

# Solar Based Smart Electrical Shock Protection & Agriculture Kit for Farmers

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**Abstract**— Today effective management of water is the need of the moment. In this paper a smart irrigation system is proposed that uses soil moisture sensor, temperature, sensor and current leakage detection as well as voltages and current sensor to monitor the voltage and current provided to pump at agricultural field. A sensor node sends sensor data to PIC controller, which sends data to stores the data in its local database and applies rule based algorithm on sensor data to find out whether crops need irrigation or not. Based on the output of the algorithm, the drip irrigation is turned on/off by PIC controller. All sensor data are displayed on a LCD display. GSM modem will send some sms alert as well as alert using buzzer system to farmer under typical condition.

**Keywords:** Solar Plate, Sensors, GSM, Motor, pic controller

## I. INTRODUCTION

Today due to global warming and the climate change we are facing with lot of environmental problems like unexpected floods, droughts, hurricanes, thunderstorms, soil erosions, water scarcity, etc. So, the effective management of natural resources becomes very crucial. Now a day, there is limited manpower available to do farming related activities. So, automation of farming tasks is being done by smart devices connected to one another through the concept of wireless communication or IOT internet of things.

In this paper a smart farmer kit is introduced which can work totally automatically without any intervention of the farmer. Most of the times farmers are unaware about what fertilizers are to be used for higher crop yields. Today effective management of water is the need of the moment. In this paper a smart irrigation system is proposed that uses soil moisture sensor, temperature, sensor and current leakage detection as well as voltages and current sensor to monitor the voltage and current provided to pump at agricultural field. A sensor node sends sensor data to PIC controller, which sends data to stores the data in its local database and applies rule-based algorithm on sensor data to find out whether crops need irrigation or not. Based on the output of the algorithm, the drip irrigation is turned on/off by PIC controller. All sensor data are displayed on an LCD display.

As we know that 70% people are depends on farming. According to farmers problem we visited 3 farm and 1 agriculture collage to analysis the problem of farmers in actual practice. As per our guide suggestions we discussed the total scenario and try to develop the solution for this. We get the information from the IEEE research papers L.C.Eales:- He published the paper “protection against shock to earth” this paper reletade to investigation into the effects of shock current have been carried out inn many part of the world by medical men and electrical specialist.one of the earliest published works in this field was that by prof. Frei Berger of Berline, who investigated a

large number of electrocutions. The evidence available to him was inevitably inconclusive, but he form the conclusion that 360mA was necessary to cause death. The term shock severity has been used to refer this product of shock current and its duration, both in this paper and elsewhere. High sensitivity protection, preferably at operating current below no-let-go level of shock current or at 20mA at which level the restriction of respiration is unlikely ensures almost complete safety from death from shock to earth.

## II. METHODOLOGY

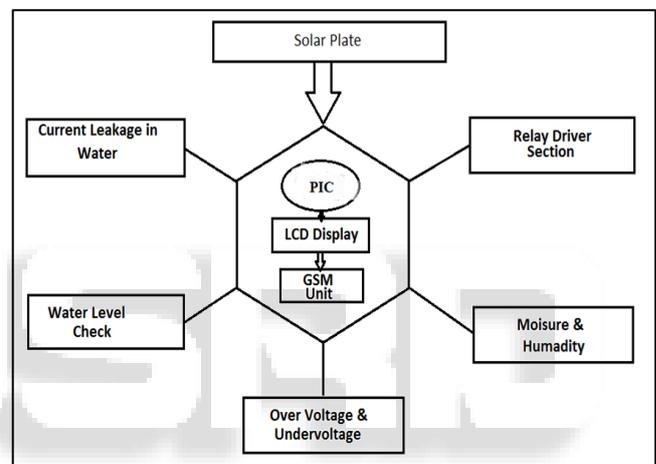


Fig. 1:

Block diagram consist of different types of sensors like temperature sensor, light sensor, humidity sensor, soil moisture sensor, GSM, LCD display and water motor etc. All sensors are connected to the pic microcontroller; LCD is also connected to the pic microcontroller.

## III. MAJOR COMPONENTS OF THE SYSTEM

- 1) Solar Panel.
- 2) On/off and alert system
- 3) AC voltage and current measurement.
- 4) Temperature measurement.
- 5) Soil moisture measurement.
- 6) Current leakage detection.
- 7) PIC controller interface.
- 8) GSM modem interface

#### IV. BLOCK DIAGRAM DESCRIPTION

##### A. Solar Plate



Fig. 2:

A 12V solar panel converts sunlight into an electric current or heat used to provide electricity for home or building. Solar panels are constructed as a collection of lots of small solar cells that are spread over a large area to provide enough power.

