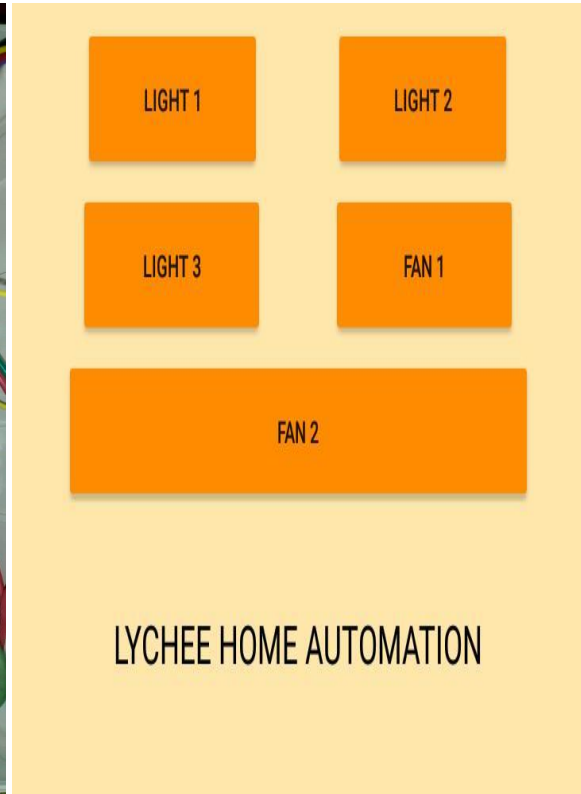
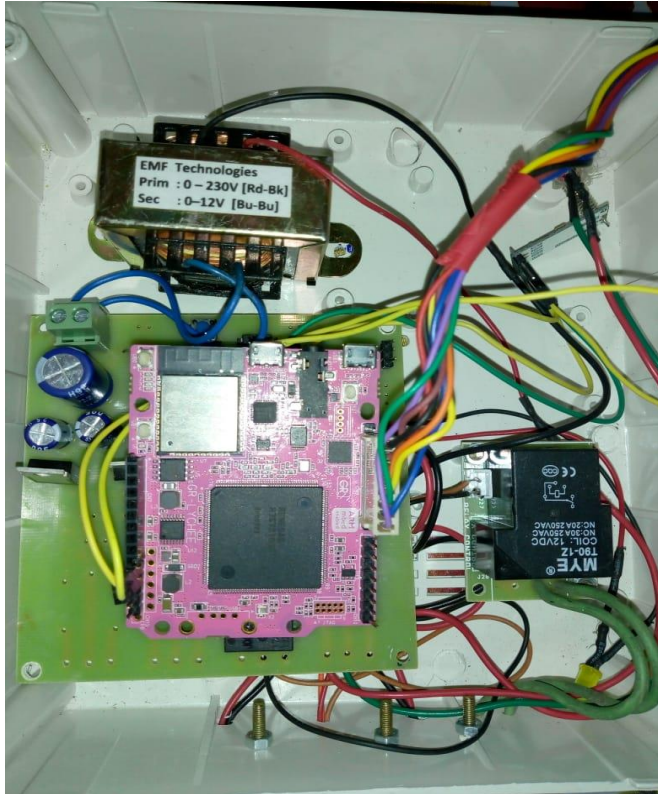


Project ID : skalaiselvi95@gmail.com | GR-Lychee's awesome solution for Security and Health

GR-Lychee's awesome solution for Security and Health

By

Project ID:skalaiselvi95@gmail.com



You tube video link

<https://youtu.be/aEN6XFVjuiQ>

Submitted
For
Renesas GR Lychee India Design Contest 2018

Organized
By
Electronics for you & Renesas

Project ID : skalaiselvi95@gmail.com | Renesas GR Lychee INDIA Design Contest 2018

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1. Abstract

Razzle dazzle big puzzle, where will the global guzzle lead us to! Technology is growing at an imaginable rate! With the advancement in technology, the number of electronic devices in our day-to-day Life has increased to make life simpler. But the dark side is that the rising population of India poses serious threats with regard to the availability of living space, utilization of natural resources and raw materials.

