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SURVEY ON AGRICULTURE AUTOMATION

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Abstract:

An automated irrigation system is developed to minimize and maintain water usage for farming. The system will have several sensors of our interest like temperature, moisture, humidity sensors placed in farm field at roots of plants. A micro-controller based gateway or relay is used for controlling water supply. Automation is done through IOT i.e., IOT is a shared network that can interact with objects through internet connection. This smart work helps in effective usage of resources like water, fertilizers, electricity. This system is developed for monitoring and maintaining the situation at farm field with sensors. Mobile networks like 3G and LTE along with smart phones have made tremendous growth in technology. Where objects like micro controller and other are connected to internet through an IP address. This IOT has spread too many fields like home automation, smart agriculture etc., through android mobile app.

Keywords: Irrigation, Automation, Micro controller, Sensors, Mobile app, Ethernet, ZigBee, Bluetooth, Internet of Things (IOT).

Introduction:

Agriculture is considered as a backbone of a country. The countries like India many people's livelihood is agriculture. Agriculture utilizes almost 85% of fresh water available world-wide, but growing population needs more food and fresh water also, so by using limited resources like water, we must be able to produce more yield. So agriculture automation will have a sensored network where when soil moisture level falls below threshold value that we mention for crop, motor switches automatically to supply water. Another important factor is, if water is supplied more than needed, crop may be damaged, so automation helps in maintaining water level in different seasons as well as periodically in cultivating a particular crop. Sensors produce analog voltages of the factors that it senses. The system includes zigBee protocol, Ethernet, Bluetooth connection for communicating with micro controller and objects to be

controlled like mobile app, motors etc. Coming to internet of things (IOT), it came to know from CISCO that 50 billion devices would be connected to internet by 2020. IOT deals with billions of objects which are connected to communicate with other. It improves quality of living in more intelligent and meaningful manner. It also includes safety, security and entertainment. IOT plays important role in realising smart cities, smart irrigation.

Automation is done using two prototypes namely

- Bluetooth
- Ethernet

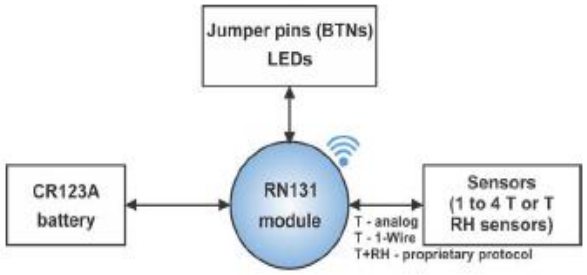
Surveyed models:

George Mois (2016): In this paper we have two basic components

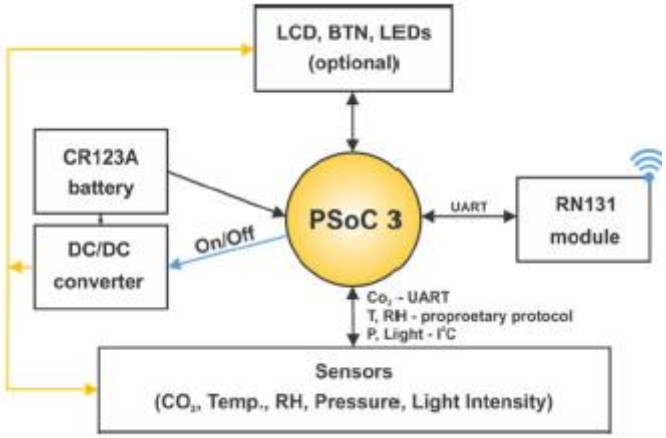
1. Wi fi sensors
2. IOT flatform

Wi-fi sensors is implement by two architecture, using RN-131C/G WLAN module

One , in which sensors are being connected to central node by Wi-Fi module and other, in which by using Universal Asynchronous Receiver/Transmitter connected to an processor controlling RN-131C/G



In first architecture temperature sensors (analog PT1000 & digital DS18B20) and relative humidity (DHT22). Analog PT1000 are read through analog input and Digital DS18B20 and DHT22 are read through appropriate protocols in WLAN module