##### B. PIC 16F877A Microcontroller -

PIC is a family of Harvard architecture microcontrollers made by microchip technology, derived from the PIC1640 originally developed by general instrument's microelectronics division. The name PIC initially referred to "Programmable interface controller", but shortly thereafter was renamed as "programmable intelligent computer". PIC is popular due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools and serial programming (and re-programming with flash memory) capability.

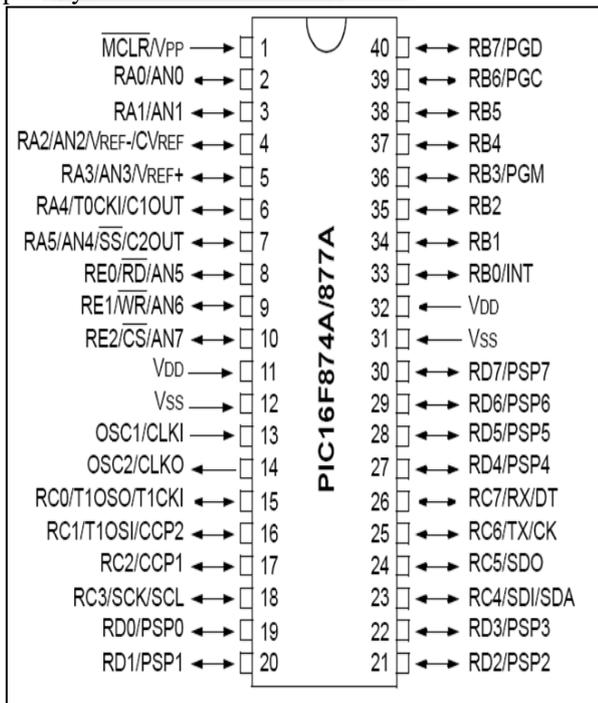


Fig. 3: PIC 16F877 MCU Block diagram

##### 1) Features

- 1) Separate code and data spaces (Harvard architecture)
- 2) A small number of fixed length instructions.
- 3) Most instructions are simple cycle execution (4 clock cycles) with single delay cycles upon branches and skips.
- 4) A single accumulator (W), the use of which (as source operand) is implied (i.e is not encoded in the opcode).
- 5) All RAM location function as registers as both source and/or destination of math and other functions.
- 6) A hardware stack for storing return addresses.
- 7) A fairly small amount of addressable data space (typically 256 bytes), extended through banking
- 8) Data space mapped CPU, port and peripheral registers.

##### C. Global System for Mobile (GSM SIM900A)



Fig. 4: GSM

The SIM900 is a complete Quad-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications.

Featuring an industry-standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3 mm, SIM900 can fit almost all the space requirements in your M2M application, especially for slim and compact demand of design.

- SIM900 is designed with a very powerful single-chip processor integrating AMR926EJ-S core
- Quad - band GSM/GPRS module with a size of 24mmx24mmx3mm” SMT type suit for customer application.

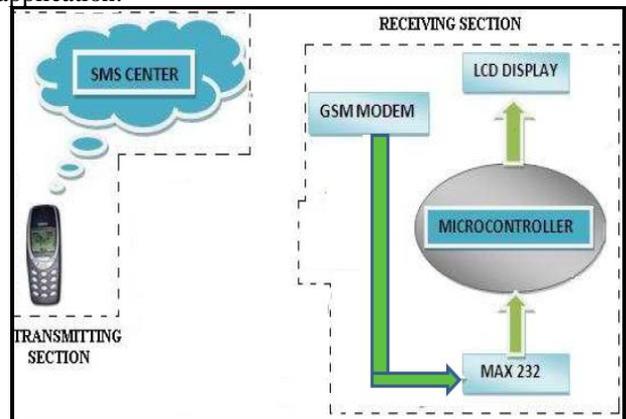


Fig. 5:

- An embedded Powerful TCP/IP protocol stack
- Based upon mature and field-proven platform, backed up by our support service, from definition to design and production