There is necessity to construct a trustable Remote System that will easily control all electronic devices in home from a distance. It will reduce both

- Complexity of handling the number of devices simultaneously,
- also power consumption.

Home security is also becoming necessary nowadays as the possibilities of intrusion are increasing day by day. Then, when it comes to **food**, major question for farmers, ranchers, and food scientists around the globe is “How are we going to feed more than 9 billion people that will live on Earth by 2050?” Increasingly, the quality of food is as important as quantity, and better food must become a priority.

2. Goal

In order to solve above problem aquaponics system is one of the best solution, where the fish provide nutrients in the form of their "waste," or excrement. Organic farming has two main goals.

- Reduces the diseases like headaches, birth defects, brain tumors, breast cancer and added strain on weakened immune systems in humans.
- Increase sustainability, which means this farming practices take care of the land to make sure it is useful for a long time.

In today's modern world nothing is manual everything has become automatic. The purpose of this project is the realization of a compact, low cost and user friendly home automation and home security by updating the status to user's mobile via android application wherever he/she may survive in the world.

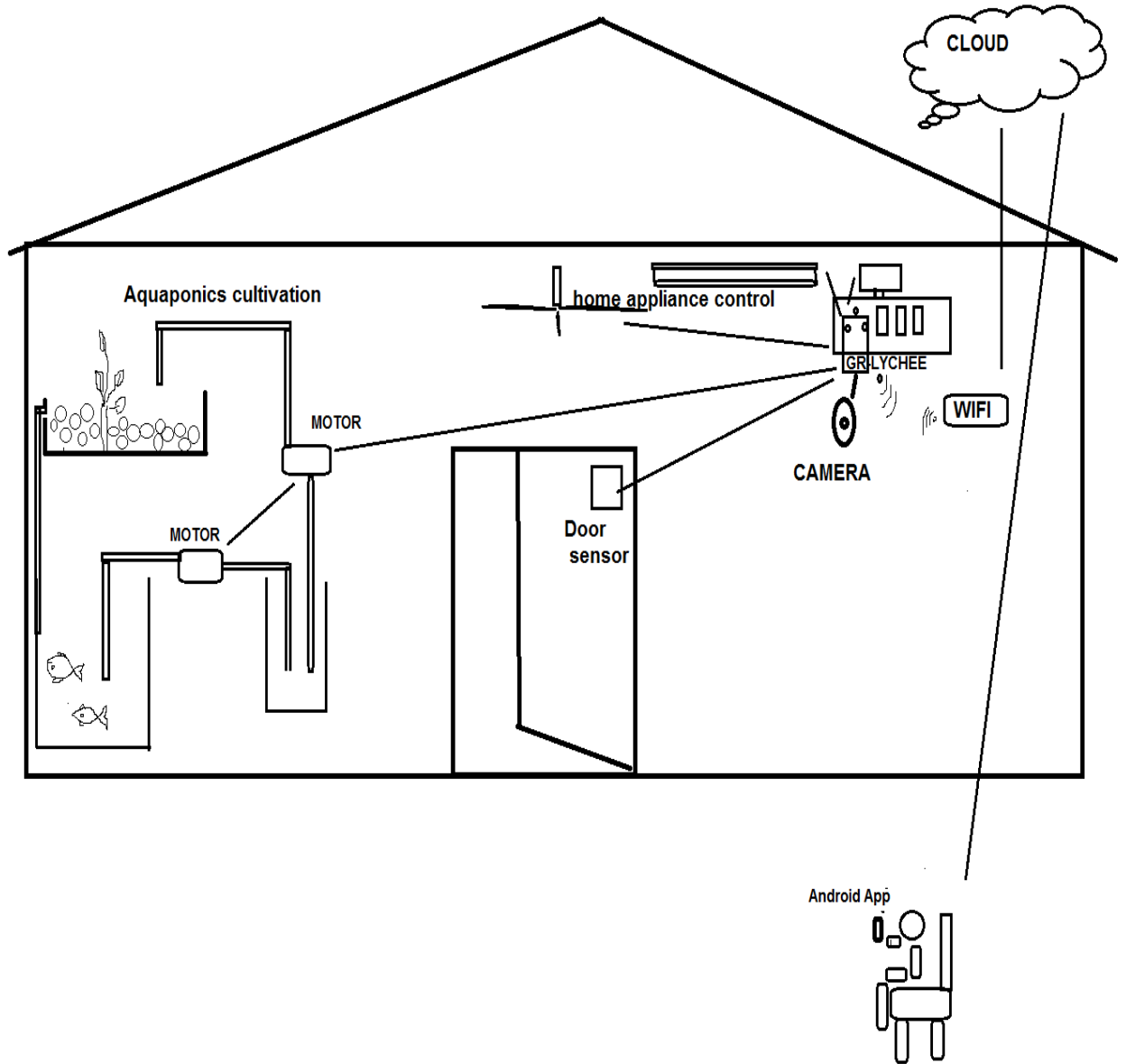
As human life is precious, **GR-Lychee's awesome solution for Security and Health** is designed in such a way that it never causes any diseases via food and guaranteed home automation and security.