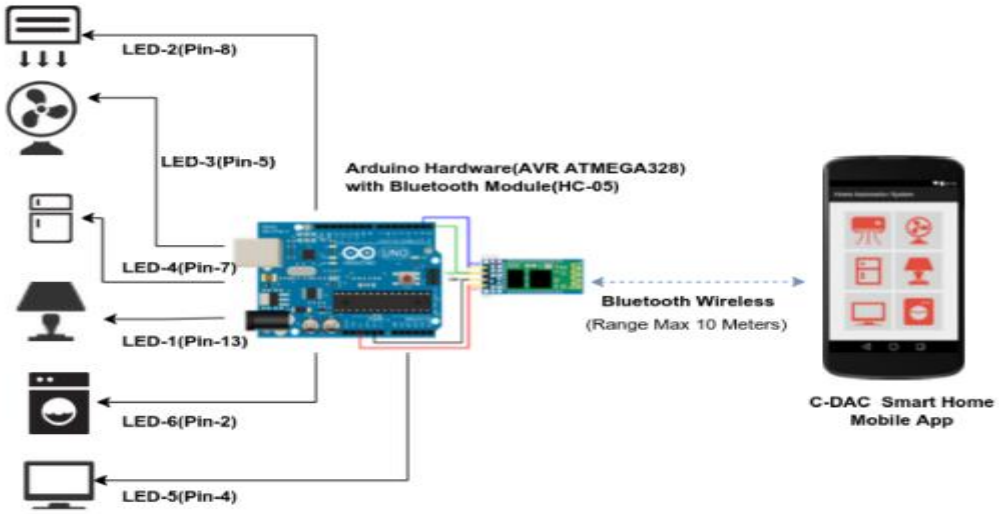
The second architecture uses CY8C3246PVI-147 programmable system on-chip micro-controller. This device can measure CO_2 levels (Cozir ambient sensor), temperature (DHT22), humidity, absolute preasure (MPL115A2 barometer) and light intensity (TSL2561) using I^2C chip for communicating.

ICCICCT (2015): In this paper home automation using IOT is done for indoor using Bluetooth and Ethernet.

Home automation using Bluetooth:

Here all the home appliances like fan, refrigerator, washing machine, lamp, AC etc. a11re connected to Adriano board pins and an android app is developed by using Android Studio (ver-1.5) this includes compilation, verification, debugging and packaging.

The app page shows 6 icons for various appliances namely lamp, AC, fan, refrigerator, TV, washing machine connected to Arduino board through an LED light for indicating status, RED indicates OFF state, GREEN indicates ON state.



Steps for connecting appliances to Arduino board and Bluetooth enabled smart phone for indoor:

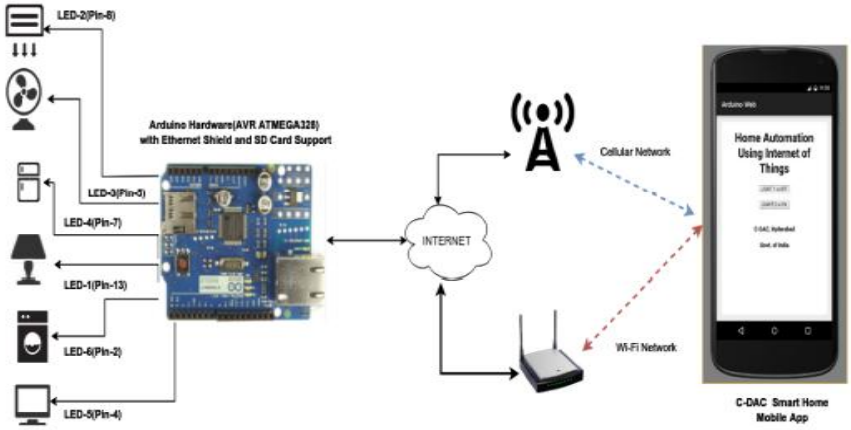
1. Connect Bluetooth's ground& VCC to respective ground & VCC of Arduino.
2. Connect LED to Arduino pin along with cathode to ground pin.
3. To form HC-05 Bluetooth interface, connect TXD of Bluetooth to Rxof Arduino and RXD of Bluetooth to TX of Arduino for serial communication.

When mobile app is launched, Arduino gets paired to Bluetooth of smart phone. MAC address of HC-05 is directly paired to Bluetooth device in vicinity.

Once connections are established, if user taps a particular icon in app, a data will be sent. That data will be received by Arduino's Bluetooth module. On receiving data from phone, data gets verified and corresponding LED status is changed.

Home automation using Ethernet:

Drawbacks of Bluetooth are overcome by using Ethernet. By using Ethernet Arduino board is connected from any part of the world. By using Arduino's Ethernet IP address and port we can control any device or appliance.

