IIT GANDHINAGAR

ES-333 Microcontroller and Embedded System

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SMART FARMING SYSTEM

Implementation using NodeMCU and STM32F407 Microcontrollers.

About the Project

- We have implemented a smart farming system which copes with general challenges faced by the farmers.
- We have used STM32F4XX microcontroller along with node MCU microcontroller.
- We have used a few sensors like temperature, smoke, humidity, PIR.
- We have used NodeMCU with wifi module for remote monitoring.
- Deployed a web app in order to monitor and access the whole system remotely.
- Also created a module for the OLED display.

Challenges Faced by Farmers

Unexpected fires.

Irrigation not according to soil moisture content.

Unwanted Cattle Invading the fields and destroying crops.

Unavailability of farmers during irrigation period.

Solution Developed

- Developed an integrated system using the STM32 and NodeMCU microcontrollers that solves all the discussed challenges faced by farmers.
- The integrated system comprises of fire detection system, soil moisture calculator, cattle detection system and remote control water pump.
- The systems are designed with the help of sensors and modules.
- The integrated system is operated with the help of a web application that is user friendly.

Components Required

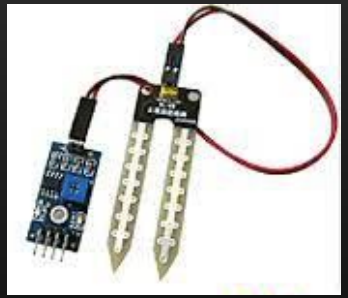
Serial No	Components	Quantity	Appox Amount	Purchase Link
1	STM32 Microcontroller	1	-	From Lab
2	NodeMCU	2	420	link
3	OLED Display	1	331	Link
4	Temperature Sensor	4	340	Link
5	Smoke Sensor	4	320	link
6	Humidity Sensor	2	126	Link
7	Speaker/Buzzer	1	-	From Lab
8	Breadboard	4	-	From Lab
9	Servo Motor	1	99	Link
10	Photo resistor	4	112	Link
11	Resistors/Capacitor			From Lab
12	PIR Sensor	1	62	Link
13	9VBattery	5	105	Link
14	Battery connector	6	27	Link
15	Relay Module	5	190	Link
16	Electric Lamps	4	-	From Lab
17	Jumper Wires	pack of 120 wire	114	link
18	LEDs	5	-	From Lab
19	DIP switches	10	-	From Lab
20	DC motor combo	1	192	Link
21	Glue gun	1	199	link
22	Glue Sticks	1	129	Link
	Total		**2766**	

