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INTELLIGENT AGRICULTURE GREEN HOUSE ENVIRONMENT MONITOR AND CONTROL SYSTEM ON (IOT) TECHNOLOGY

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ABSTRACT

The main objective of the present paper is to develop a Internet Of Things (IoT) technology for an agricultural environment. Monitoring agricultural environment for various factors such as soil moisture, temperature and humidity along with other factors can be of significance. A traditional approach to measure these factors in an agricultural environment meant individuals manually taking measurements and checking them at various times. This paper investigates a remote monitoring system using WIFI. Due to uneven natural distribution of rain water it is very crucial for farmers to monitor and control the equal distribution of water to all crops in the whole farm or as per the requirement of the crop. There is no ideal irrigation method available which may be suitable for all weather conditions, soil structure and variety of crops cultures.Green house technology may be the best solution for this solution. In modern greenhouses, several measurement points are required to trace down the local climate parameters in different parts of the big greenhouse to make the greenhouse automation system work properly. The temperature and soil moisture content are monitor and sent to Server through wifi. Data received is compared with pre-defined data given by the user. If the value exists the pre-defined value the water is supplied to the plant through the value and cutoff when reaches the defined value. It also able to show that the network can detect the local differences in the greenhouse climate caused by various disturbances, such as direct sunshine was near the green house walls.

Keywords: WIFL, climate data, green house.

1. INTRODUCTION:

Facilities agriculture is a new agricultural industry which has a high degree of intensification. It is an important part of modern agriculture. In recent years, the technology of Internet of Things which continues to evolve and mature has injected new vitality into the development of agricultural facilities. IntelliSense chips, mobile embedded systems such as the Internet of Things technology in modern agriculture are gradually widened. Extensive use of automation, intelligent remote-controlled production equipment can obtain accurate crop and crop information. Through these, people who stay

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at home can monitor a variety of field information. This can achieve the scientific cultivation, scientific monitoring and production management and promote modern agriculture development pattern. The gardening is a kind of production with the bad-effect condition in which the crops (flowers, fruit trees and vegetables) don't tend to grow normally in the cold or hot season .Thus people must utilize heat preservation, cold-proof, temperature reduction, defense and equipments in a man-made way to create an environment that favors the crop's growth without the effect of climate change.

The proposed system to Monitoring and control of green house monitoring is automatic process. The temperature and soil moisture content is measured by the automation and also Water flow is done by the automatic. The green house monitoring is done automatically. The proposed system can also be used the temperature and moisture content can be measured properly and regularly. The water flow content can be proper.