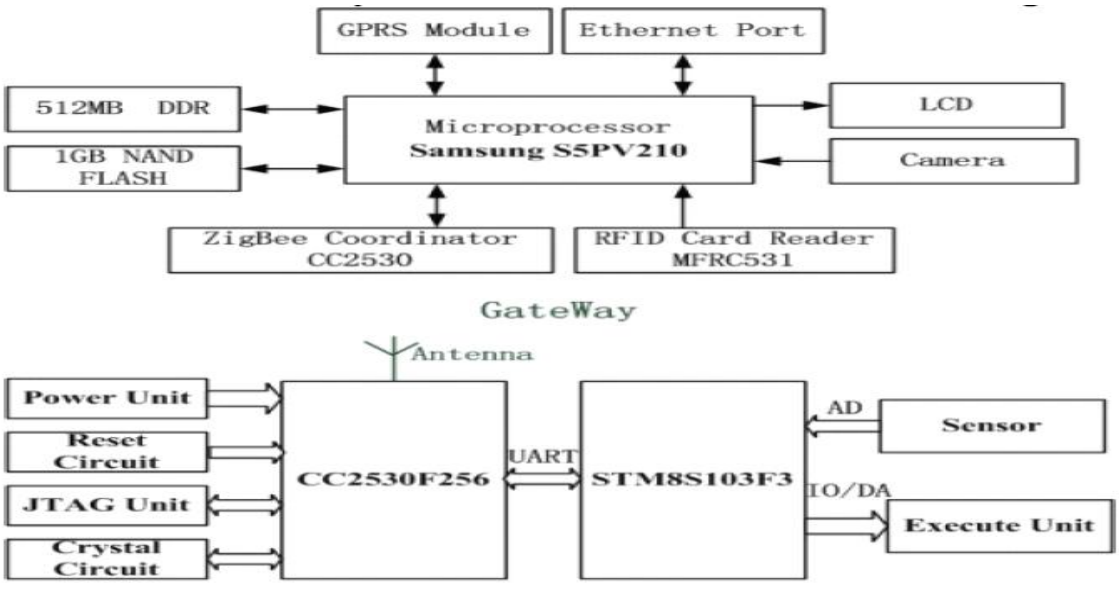


Arduino is configured as server, so that when user enter IP address and port number a request will be sent to Arduino(server) board to turn ON/OFF a particular LED is connected to Arduino

LIU DAN (2015) : The system uses CC2530 developed by TI corporation as a main chip in the ZigBee communication module. A 2.4GHz DSSS RF transceiver based on IEEE802.15.4 and an industrial level low power, enhanced 8051 microprocessor core is integrated to form CC2530 single chip, which is power-saver, low-cost and other economic benefits for smart systems

CC2350 gives a complete ZigBee solution along with Z-Stack. Wireless sensing and control nodes of the system uses the CC2530F256 as the core, including transceiver, power module, debugging module, crystal oscillator. STM8S103F3 chip serves as information collecting microprocessor.

Sensed analog data is converted to digital using AD and sent to CC2350 chip through serial port.



Joaquin Gutiérrez (2014): This system consists of two components Wireless Sensor Unit (WSU) and a Wireless Information Unit (WIU) that are connected by radio transceiver.

Wireless Sensor Network (WSN) uses ZigBee technology and WIU has GPRS to transmit data to web portal.

