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SENSING MULTI AGENT SYSTEM FOR ANAMOLY DETECTION OF CROP FIELDS EXPLOITING THE PHENOLOGICAL AND HISTROLICAL CONTEXT

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Abstract

IOT technology spread led to the development of smart solutions for precision agriculture, employing multiple smart sensors to acquire and process data to support vegetation monitoring and crucial task such as seeding, irrigation, cultivation and etc. The water level is maintained in such a way using the water level sensor and pump motor, gas sensor is used to sense the hazardous manure used in the crop field, motion sensor is used to detect the abnormal person or animal movement in the crop field and restricts the entry using the buzzer alert, the fire sensor senses the fire and the water sprinkler helps to put-off the fire, after that all the sensor collectively sends the information to microcontroller. Microcontroller gets the information from savvy remote sensors, process the information and send to the user through message queue telemetry transport protocol cloud platform. if there are any deviations in the stored sensor value then alert message is sent to the users smartphone.

Keywords : IOT technology, smart sensors

1. PROPOSED SYSTEM

This project is implemented by a 3 Phase full bridge inverter topology with six switches in order to drive the BLDC Motor. The 3-phase full bridge arrangement was chosen for the power interface between the motor and controller. The full bridge was chosen for it higher torque output capability over a half bridge arrangement. The purpose of the bridge circuit is to enable each of the three motor phases to be switched on as required by the motor. And another new implementation of this project is RF-link, which is used to drive the motor from remote.

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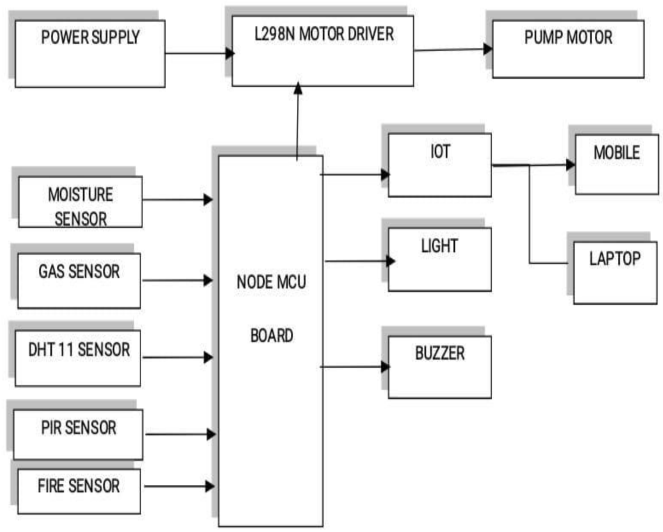

Fig1.1 Block Diagram

2. HARDWARE IMPLEMENTATION

A. ESP8266 NODE MCU:-

The NodeMcu is an open-source firmware and development kit that helps you to prototype your IoT product with few Lua script lines.The Development Kit based on ESP8266, integates GPIO, PWM, IIC, 1-Wire and ADC all in one board.

The ESP8266 is the name of a micro controller designed by Espressif Systems. The ESP8266 itself is a self-contained WiFi networking solution offering as a bridge from existing micro controller to WiFi and is also capable of running self-contained applications.

It is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module.The term "NodeMCU" by default refers to the firmware rather than the dev kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson,and spiffs.