3. Project Overview

The water in the fish tank, which contains ammonia, nitrites, nitrates, phosphorus, potassium, and other micronutrients, is continuously pumped into a grow bed where the plants are located. The plants will absorb the nutrients from this water, then the plain water which is excess for plant is then sent back into the fish tank.

In aquaponics there are some parameters like pH, temperature, EC(Electrical Conductivity), salinity and hardness are to be measured for achieving it. These parameters are measured using corresponding meters and sensors, then this output is fed to GR-Lychee.

Similarly in home automation and security, the output of sensors, lights, fans, camera and other electronic devices is given to GR-Lychee board. The transmission of data is done via wireless RF transreceiver. It can control 'n' number of electronic devices, so home becomes completely automated.



UTILIZATION OF GR-LYCHEE IN THE PROJECT

The GR-LYCHEE provided an excellent platform for building our prototype utilizing the features on the LYCHEE board.

The following is the explanation on how the board features were utilized.

- **Arduino Compatible Pins:**

All the sensing parameters, camera and its output from the sensing and camera module were fed into the GR-LYCHEE by the sensors. The parameters pH, temperature, EC(Electrical Conductivity), salinity and hardness. All these are sensed whenever the waste is thrown and GR- LYCHEE with its Arduino compatible pins aids in this process.

