

## Implementation of Hi-Tech Agricultural Solar Fence Security with Soil Humidity Based Automatic Irrigation System and Voice Alert on PIR Live Human Detection



**Markala Priyanka**

**M.Tech, Embedded Systems,  
Annamacharya Institute of  
Technology and Sciences.**



**Mr. Ashok Kumar Konduru**

**Associate Professor & HOD,  
Department of ECE,  
Annamacharya Institute of  
Technology and Sciences.**



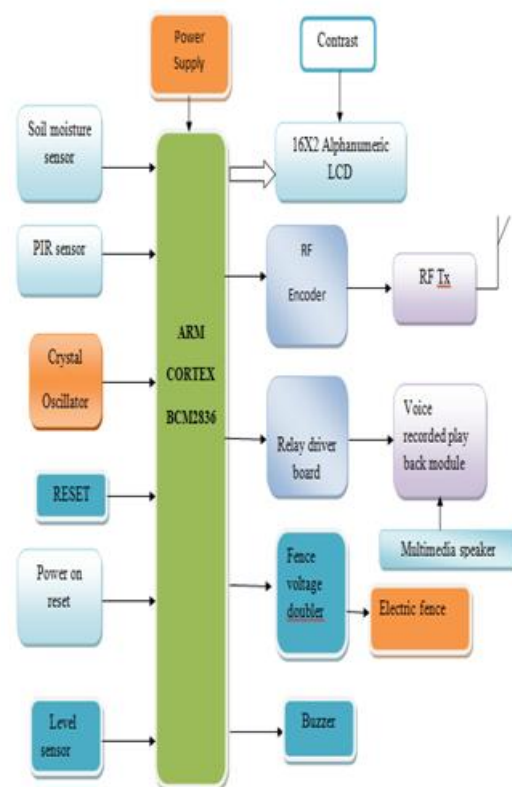
**Mrs. G. Praveena**

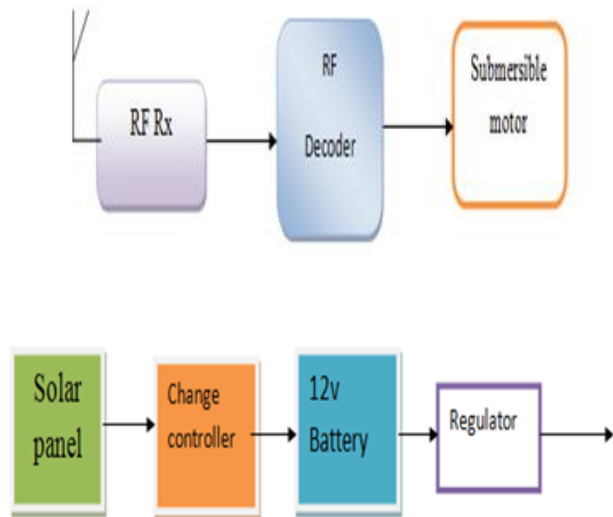
**Assistant Professor,  
Annamacharya Institute of  
Technology and Sciences.**

### Abstract:

Irrigation system in India has given a high priority in economic development. Many new concepts are being developed to allow agricultural automation to flourish and deliver its full potential. To take full advantage of these technologies, we should not just consider the implication of developing a new single technology but should look at the wider issues for complete development of a system. Implementation of Hi-tech Agricultural Solar Fence Security with soil Humidity Based Automatic irrigation system and voice alert on PIR live Human Detection is been implemented in this project for safe and secure agriculture irrigation. The project irrigation control using BCM2836 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 BCM2836, Moisture sensors, AC submersible pump, relay driver. A submersible motor will get switched ON /OFF depending on the soil moisture condition and status of motor can be displayed on 16X2 LCD. This motor will be operated using RF communication.

Whenever the dry condition is detected then the motor goes to on condition. Level Sensor is used to indicate the level of water. If water level is LOW or HIGH it will give the buzzer indication. Here we are utilizing solar energy to charge the battery.



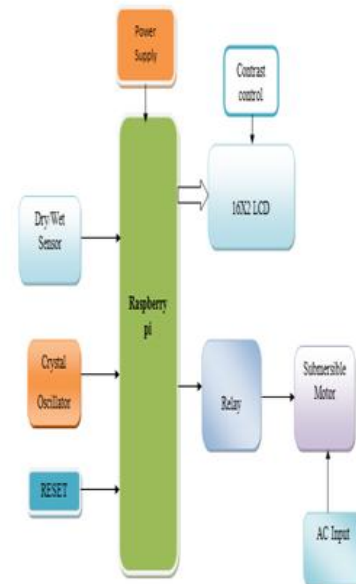


**Existing system:**

The project irrigation control using Raspberry pi 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 Raspberry pi, Moisture sensors, AC submersible pump, relay driver. A submersible motor will get switched ON /OFF depending on the soil moisture condition and status of motor can be displayed on 16X2 LCD.

BLOCK DIAGRAM:



**Draw backs:**

There is no verification of human presence no voice alert and there is no utilization of solar energy.