#### D. Sensor Block

##### 1) Moisture Sensor:

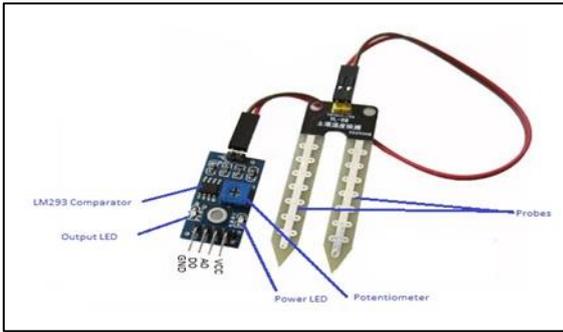


Fig. 6: Moisture Sensor

This is an easy to use digital soil moisture sensor. Just insert the sensor in the soil and it can measure moisture or water level content in it. It gives a digital output of 5V when moisture level is high and 0V when the moisture level is low in the soil. The sensor includes a potentiometer to set the desired moisture threshold. When the sensor measures more moisture than the set threshold, the digital output goes high and an LED indicates the output. When the moisture in the soil is less than the set threshold, the output remains low. The digital output can be connected to a micro controller to sense the moisture level. The sensor also outputs an analog output which can be connected to the ADC of a micro controller to get the exact moisture level in the solid. This sensor is great for making water gardening projects, water sensing, etc.

##### 2) Temperature Sensor:

Temperature measurement is now more common than ever before just look around and you will find even air conditioners having built-in temperature indicators. Also, with a temperature probe, we can measure how hot the water for bath is. Temperature is measured either in degree Celsius or Fahrenheit though the former is now standard the ambient temperature keeps varying during different times of the day and night of any place. Here we describe a temperature indicator using PIC microcontroller, temperature sensor and other components.

LM35 is precision integrated circuit temperature sensors, whose output voltage is linearly proportional to the Centigrade temperature values. The rate of change of the output voltage of the sensor with respect to the rise in temperature is 10mV/ degree. LM 35 have a full range fo-55°C to+150°C. The sensor is like three-pin transistors in plastic devices. Microcontroller PIC.

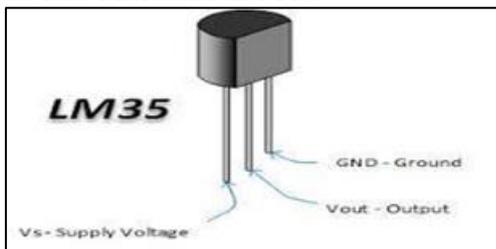


Fig. 7: Temperature Sensor

Those LM35 may be an incorporated information preparing sensor that might a chance to be used to figure temperature for an electrical yield proportional of the

temperature. It might quantify temperature additional faultlessly over a utilizing an indoor controller.

#### V. SYSTEM OVERVIEW

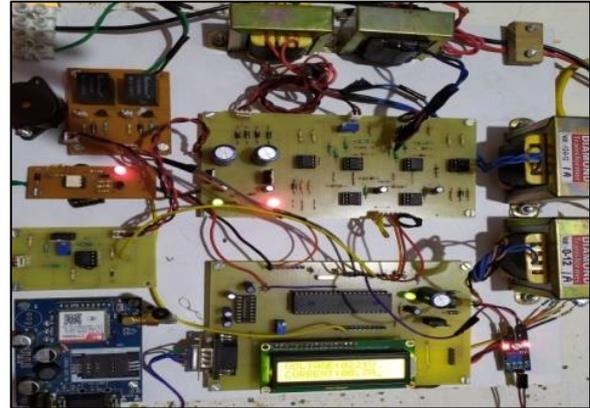


Fig. 8: System Overview

In smart agriculture using pic microcontroller based GSM technology consist of temperature sensor, humidity sensor, soil moisture sensor, light sensor, GSM module. All sensors are successfully interfaced with pic microcontroller. Each sensor is separately connected to the pic microcontroller. The pic microcontroller used interfaced with GSM. This pi microcontroller transmits all the data collected by the each sensor to the GSM and this data displayed on the LCD.



Fig. 9: LCD Display

The GSM module sends a message on mobile phone. So on mobile phone we get a particular name of disease and medicine for that disease which we are going to detect the or identifying from our sensor data.

##### 1) Over voltage & under voltage Conditions

Under and Over Voltage Protection Circuit Using Comparators. This voltage protection circuit is designed to develop a low-voltage and high-voltage tripping mechanism to protect a load from any damage. In many of the homes and industries fluctuations in AC mains supply take place frequently.

#### VI. CONCLUSIONS

- The progress in science and technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future of shock protection
- As it is automated there is no errors and no need of man power.
- This can be the solution of future of shock protection.
- The smart irrigation system is feasible and cost effective for optimizing water resources for agricultural production.
- This irrigation system allows cultivation in places with water scarcity thereby improving sustainability.
- It proves that the use of water can be diminished.

- The use of solar power in this system is significantly important for organic crops

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