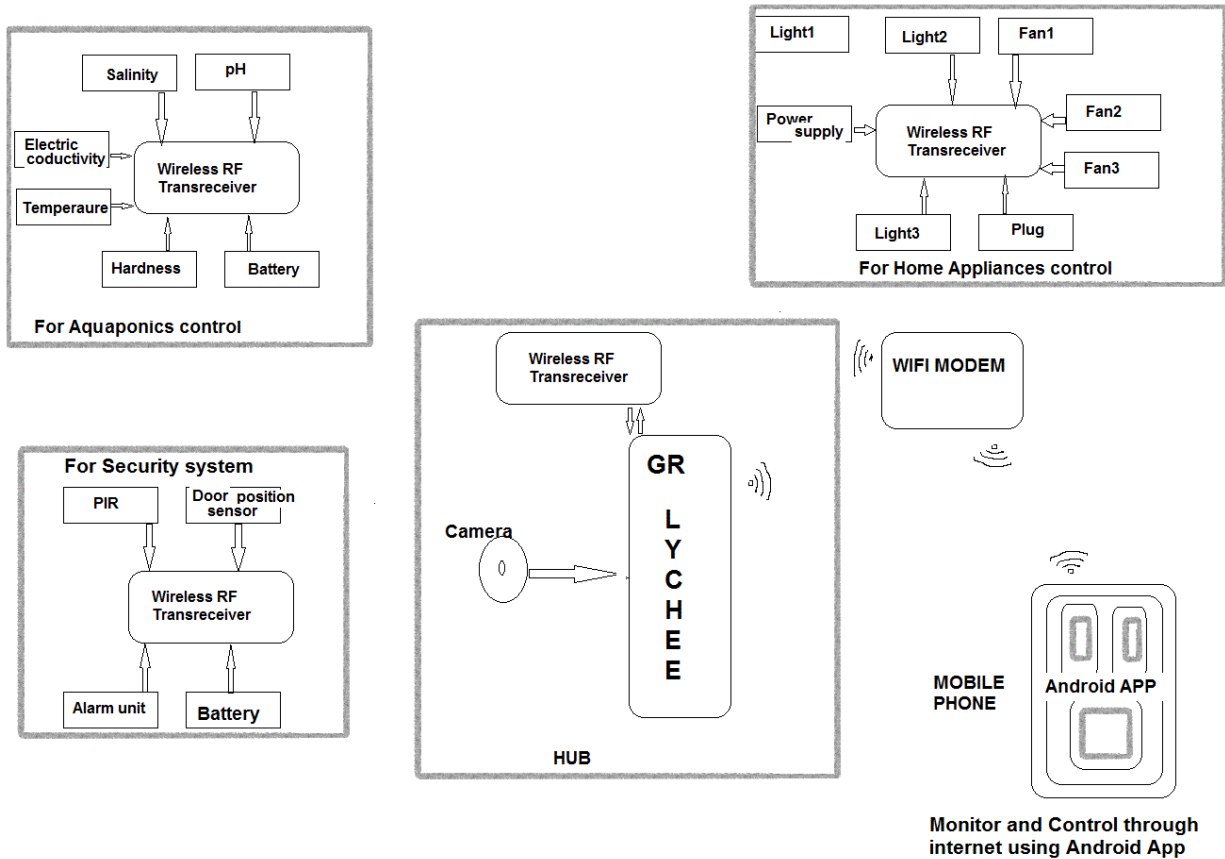
- **Web Compiler:**

The features of web compiler are

1. The compatible browsers for web compiler are chrome, firefox, internet explorer and opera.
2. Supports multiple languages like English and Japanese.
3. Easy to edit the source code.

4. Block Diagram

Different parts of Lychee's awesome solution for security and health module are described in Figure. The entire Lychee's awesome solution for security and health module is designed around **Renesas GR LycheeBoard**.



Different system block descriptions are as follows.

Aquaponics Control

- Values of pH, temperature, EC(Electrical Conductivity), salinity and hardness are measured using respective sensor.
- Based on the output of above mentioned sensors, the motor will be turned on and off automatically.