2. BLOCK DIAGRAM OF PROPOSED SYSTEM:

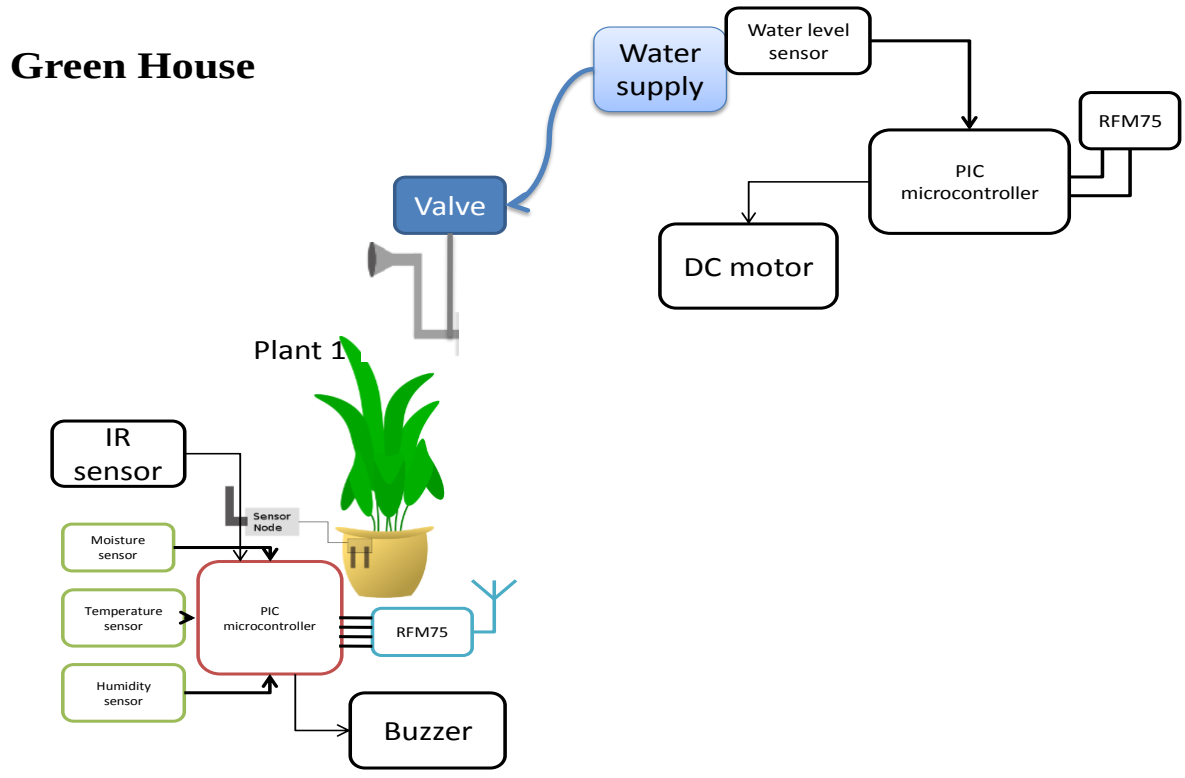

Fig.1.Block Diagrram

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3. CIRCUIT DIAGRAM OF PROPOSED SYSTEM