**PIR SENSOR:**

In a PIR-based motion detector (usually called a PID, for Passive Infrared Detector), the PIR sensor is typically mounted on a printed circuit board containing the necessary electronics required to interpret the signals from the pyroelectric sensor chip. The complete assembly is contained within a housing mounted in a location where the sensor can view the area to be monitored. Infrared energy is able to reach the pyroelectric sensor through the window because the plastic used is transparent to infrared radiation (but only translucent to visible light). This plastic sheet also prevents the intrusion of dust and/or insects from obscuring the sensor's field of view, and in the case of insects, from generating false alarms.



**APR33A3:**

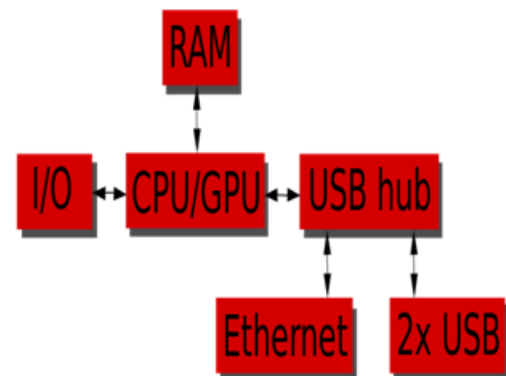
The APR33A series are powerful audio processor along with high performance audio analog-to-digital converters (ADCs) and digital-to-analog converters (DACs). The APR33A series are a fully integrated solution offering high performance and unparalleled integration with analog input, digital processing and analog output functionality. The APR33A series incorporates all the functionality required to perform demanding audio/voice applications. High quality audio/voice systems with lower bill-of-material costs can be implemented with the APR33A series because of its integrated analog data converters and full suite of quality-enhancing features such as sample-rate convertor.



**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.



### Raspberry Pi 2 Model B specifications:

- SoC – Broadcom BCM2836 quad core Cortex A7 processor @ 900MHz with VideoCore IV GPU
- System Memory – 1GB LPDDR2  
Storage – micro SD card slot (push release type)
- Video & Audio Output – HDMI and AV via 3.5mm jack.
- Connectivity – 10/100M Ethernet  
USB – 4x USB 2.0 ports, 1x micro USB for power

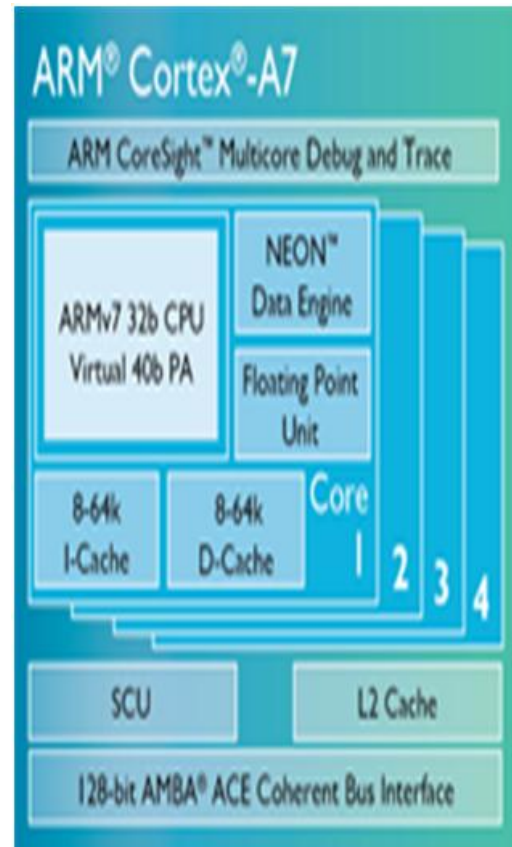
### Expansion

- 2x20 pin header for GPIOs
  - Camera header
  - Display header
- Power – 5V via micro USB port.
  - Dimensions – 85 x 56 mm



Image of the board showing SD card

### Cortex-A7 Processor

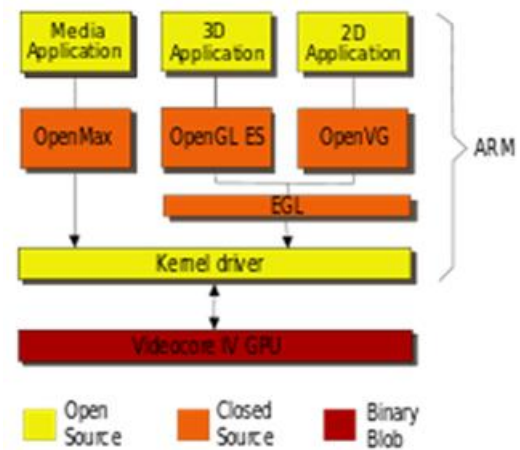


### Overview

The Cortex-A7 processor is a very energy-efficient applications processor designed to provide rich performance in entry-level to mid-range smart phones, high-end wearable's, and other low-power embedded and consumer applications. It provides up to 20% more single thread performance than the Cortex-A5 and provides similar performance to mainstream Cortex-A9 based smart phones in 2012 while consuming less power. It has been licensed by many of the industry's leading silicon manufacturers including Broadcom, Freescale, HiSilicon, LG, Samsung, Texas Instruments, and many others. The Cortex-A7 incorporates all features of the high-performance Cortex-A15 and Cortex-A17 processors, including virtualization support in hardware, Large Physical Address Extensions (LPAAE), NEON™, and 128-bit AMBA® 4 AXI bus interface.