Sensors Used

PIR Sensor

Smoke Sensor

Humidity Sensor



Temp Sensor

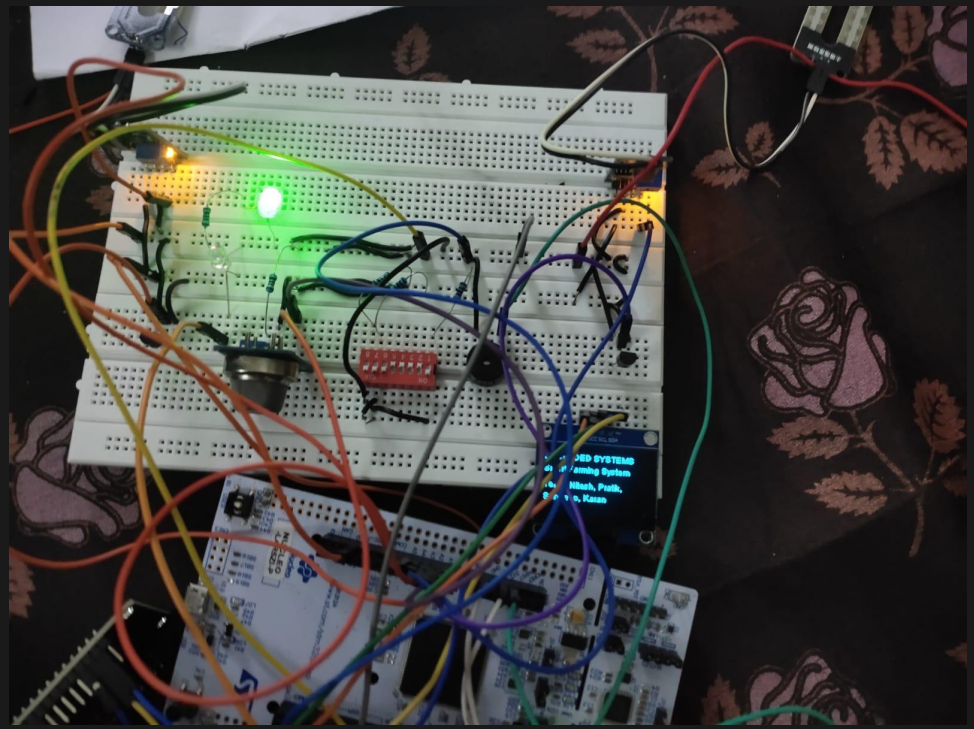
Threshold Value for Sensors

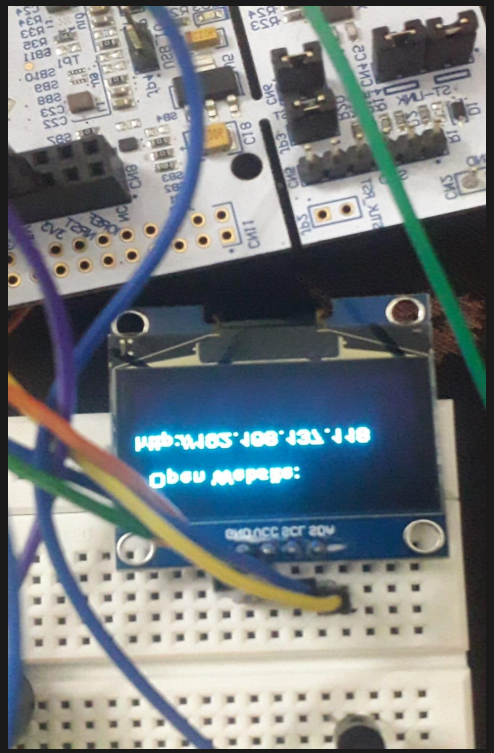
```
#define TEMP1_TH 250  // analog value
#define TEMP2_TH 250
```

```
#define MOIS_TH 1650    // analog value
```

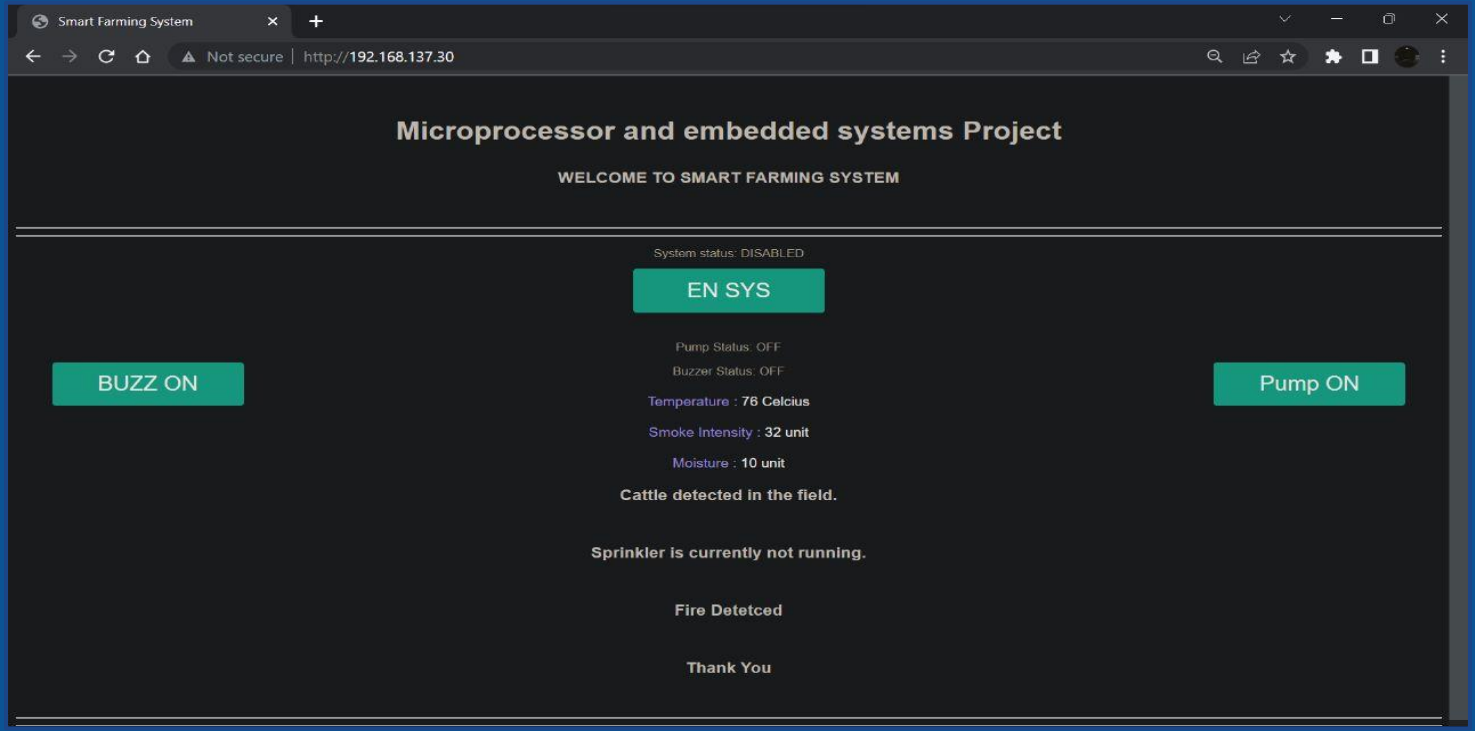
```
#define SMOKE1_TH 340   // analog Value
#define SMOKE2_TH 340
#define WifiMode 0
#define WifiPriority 0
```

Circuit and Display





Web App for Monitoring



Work Distribution

- Reading Sensors (input) values and processing in STM32.
- Output Sensors drive with STM32 microcontroller.
- Making communication between NodeMCU and STM32.
- Interfacing master and slave nodeMCU using WiFi.
- Controlling Distance Control unit and display with nodeMCU.
- Making Physical Connection and Analog Circuit for Alarms.
- Installing components and radar system on prototype.

Thank You