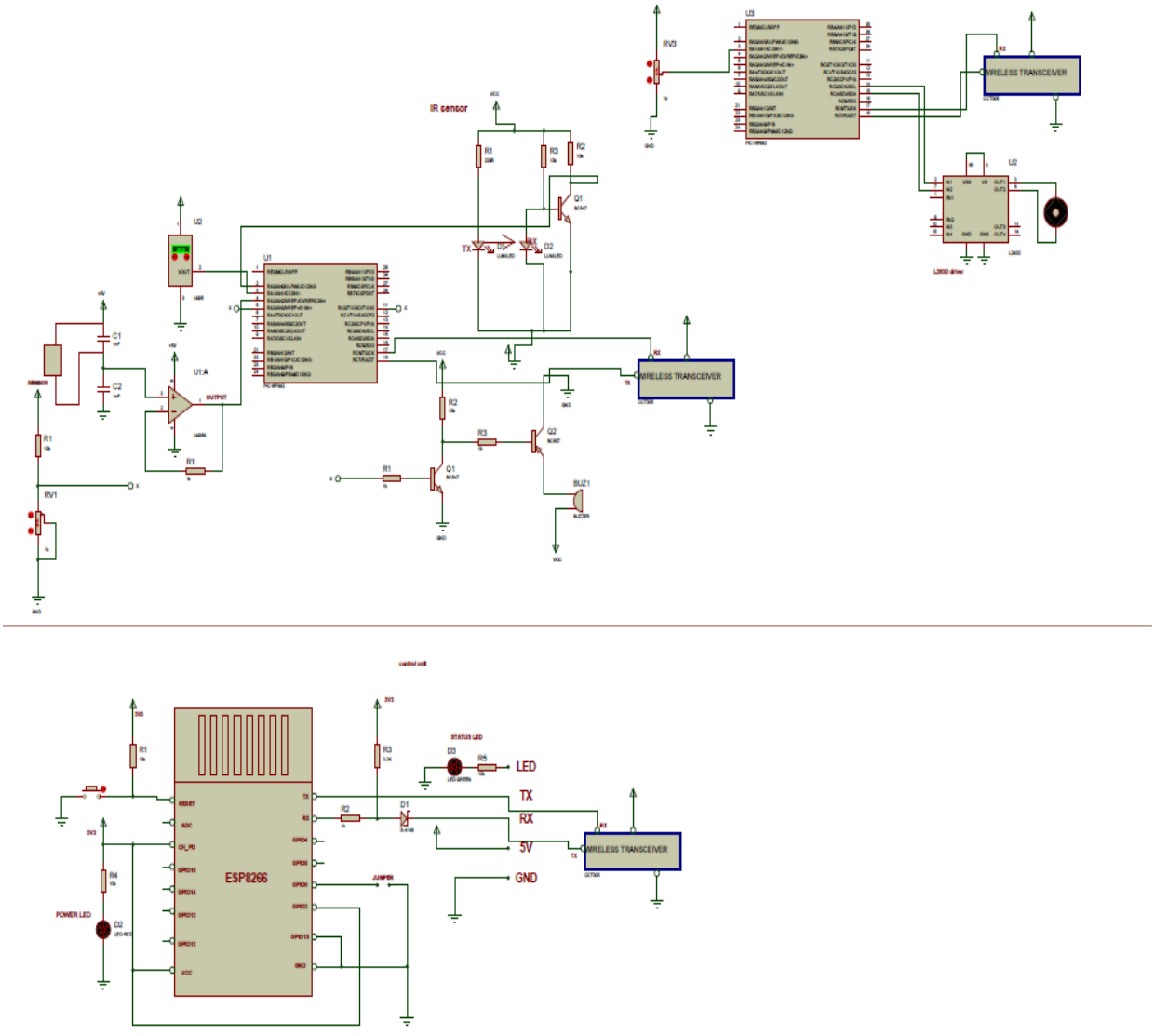

Fig.2. Circuit Diagram Of Proposed System

4. SENSORS

MOISTURE SENSOR

What is an electronic brick? An electronic brick is an electronic module which can be assembled like Lego bricks simply by plugging in and pulling out. Compared to traditional universal boards and circuit modules assembled with various electronic components, electronic brick has standardized interfaces, plug and play, simplifying construction of prototype circuit on one's own. There are many types of electronic bricks, and we provide more than twenty types with different functions including

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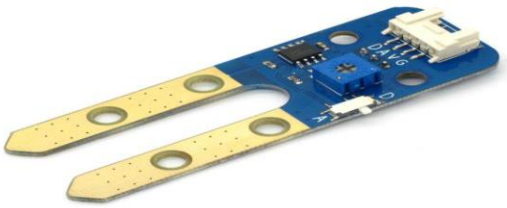
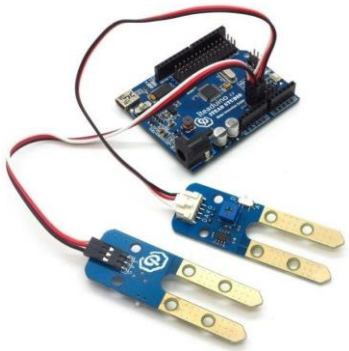
buttons, sensors, Bluetooth modules, etc, whose functions cover from sensor to motor drive, from Ethernet to wireless communication via Bluetooth, and so on. We will continue to add more types to meet the various needs of different projects. Electronic brick of soil moisture sensor is mainly used to detect the moisture content in the soil. The control board can get the moisture value or threshold in the soil via analog or digital pins.



Features

1. Plug and play, easy to use. Compatible with the mainstream 2.54 interfaces and 4-Pin Grove interfaces in the market.



2. With use of M4 standard fixed holes, compatible with M4-standard kits such as Lego and Makeblock.

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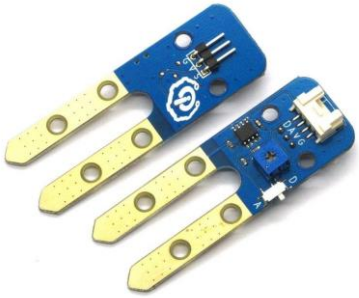
3. With switch to shift between analog and digital output. Able to read the specific soil moisture information (analog) or the over-wet or over-dry soil information according to the threshold (digital). The adjustable potentiometer is used to set the moisture threshold.



4. With hysteresis comparator circuit for more stable digital output voltage

TEMPERATURE SENSOR

GENERAL DESCRIPTION

Thermistors are thermally sensitive resistors whose prime function is to exhibit a large, predictable and precise change in electrical resistance when subjected to a corresponding change in body temperature. Negative Temperature Coefficient (NTC) thermistors exhibit a decrease in electrical resistance when subjected to an increase in body temperature and Positive Temperature Coefficient (PTC) thermistors exhibit an increase in electrical resistance when subjected to an increase in body temperature. Temperature is the most often-measured environmental quantity. This might be expected since most physical, electronic, chemical, mechanical, and biological systems are affected by temperature. Certain chemical reactions, biological processes, and even electronic circuits perform best within limited temperature ranges. Temperature is one of the most commonly measured variables and it is therefore not surprising that there are many ways of sensing it. Temperature sensing can be done

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either through direct contact with the heating source, or remotely, without direct contact with the source using radiated energy instead. There are a wide variety of temperature sensors on the market today, including Thermocouples, Resistance Temperature Detectors (RTDs), Thermistors, Infrared, and Semiconductor Sensors.

1. Planck's radiation law:

Every object at a temperature T not equal to 0 K emits radiation. Infrared radiant energy is determined by the temperature and surface condition of an object. Human eyes cannot detect differences in infrared energy because they are primarily sensitive to visible light energy from 400 to 700 nm. Our eyes are not sensitive to the infrared energy.

