system into continuous voltage (DC). In other words, the power supply converts the conventional 220V alternating voltage into a continuous voltage used by the PC electronic components. We will use 220 V‖ voltages will convert into +5V. +5 V is given to microcontroller, and then LCD, A moisture sensor is used to sense the level of moisture content present in the soil. It has a level detection module in which we can set a reference value. With the help of moisture sensor signaling a controller, a Control pulse is given to the driver circuit that excites the motor. So the pump starts working and moves water to the irrigation field as per the soil moisture content. When the soil moisture content reaches the required value, the motor is stopped and power to driver circuit is stopped and controller is put into sleep mode for low power consumption.

1. Pic16F877A:

Micro-controller is heart of the system. It has number of features and it's controlled over all process we can write code and load the controller for control real time application processes. A timer module used to allow the micro-controller to perform tasks for certain time periods. A serial i/o port to allow data to flow between the controller and other devices such as a PIC or another microcontroller. An ADC used to allow the microcontroller to accept analogue input data for processing.

2. PIC microcontroller:

Peripheral Interface Controller (PIC) provided by Micro-chip Technology to categorize its solitary chip microcontrollers. These appliances have been extremely successful in 8 bit micro-controllers. The foremost cause behind it is that Micro-chip Technology has been constantly upgrading the appliance architecture and included much required peripherals to the micro-controller to go well with clientele necessities. PIC microcontrollers are very popular amid hobbyists and industrialists; this is only cause of wide availability, low cost, large user base & serial programming capability.

3. PIC Microcontroller Architecture:

Base Line Architecture-In the base-line architecture PIC microcontrollers of PIC10F family are included, other than that a fraction of PIC12 & PIC16 families are also included. These gadgets make use of 12 bit program word architecture with six to twenty-eight pin package alternatives.

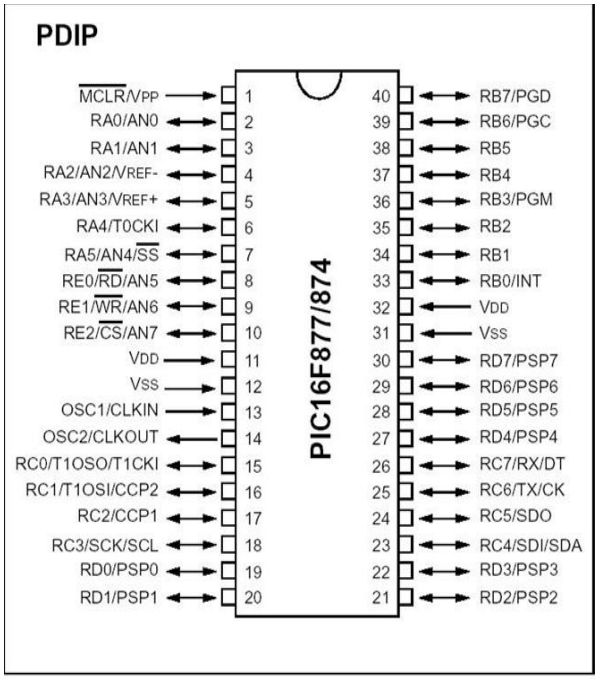

Fig 3. Architecture of PIC Microcontroller.

Briefly defined attribute set of baseline architecture allows the most lucrative product solutions. This architecture is perfect for battery enabled gadgets. The PIC10F200 series is another reasonably priced 8 bit flash micro-controller with a 6 pin package.

Microcontroller unit The microcontroller selected is PIC16F877A [5]. It is an 8-bit, 40-pins dual inline package (DIP), having five ports (A-E), 8- input channels (ADC module), and many more features. It is selected due to its in-built analogue-to-digital module [5] and it's readily availability in the market. Quartz crystal is selected for this work due to its high stability with two 15pF capacitors [5] and 4MHZ clock frequency.

III. HIGH-PERFORMANCE RISC CPU

- Only 35 single-word instructions to learn
- All single-cycle instructions except for program branches, which are two-cycle
- Operating speed: DC – 20 MHz clock input DC – 200 ns instruction cycle
- Up to 8K x 14 words of Flash Program Memory,
- Up to 368 x 8 bytes of Data Memory (RAM),
- Up to 256 x 8 bytes of EEPROM Data Memory
- Pinout compatible to other 28-pin or 40/44-pin

IV. PERIPHERAL FEATURES

- Timer0: 8-bit timer/counter with 8-bit prescaler
- Timer1: 16-bit timer/counter with prescaler, can be incremented during Sleep via external crystal/clock
- Timer2: 8-bit timer/counter with 8-bit period register, prescaler and postscaler
- Two Capture, Compare, PWM modules
- Capture is 16-bit, max. resolution is 12.5 ns
- Compare is 16-bit, max. resolution is 200 ns
- PWM max. resolution is 10-bit
- Synchronous Serial Port (SSP) with SPI™
- (Master mode) and I2C™ (Master/Slave)
- Universal Synchronous Asynchronous Receiver
- Transmitter (USART/SCI) with 9-bit address detection
- Parallel Slave Port (PSP) – 8 bits wide with external RD, WR and CS controls (40/44-pin only)
- Brown-out detection circuitry for
- Brown-out Reset (BOR)
- Refrigeration equipment
- HVAC (Heating, Ventilation and Air Conditioning) equipment
- Medical equipment
- Drying
- Metrology
- Battery-powered systems
- OEM assemblies

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