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B.SCHEMATIC DIAGRAM

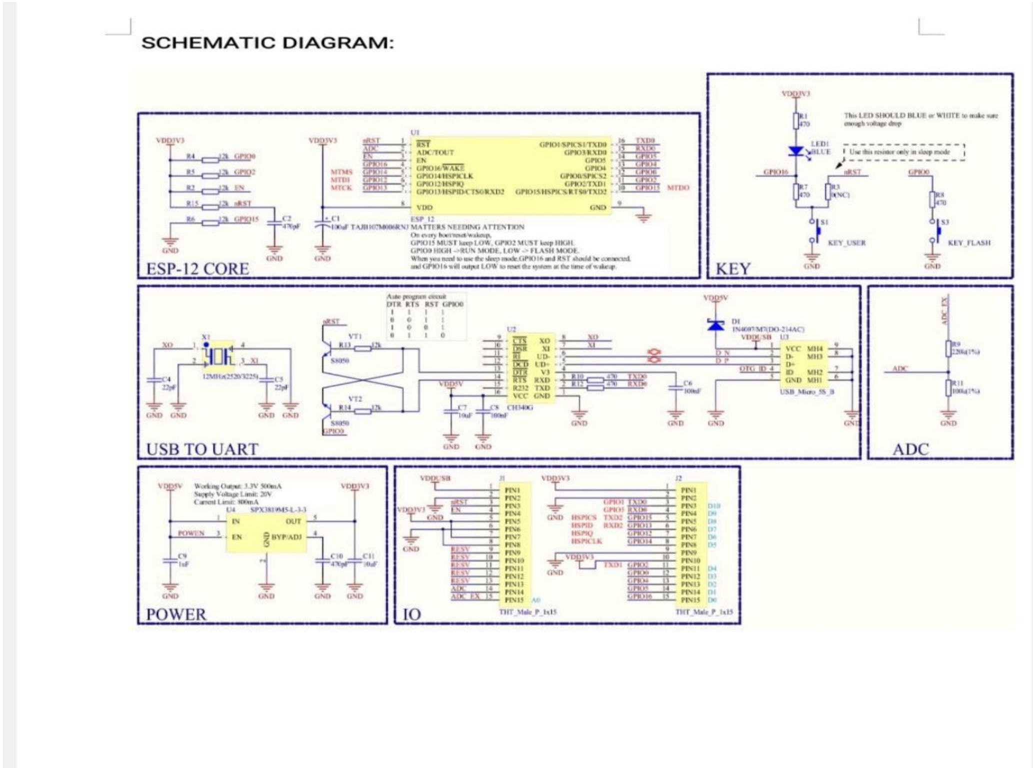

Fig1.2 Schematic diagram

C. HISTORY :

NodeMCU was created shortly after the ESP8266 came out. On December 30, 2013, Espressif Systems began production of the ESP8266. The ESP8266 is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core,[citation needed] widely used in IoT applications (see related projects). NodeMCU started on 13 Oct 2014, when Hong committed the first file of nodemcu-firmware to GitHub. Two months later, the project expanded to include an open-hardware platform when developer Huang R committed the gerber file of an ESP8266 board, named devkit v0.9. Later that month, Tuan PM ported MQTT client library from Contiki to the ESP8266 SoC platform, and committed to NodeMCU project, then NodeMCU was able to support the MQTT IoT protocol, using Lua to access the MQTT broker.

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D. FEATURES :

- Uses CH340G instead of CP2102.
- NodeMCU has built-in USB-TTL serial with super reliable industrial strength CH340G for superior stability on all supported platforms.
- Communication interface voltage: 3.3V.
- Antenna type: Built-in PCB antenna is available.
- Wireless 802.11 b/g/n standard
- WiFi at 2.4GHz, support WPA / WPA2 security mode
- Support STA/AP/STA + AP three operating modes
- Built-in TCP/IP protocol stack to support multiple TCP Client connections (5 MAX)
- D0 ~ D8, SD1 ~ SD3: used as GPIO, PWM, IIC, etc., port driver capability 15mA
- AD0: 1 channel ADC
- Power input: 4.5V ~ 9V (10VMAX), USB-powered
- AD0: 1 channel ADC
- Power input: 4.5V ~ 9V (10VMAX), USB-powered
- current: Continuous current transmission=70mA(200mA MAX), standby:<200uA.
- Transfer rate: 110-460800bps
- Support UART / GPIO data communication interface
- Remote firmware upgrade (OTA)
- Support Smart Link Smart Networking
- Working temperature: -40° c ~ + 125° c
- Drive Type: Dual high-power H-bridge driver
- ESP8266 has IO Pin
- Don't need to download resetting

E. SPECIFICATION:

- The Development Kit based on ESP8266, integates GPIO, PWM, IIC, 1-Wire and ADC all in one board.
- Power your development in the fastest way combining with NodeMCU Firmware!
- USB-TTL included, plug&play
- 10 GPIO, every GPIO can be PWM, I2C, 1-wire
- FCC CERTIFIED WI-FI module（Coming soon）
- PCB antenna
- Voltage:3.3V.
- Wi-Fi Direct (P2P), soft-AP.
- Current consumption: 10uA~170mA.
- Flash memory attachable: 16MB max (512K normal).

- Integrated TCP/IP protocol stack.
- Processor: Tensilica L106 32-bit.
- Processor speed: 80~160MHz.
- RAM: 32K + 80K.
- GPIOs: 17 (multiplexed with other functions).
- Analog to Digital: 1 input with 1024 step resolution.
- +19.5dBm output power in 802.11b mode
- 802.11 support: b/g/n.
- Maximum concurrent TCP connections: 5.