2. Stephan Boltzmann Law

The total energy emitted at all wavelengths by a black body is related to the absolute temperature as

$W_b = \sigma T^4$

Where, W_b : total energy emitted
σ: constant = 5.67×10^{-8} $m^{-2}K^{-4}$
T: Temperature of the object

3. Wein's Displacement Law

Wein's Law tells that objects of different temperature emit spectra that peak at different wavelengths. It provides the wavelength for maximum spectral radiant emittance for a given temperature.

The relationship between the true temperature of the black body and its peak spectral exitance or dominant wavelength is described by this law

$\lambda_{max} = k/T = 2898/T$ OR $\lambda_{max} T = 2898$ The world is not full of black bodies; rather it comprises of selectively radiating bodies like rocks, water, etc. and the relationship between the two is given by emissivity (E).

$$Emissivity = \frac{Radiant\ emittance\ of\ an\ object}{Radiant\ emittance\ of\ a\ black\ body\ at\ same\ temperature}$$

Emissivity depends on object color, surface roughness, moisture content, degree of compaction, field of view, viewing angle & wavelength.

WATER LEVEL SENSOR

Sensors Technology has developed analog type continuous measurement water tank water level Sensor and display instrument for continuous water level monitoring, display and data recording.

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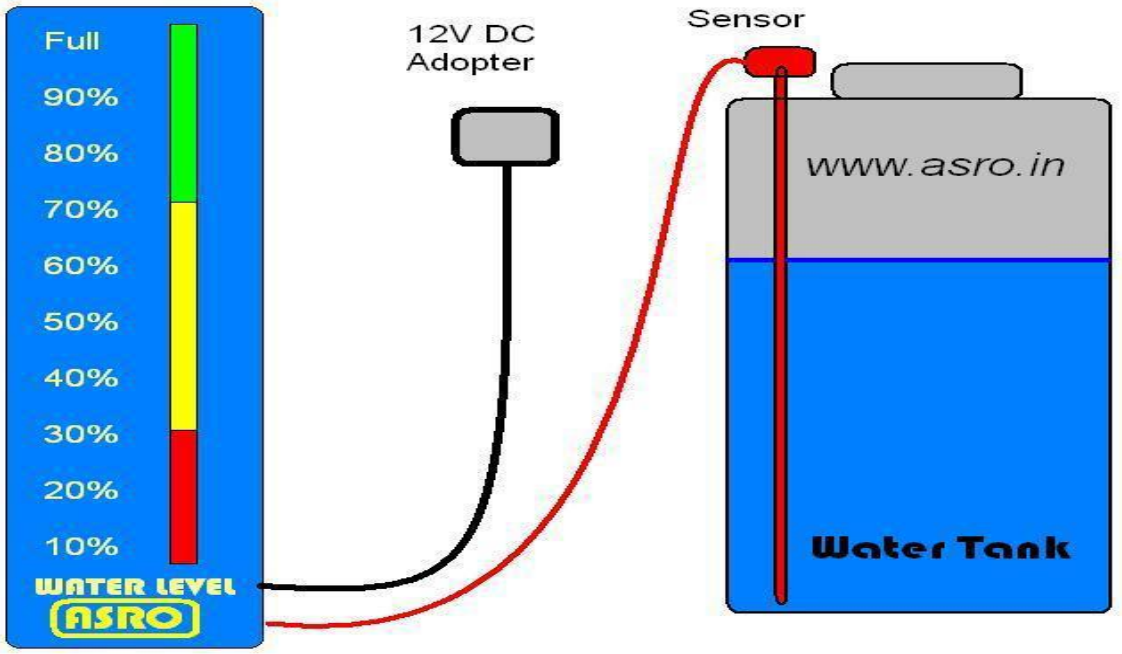

Applications:

- Reservoir water level monitoring and data logging
- River water level monitoring and data logging
- Underground water level monitoring and data logging
- Overhead water tank level monitoring and data logging
- Underground water tank level monitoring and data logging

Advantages:

Low cost, long life and power saving advanced design
Reliable faster information
Indigenous technology
Very helpful in critical water resource management

5. BUZZER

A **buzzer** or **beeper** is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke. Pilot lights and Buzzer are panel mounted device assemblies consisting of the housing, an internal lamp or buzzer, terminals, and a cover. Applications include industrial control panels of all types, equipment indicator panels, status alarm indicator. The buzzer volume is 95dB @ 10cm (3.94”), the current is 20mA. Piezo buzzers exhibit the reverse piezoelectric effect. The normal