Security System

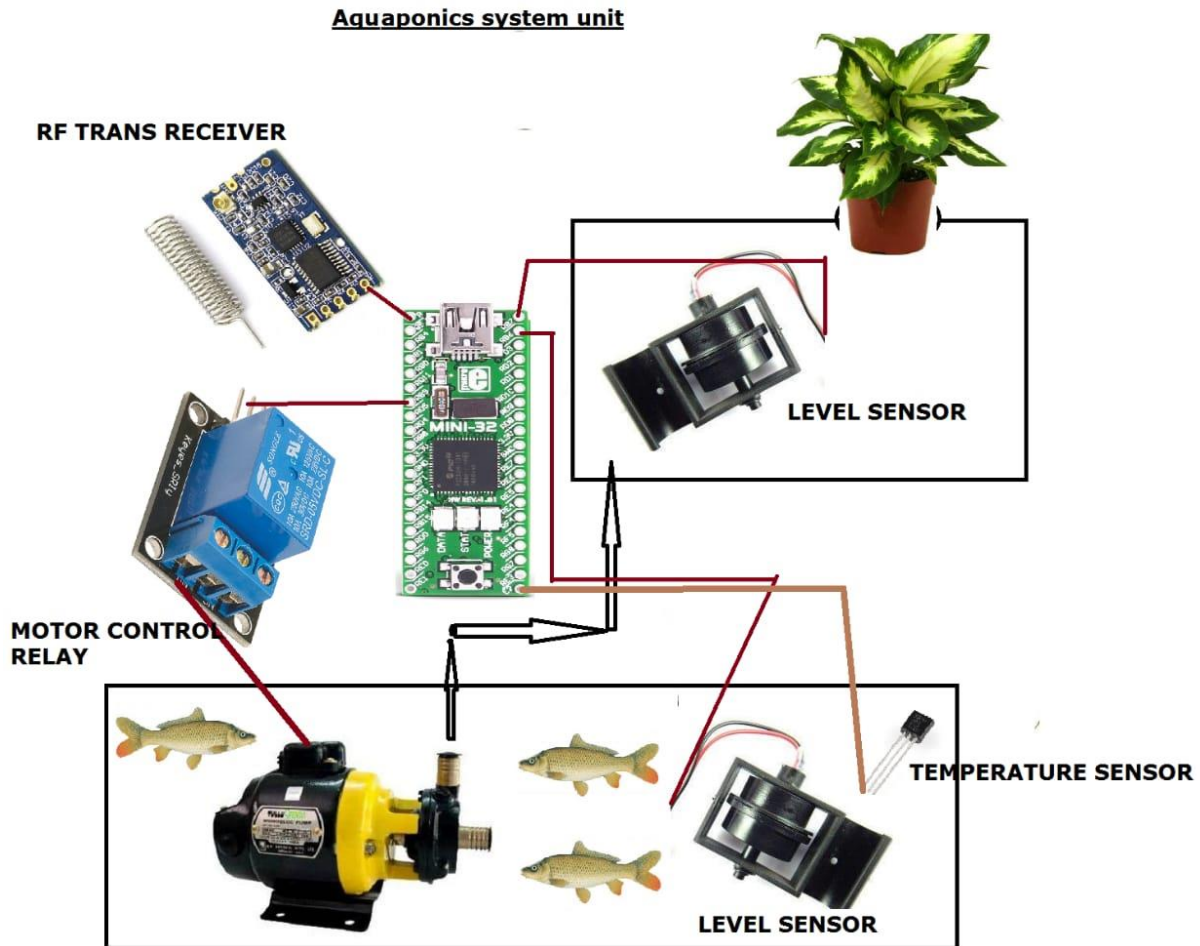
- Proximity IR sensor , door position sensor and camera are used for home security.
- Based on the output from the sensor, alarm unit will be turned on automatically.
- Camera can be accessed from mobile application.

Home Appliance Control

- The switches of the lights, fans and all other electronic devices are connected to the wireless transreceiver.
- It will be in on or off state, according to the status of corresponding switch in mobile app.