The Cortex-A7 processor is widely used as an energy-efficient LITTLE CPU with a high-performance Cortex-A15 or Cortex-A17 processor to enable ARM big. LITTLE processing. The LITTLE Cortex-A7 processor runs low processing intensity tasks such as scrolling through the contents of a web page, texting, emailing and playing audio, while the big processor (Cortex-A15 or Cortex-A17) manages periods of high processing intensity tasks such as initial web page rendering and game physics calculation. This reduces overall energy consumption and improves processing performance while extending battery life. The software can run seamlessly on the Cortex-A7 and on both the Cortex-A15 and Cortex-A17 processors as needed without recompilation.

**Diagram of API-Connection**



**OS used in Raspberry pi is Linux**



**Soil moisture (Dry and Wet) sensor**



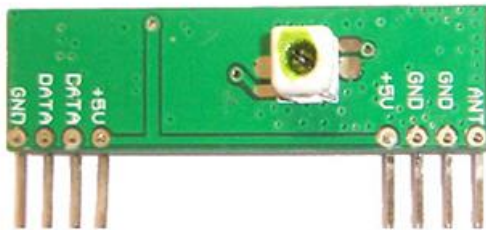
Soil moisture sensors measure the water content in soil. A soil moisture probe is made up of multiple soil moisture sensors. One common type of soil moisture sensors in commercial use is a Frequency domain sensor such as a capacitance sensor. Another sensor, the neutron moisture gauge, utilize the moderator properties of water for neutrons. Cheaper sensors - often for home use- are based on two electrodes measuring the resistance of the soil. Sometimes this simply consists of two bare (galvanized) wires, but there are also probes with wires embedded in gypsum.

**RF communication:**

Radio frequency (**RF**) is a frequency or rate of oscillation within the range of about 3 Hz to 300 GHz. This range corresponds to frequency of alternating current electrical signals used to produce and detect radio waves. Since most of this range is beyond the vibration rate that most mechanical systems can respond to, RF usually refers to oscillations in electrical circuits or electromagnetic radiation



STT-433 MHz TRANSMITTER

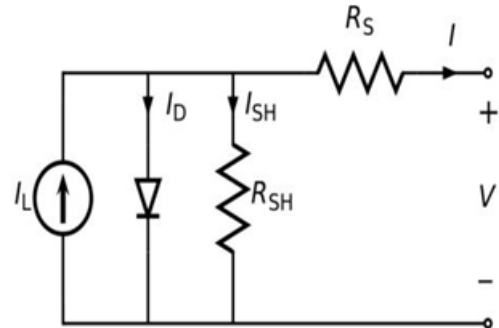


RF RECEIVER STR-433 MHz

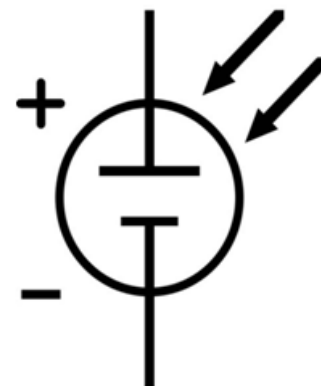
Solar cell/Plate

A solar cell or photovoltaic cell is a device that converts solar energy into electricity by the photovoltaic effect. Sometimes the term solar cell is reserved for devices intended specifically to capture energy from sunlight, while the term photovoltaic cell is used when the source is unspecified. Assemblies of cells are used to make solar panel, solar modules, or photovoltaic arrays. Photovoltaic is the field of technology and research related to the application of solar cells for solar energy. Solar cell efficiencies vary from 6% for amorphous silicon-based solar cells to 40.7% with multiple-junction research lab cells and 42.8% with multiple dies assembled into a hybrid package. Solar cell energy conversion efficiencies for commercially available multi crystalline Si solar cells are around 14-19%. Solar cells can also be applied to other electronics devices to make it self-power sustainable in the sun. There are solar cell phone chargers, solar bike light and solar camping lanterns that people can adopt for daily use

Equivalent circuit of a solar cell



The equivalent circuit of a solar cell



The schematic symbol of a solar cell

ADVANTAGES:

- Highly sensitive
- Fit and Forget system
- Low cost and reliable circuit
- Complete elimination of manpower

## APPLICATIONS:

- Gardens
- Parks
- Farms

## CONCLUSION:

This project presents a high sensitive sensor based automotive device control. The tracking controller based on the closed loop algorithm is designed and implemented with Raspberry pi in embedded system domain. The proposed system can control devices automatically. Thus, the power can be saved. Experimental work has been carried out carefully. The proposed method is verified to be highly beneficial for all the electrical appliances.

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