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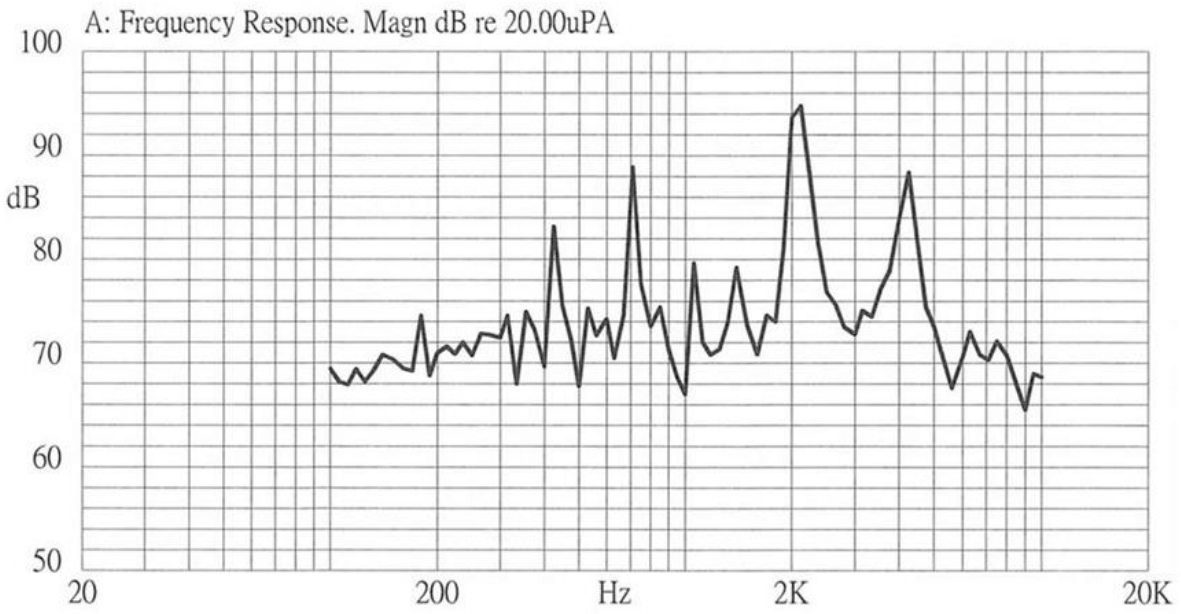
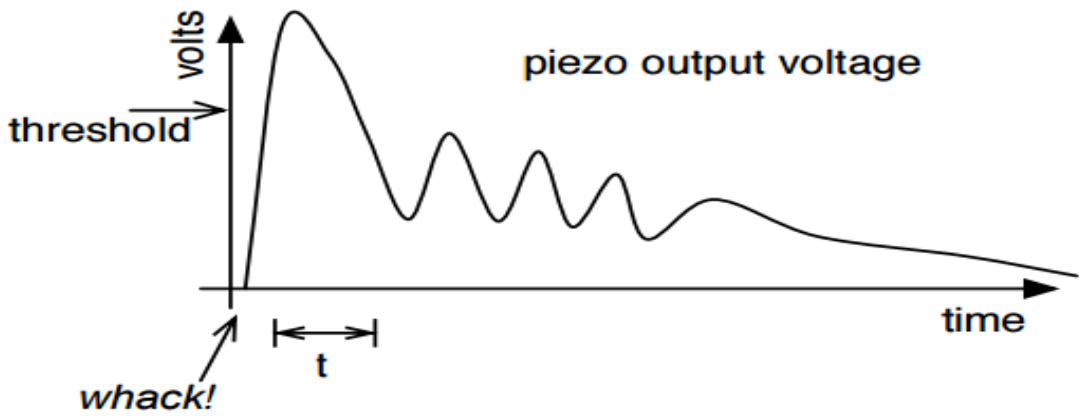
piezoelectric effect is generating electricity from squeezing a crystal.

Frequency Response Curve



6. WORKING PRINCIPLE

Whack the piezo to generate a number based on force of whack.When a Piezo is struck, it "rings" like a bell .But instead of sound, it outputs voltage. The sketch measures time above a certain voltage, hoping to catch largest ring.