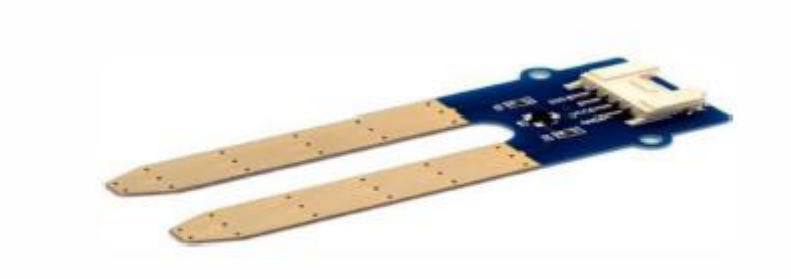
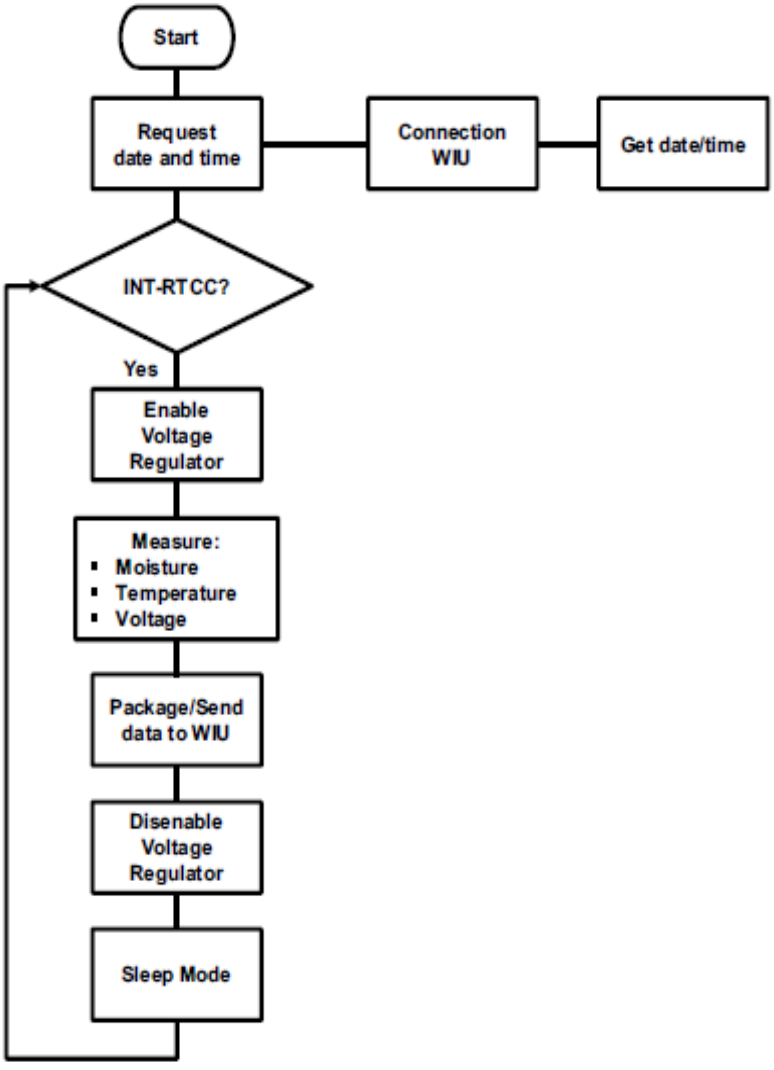


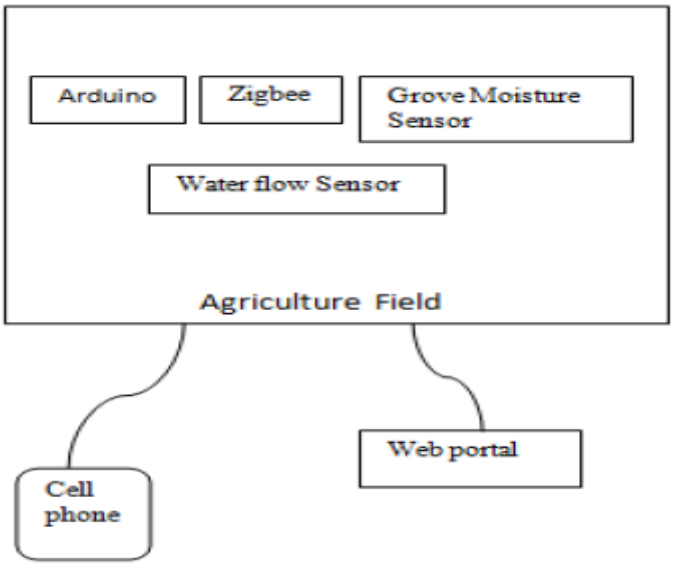
Fig: Moisture sensor

Algorithm of WSU:



M.Usha Rani (2009): This system architecture is shown in the figure.

The grove moisture sensors are deployed in farm field. The sensors retrieve the amount of moisture content present in the soil, based on the level water is supplied. This also senses the flow range and the obtained data is stored in database. These values are displayed on webpage, in this user has to login to get sensor data.



If the retrieved data readings are greater than default then those will be updated and water flow is controlled. GSM helps in sending information to user via sms.

Conclusion: A survey on argiculture automation models has been done. Agriculture is base for all the industries for raw material and cultivation requires different water levels at different periods, so for minimizing and maintaining water level we have surveyed some models. Automation in agriculture reduces labour, and difficulties, as most important in irrigation i.e, supplying water is done automatically by microcontroller based IOT as, IOT made life interesting and easy. Still there remains some more things to be included in our work.

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