5. Circuit Diagram

Lychee's awesome solution for Security and Health

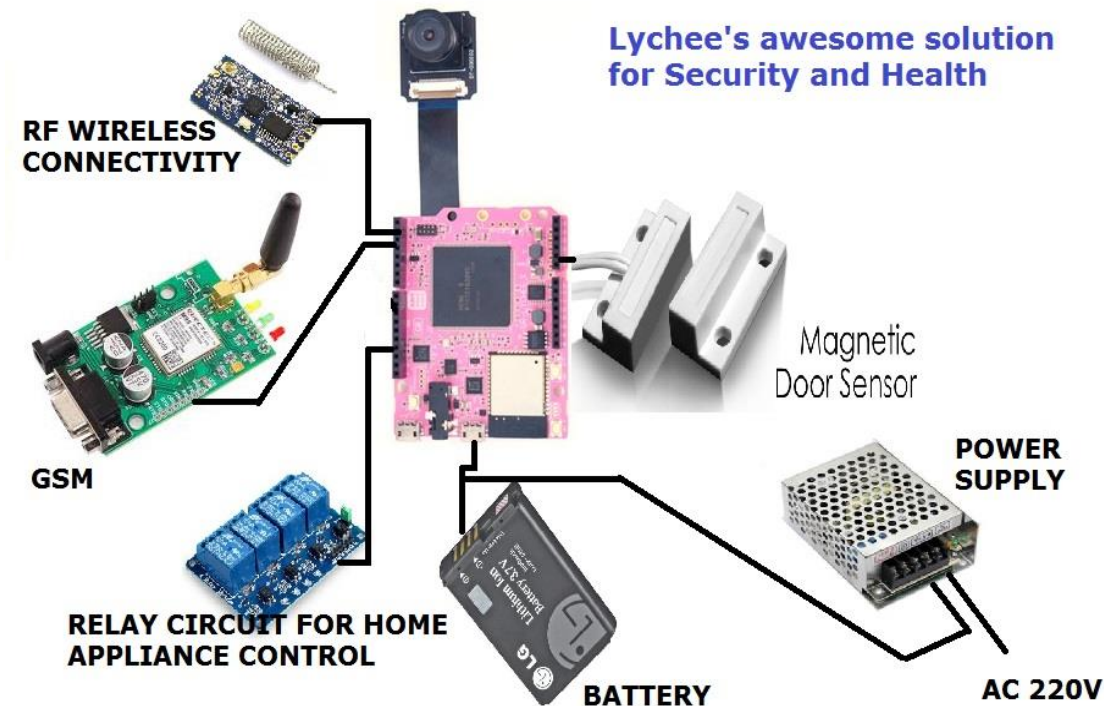


MAGNETIC FLOAT SWITCH

Magnetic float level switches can provide level measurement of water. The float rides on the process liquid surface, precisely tracking liquid surface motion. Rising liquid level lifts the float, sliding the attraction sleeve up inside the enclosing tube and into the magnetic field to actuate the electrical or pneumatic switch. This signals the presence of liquid. Subsequently, falling liquid level lowers the float, drawing the attraction sleeve out of the magnetic field to deactivate the electrical or pneumatic switch. This signals the absence of liquid.

LM35 TEMPERATURE SENSOR

The LM35 is one kind of commonly used temperature sensor that can be used to measure temperature with an electrical o/p comparative to the temperature (in °C). It can measure temperature more correctly compare with a thermistor. This sensor generates a high output voltage than thermocouples and may not need that the output voltage is amplified. The LM35 has an output voltage that is proportional to the Celsius temperature. The LM35 does not need any exterior calibration and maintains an exactness of $\pm 0.4^{\circ}\text{C}$ at room temperature.



GSM SIM 900A

It consists of the Base Transceiver Station which contains the radio transceivers and handles the protocols for communication with mobiles. It also consists of the Base Station Controller which controls the Base Transceiver station and acts as a interface between the mobile station and mobile switching centre. Appliance control subsystem enables the user to control home appliances remotely and the security alert subsystem gives the automatic security monitoring.

HC12 TRANSRECEIVER

The HC-12 is a wireless serial port communication module that is very useful, extremely powerful and easy to use. Its wireless working frequency band is 433.4-473.0MHz, multiple channels can be set, with the stepping of 400 KHz, and there are totally 100 channels. The maximum transmitting power of module is 100mW (20dBm), the receiving sensitivity is -117dBm at baud rate of 5,000bps in the air, and the communication distance is 1,000m in open space. Built-in MCU, performing communication with external device through serial port. The number of bytes transmitted unlimited to one time.

MAGNETIC DOOR SENSOR

Door sensors have one reed switch and one magnet, creating a closed circuit. If someone opens an armed door or window, the magnet is pulled away from the switch, which breaks the circuit and triggers an event. When the door is opened and the pieces move apart, the sensor signals 'open' to security system. Generally the contact sensor's role is to trigger the alarm but here their status (open or closed) can generate real-time smart phone alerts so user knows when a door is opened around the home.