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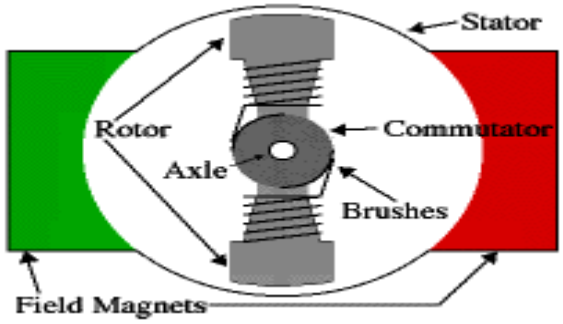
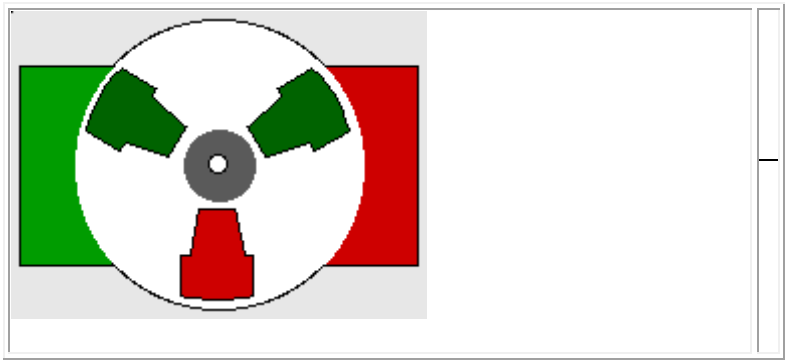
7. DC MOTOR

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.



Every DC motor has six basic parts -- axle, rotor (a.k.a., armature), stator, commentator, field magnet(s), and brushes. In most common DC motors (and all that Beamers will see), the external magnetic field is produced by high-strength permanent magnets[1]. The stator is the stationary part of the motor -- this includes the motor casing, as well as two or more permanent magnet pole pieces. The rotor (together with the axle and attached commutator) rotate with respect to the stator. The rotor consists of windings (generally on a core), the windings being electrically connected to the commutator. The above diagram shows a common motor layout -- with the rotor inside the stator (field) magnets.



You'll notice a few things from this -- namely, one pole is fully energized at a time (but two others are "partially" energized). As each brush transitions from one commutator contact to the next, one coil's field will rapidly collapse, as the next coil's field will rapidly charge up (this occurs within a few microsecond). We'll see more about the effects of this later, but in the meantime you can see that this is a direct result of the

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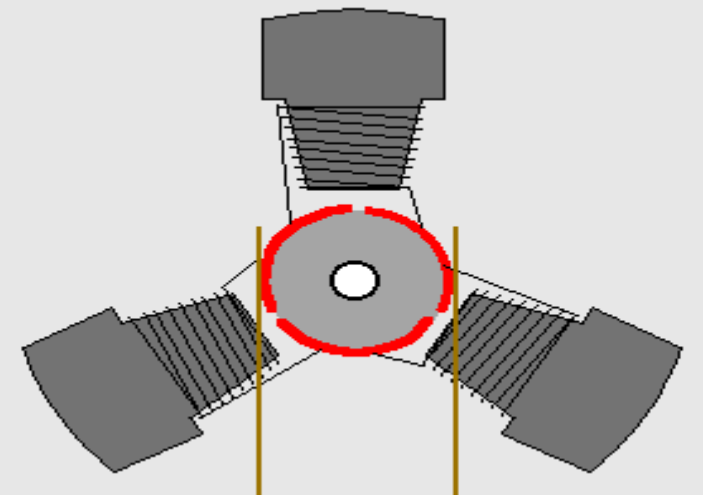
coil windings' series wiring:



DATA SECURITY RISKS

The most common wireless encryption-standard, Wired Equivalent Privacy (WEP), has been shown to be easily breakable even when correctly configured. Wi-Fi Protect Access (WPA and WPA2) encryption, which became available in devices in 2003, aimed to solve this problem. Wi-Fi access points typically default to an encryption-free (*open*) mode.

Wi-Fi Protected Access encryption (WPA2) is considered secure, provided a strong passphrase is used. A proposed modification to WPA2 is WPA-OTP or WPA3, which stores an on-chip optically generatedonetime pad on all connected devices which is periodically updated via strong encryption then hashed with the data to be sent or received.

SECURING METHODS

A common measure to deter unauthorized users involves hiding the access point's name by disabling the SSID broadcast. While effective against the casual user, it is ineffective as a security method because the SSID is broadcast in the clear in response to a client SSID query. Another method is to only allow computers with known MAC addresses to join the network, but determined eavesdroppers may be able to join the network by spoofing an authorized address.

WIRELESS TRANSCEIVER (RFM75)

Wireless transceiver (transmitter / receiver) RFM75 modules is ability to communicate at short or long range. While consuming low power and maintaining high levels of interference rejection over transparent peer-to-peer, point-to-point, point-to-multipoint and multi-drop networks.

