

Smart Farm Monitoring Using Raspberry Pi and Arduino

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Abstract

The project is based on irrigation control using microcontroller which is designed to tackle the problems of agricultural sector regarding irrigation system with available water resources. Prolonged periods of dry climatic conditions due to fluctuation in annual precipitation, may appreciably reduce the yield of the cultivation. The expenses in establishing many of these crops and their relative intolerance to drought make an effective irrigation system a necessity for profitable enterprises.

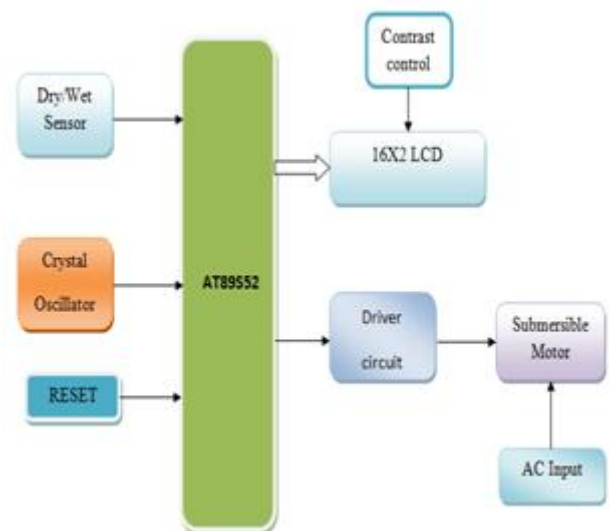
Existing system

The project irrigation control using AT89S52 is designed to tackle the problems of agricultural sector regarding irrigation system with available water resources. Prolonged periods of dry climatic conditions due to fluctuation in annual precipitation, may appreciably reduce the yield of the cultivation. The expenses in establishing many of these crops and their relative intolerance to drought make an effective irrigation system a necessity for profitable enterprises.

In this project we are using AT89S52, Moisture sensor, AC submersible pump. A submersible motor will get switched ON /OFF depending on the soil moisture condition and status of motor can be displayed on 16X2 LCD.

Draw back:

- There is no wireless communication
- No temperature sensor



Proposed system

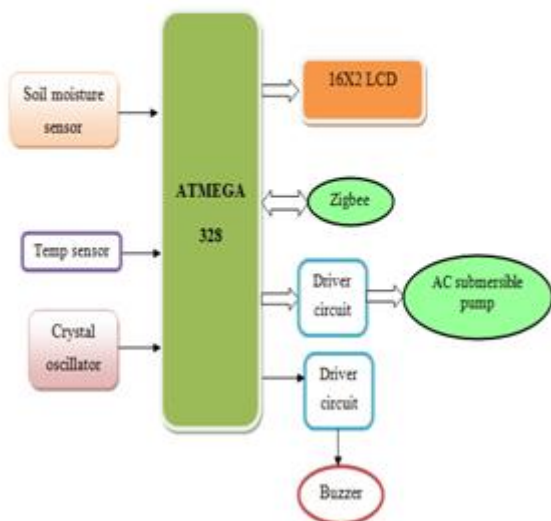
Here we are employing an ATMEGA328 as our controller with moisture and temperature sensors to know about condition of farm without any human interference. Raspberry pi is also used to receive the status of farm through Zigbee. So that owner can have a glance about their farm/garden and take necessary action within short time. A buzzer alert is also given to show the exceeded limit. A 16X2 LCD is also employed for the purpose of display. A submersible motor is arranged to pump the water in the farm during dry condition.

The sensor used here is to check the temperature and humidity. The **Raspberry Pi** is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation. The Raspberry Pi has a Broadcom BCM2836 system on a chip. It does not include a built-in hard disk or solid-state drive, but Uses an SD card for booting and long-term storage.