F. STARTING WITH NODE MCU:

You need to power the board with external power supply. I used 5V/GND from Arduino powered by 12V/1A adapter on VIN/G on NodeMCU bottom left (USB facing down) - because that is what I had readily available on my desk when testing a batch of samples. Some units may work without external power, other may not even come up as serial port, some may cycle between serial port apearing and disapearing. NodeMCU does not have large power draw, but power surges from it's own working are most likely reseting the device. Some poeple have had success installing additional electrolytic capacitor on the device. Arduino-like hardware IO Advanced API for hardware IO, which can dramatically reduce the redundant work for configuring and manipulating hardware. Code like arduino, but interactively in Lua script.

5. SIMULATION RESULT

5.1 PROTEUS

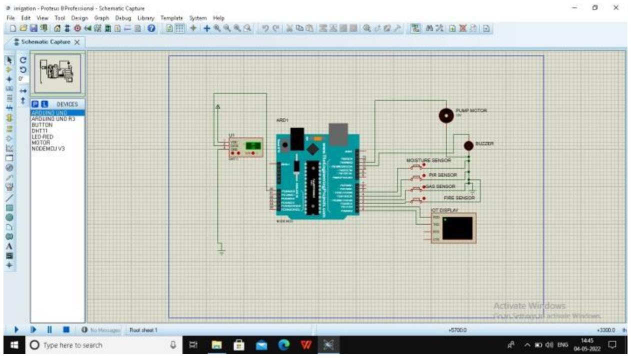
5.1.1 INTRODUCTION

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

5.1.2 KEY FEATURES

- Schematic Capture. Schematic capture in the Proteus Design Suite is used for both the simulation of designs and as the design phase of a PCB layout project. ...
- Microcontroller Simulation. ...
- PCB Design. ...
- 3D Verification.

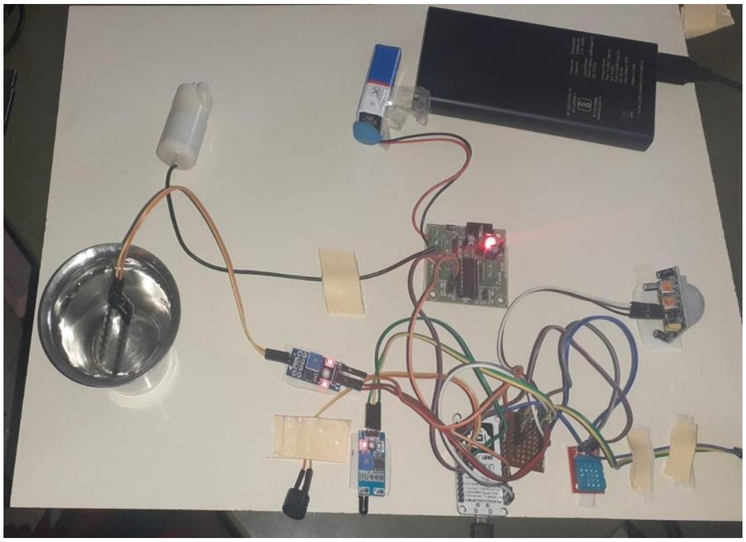
5.2 SOFTWARE RESULT:



5.2.1 INTRODUCTION

Simulink is an environment for multidomain simulation and Model-Based Design for dynamic and embedded systems. It provides an interactive graphical environment and a customizable set of block libraries that let you design, simulate, implement, and test a variety of time-varying systems, including communications, controls, signal processing, video processing, and image processing

HARDWARE RESULT



CONCLUSION:

Thus the "Sensing multi-agent system for anomaly detection on crop fields exploiting the phenological and historical context" has been designed and tested successfully. It has been developed by integrated features of all the hardware components used. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. The system has been tested to function automatically. The moisture sensors measure the moisture level (water content) of the different plants. If the moisture level is found to be below the desired level , the moisture sensor sends the signal to the NODE MCU board which triggers the Water Pump to turn ON and supply the water to respective plant using the Sprinkler. When the desired moisture level is reached, the system halts on its own and the Water Pump is turned OFF. If the fire detects and any harmful animals and any hazardous gas found it will automatically activate buzzer as well as activate pump motor to put off the fire and we will get a notification to our mobile using IOT module. Thus, the functionality of the entire system has been tested thoroughly and it is said to function successfully.

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