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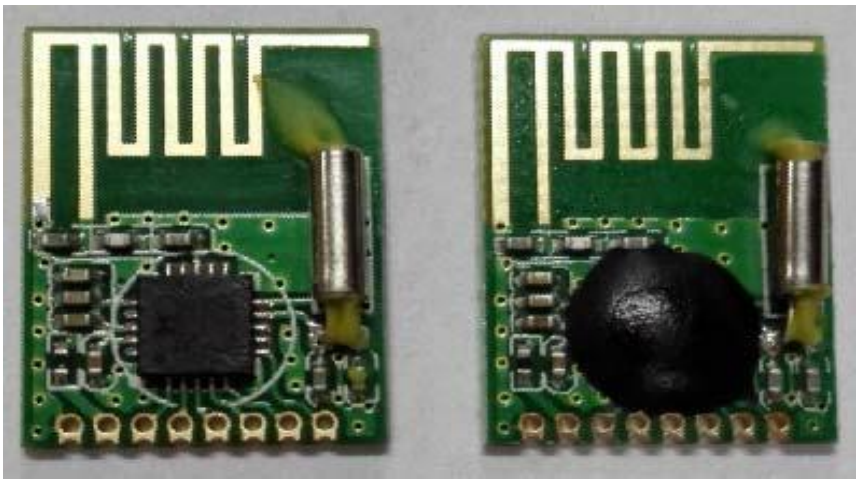
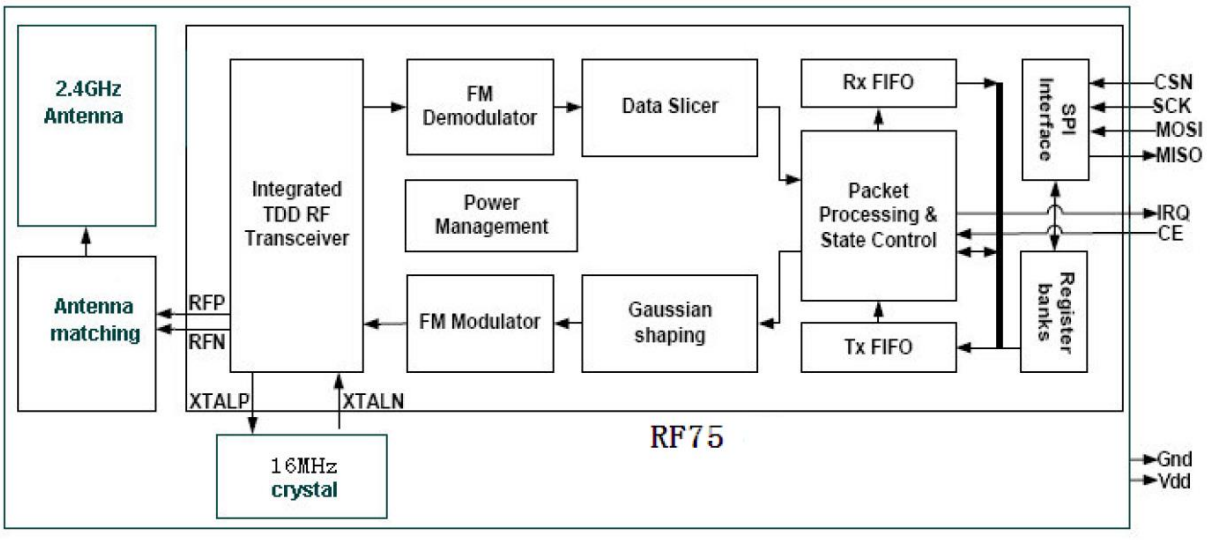


FEATURES OF RFM75:

- 2400-2483.5 MHz ISM band operation
- Support 250Kbps, 1Mbps and 2 Mbps air data rate
- Programmable output power
- Tolerate +/- 60ppm 16 MHz crystal
- Variable payload length from 1 to 32bytes
- Automatic packet processing



RFM75 Block Diagram

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8. SOFTWARE PROFILE

CCS SOFTWARE

A compiler is a computer program (or set of programs) that transforms source codewritten in a programming language (the source language) into another computer language (the target language, often having a binary form known as object code). The most common reason for wanting to transform source code is to create an executable program. This integrated C development environment gives developers the capability to quickly produce very efficient code from an easily maintainable high level language. The compiler includes built-in functions to access the PIC microcontroller hardware such as READ_ADC to read a value from the A/D converter. Discrete I/O is handled by describing the port characteristics in a PROGRAM. Functions such as INPUT and OUTPUT_HIGH will properly maintain the tri-state registers. Variables including structures may be directly mapped to memory such as I/O ports to best represent the hardware structure in C.