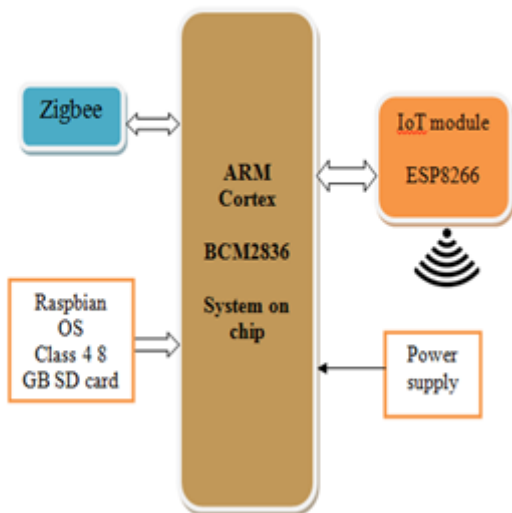
At the receiver end an IoT module is also interfaced to the controller to make the information available in web. This can be checked from any place in the world using internet.

Block Diagram

Transmitter



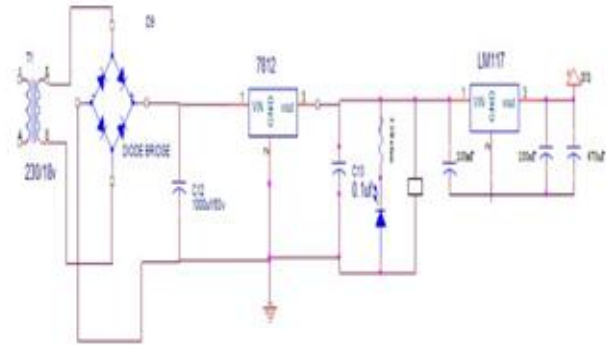
Receiver



Power supply section

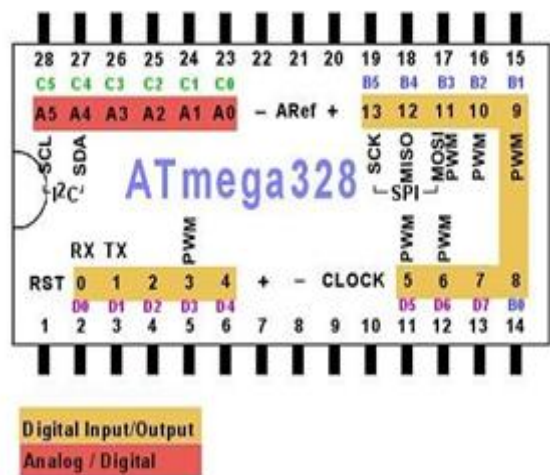
This project uses regulated 5V & 3.3V, 1A power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier

is used to rectify the ac output of secondary of 230/12V step down transformer.



ATMEGA328

The ATmega88 through ATmega328 microcontrollers are said by Atmel to be the upgrades from the very popular ATmega8. They are pin compatible, but not functionally compatible. The ATmega328 has 32kB of flash, where the ATmega8 has 8kB. Other differences are in the timers, additional SRAM and EEPROM, the addition of pin change interrupts, and a divide by 8 prescaler for the system clock.



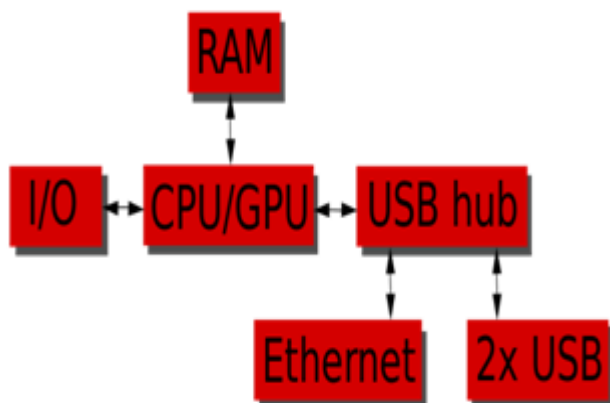
RASPBERRY-PI

The **Raspberry Pi** has a Broadcom **BCM2836** system on a chip (SoC), which includes an a quad-core Cortex-A7 cluster.