CCS C COMPILER FEATURES

1. Built in libraries that work with all chips for RS232 serial I/O, I2C, discrete I/O and precision delays.
2. Integrates with MPLAB IDE and other simulators and editors for source level debugging. Standard HEX file and debug files ensure compatibility with all programmers.
3. Formatted printf allows easy formatting and display in HEX or decimal.
4. Efficient function implementation allows call trees deeper than the hardware stack.
5. Source code drivers included for LCD modules, keypads, 24xx and 94xx serial EEPROM's, X10, DS1302 and NJU6355 real time clocks, Dallas touch memory devices, DS2223 and PCF8570 serial SRAM, LTC1298 and PCF8591 A/D converters, temperature sensors, digital pots, I/O expander and much more.

PROTEUS 7.0 SIMULATION TOOL

Proteus 7.0 is a Virtual System Modeling (VSM) that combines circuit simulation, animated components and microprocessor models to co-simulate the complete microcontroller based designs. This is the perfect tool for engineers to test their microcontroller designs before constructing a physical prototype in real time.

This program allows users to interact with the design using on-screen indicators and/or LED and LCD displays and, if attached to the PC, switches and buttons. One of the main components of Proteus 7.0 is the Circuit Simulation -- a product that uses a SPICE3f5 analogue simulator kernel combined with an event-driven digital simulator that allow users to utilize any SPICE model by any manufacturer. Proteus VSM comes with extensive debugging features, including breakpoints, single stepping and variable display for a neat design prior to hardware prototyping. In summary, Proteus 7.0 is the program to use when we want to simulate the interaction between software running on a microcontroller and any analog or digital electronic device connected to it.

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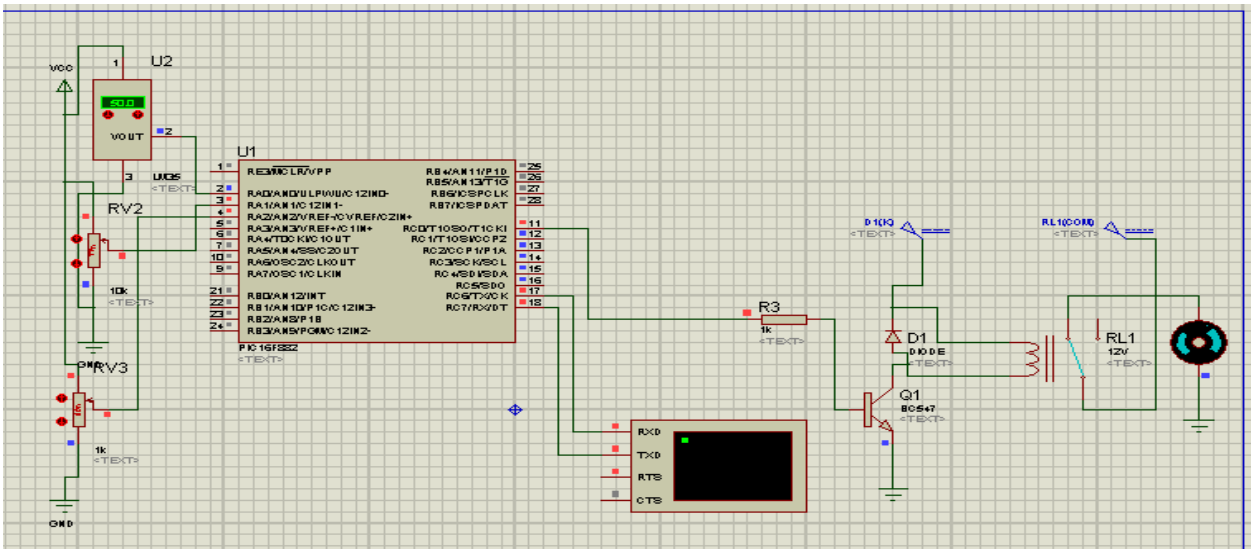
9. RESULTS AND DISCUSSION



CONCLUSION

It is a trend to use information technology to lead the development of modern agriculture. The IntelliSense Internet of Things will be an important support for intensive, high-yield, high-quality, efficient, ecological security agriculture. As a comprehensive application of technology in different disciplines, facility agricultural based on Internet of Things technology integrates a variety of technologies such as sensor, automation, communications, computer and animal plant sciences. It will play a major role to improve the overall efficiency of agriculture, promote the upgrade of modern agricultural transformation.In green house technology, more number of the parameters is to be control because, the varietiesof the crop are large. They are increasing day by day because of the development in agriculturetechnology. In this situation, the wifinetwork with additional hardware and softwareis an efficient solution for green house control.

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