The Cortex-A7 MP Core processor is a high-performance, low-power processor that implements the ARMv7-A architecture. The Cortex-A7 MPCore processor has one to four processors in a single multiprocessor device with a L1 cache subsystem, an optional integrated GIC, and an optional L2 cache controller.

The Raspberry Pi foundation has finally released an upgraded version of the Raspberry Pi. Raspberry Pi 2 model B features much of the same ports and form factor as Raspberry Pi Model B+, by replaces Broadcom BCM2835 ARM11 processor @ 700 MHz with a much faster Broadcom BCM2836 quad core ARMv7 processor @ 900 MHz, and with an upgrade to 1GB RAM.



Basic Hardware of Raspberry-PI

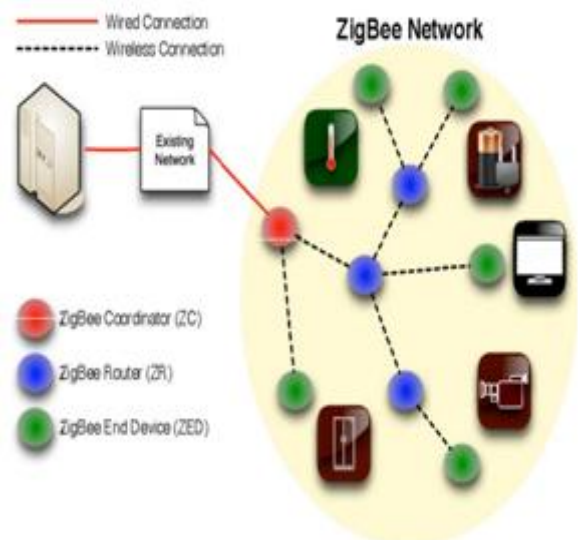
OS used in Raspberry pi is Linux



Coding will be done in python language



Zigbee



It is the wireless device for transmitting and receiving purpose or simply it called as Transceiver. Zigbee is based on the IEEE802.15.4 protocol. The range of the Zigbee is covered as 100m. Its range is 10 times better than Bluetooth device so it can be more preferable one in wireless device. The data rate is very low for transmission while using this device.



Internet of things helps the things to communicate each other using IoT module

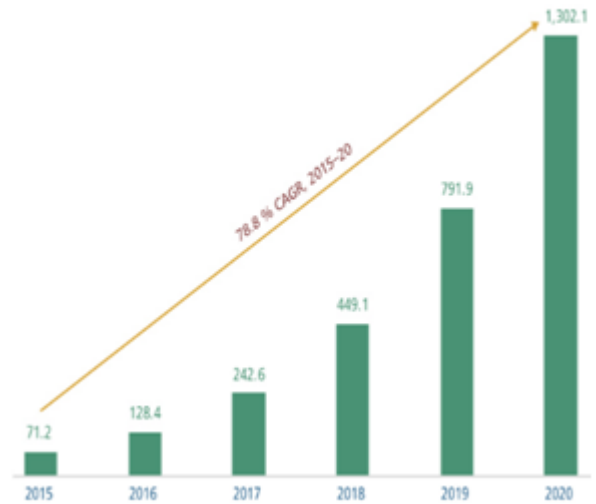
ESP8266EX

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.

Worldwide Internet of Things Revenue Opportunity



Potential growth in worldwide IoT sensor deployments for CRE (2015-20), millions



ADVANTAGES

- Highly sensitive
- Fit and Forget system
- Low cost and reliable circuit

APPLICATIONS

- Gardens
- Parks
- Lawns

CONCLUSION

This project presents a high sensitive sensors based automotive device control. The tracking controller based on the closed loop algorithm is designed and implemented with MCU in embedded system domain.

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