6. Working

Whenever an unknown person opens the door , the alert message will be sent to the registered mobile. The message communication takes place through GSM. The user will be able to identify the person, who opened the door immediately via CCTV footage using android mobile application. Correspondingly he or she can on the alarm, so that neighbors can trap the thief.

Similarly any number of electronic devices can be configured to registered mobile. So that user can control the state of devices either ON or OFF from any place apart from home. By controlling this, user can turn ON fans and air conditioner before they reach home. Thereby one can be comfortable with all climate in home. If children forget to turn OFF television before going to bed, parents can operate it from their place.

In addition to comfort zone of humans. It also saves the power. This is how home appliances and security can be brought under our control.

In aquaponics there are some parameters like pH, temperature, EC(Electrical Conductivity), salinity and hardness are to be measured for achieving it. These parameters are measured using corresponding meters and sensors, then this output is fed to GR-Lychee.

The value of the temperature sensor will be displayed in LCD display. Once the output from the temperature sensor crosses the threshold value. It means that plant needs some water. So the motor will be turned on automatically as the level of water in fish tank gets reduced. The motor state will be maintained according to the output of the magnetic float sensor.

The output of pH and EC sensors are used to find the level of nutrients in the water. In a rare case it becomes low, when the fish is not feed with sufficient nutrients. In such a case, we have to increase the nutrient level by adding external agents.

The motor can be turned ON and OFF from mobile also. Anyway, it will be controlled automatically according to the output of the temperature sensor. In worst case, it will be operated manually.

7. Conclusion

As human life is precious, aquaponics is implemented in such a way that it never causes any diseases. People can live healthy and long life. Additionally, the quality of food is as important as quantity, which is obtained in this case.

Money will not come easily for anyone in this world. So security for our assets, which are stored in our home are very important. Same way, expenses should be reduced. Both can be obtained by GR-Lychee's awesome solution for health and security.

FUTURE SCOPE:

1. Farming area can be increased up to hectares. It can be adopted for all types of plants.
2. Home security can be increased by configuring the police man mobile number, so that theft can be trapped by them immediately.
3. Electronic devices like refrigerator, fans and washing machine can be controlled along with their speed from mobile.

Parts used and its cost

Parts Used	Price(INR)
<i>Security and Automation</i>	
GR LYCHEE board	2500
Camera Module	800
HC-12 RF Transreiceier	600
Four channel TRIAC Driver	220
Door sensor	170
SMPS Power supply	250
<i>Aquaponics</i>	
Pic controller for aquaponics system	120
LCD 16*4	230
Single Relay driver	110
Power supply	200
HC-12 RF Transreceiver	600
GSM module	980
Temperature sensor LM35	30
Total	6810

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Appendix-A

```
//  
*****  
  
//  
// GR-Lychee's awesome solution for Security  
and Health  
//  
+++++  
+++++//  
// Designed for GR Lychee India Design  
Contest-2018 //  
//  
+++++  
+++++//  
// By: Project ID: skalaiselvi95@gmail.com //  
//  
*****  
  
//  
int inByte = 0; // incoming serial byte
```

```
int cinp = 3;
```

```
int cinp11 = 4;
```

```
int LIGHT1 = 13;
```

```
int FAN = 5;
```

```
int SHUTDOWN = 6;
```

```
int a=10,b=10,c=10,d=10,e=10,f=10;
```

```
void cin();
```

```
void setup() {
```

```
    // start serial port at 9600 bps:
```

```
    Serial.begin(9600);
```

```
    while (!Serial) {
```

```
        ; // wait for serial port to connect. Needed  
for native USB port only
```

```
    }
```

```
    Serial.println("AT+CMGD=1");
```

```
    delay(10);
```

```
Serial.println("AT+CMGD=2");  
  
delay(10);  
  
Serial.println("AT+CMGD=3");  
  
delay(10);  
  
Serial.println("AT+CMGD=4");  
  
delay(10);  
  
Serial.println("AT+CMGD=5");  
  
delay(10);  
  
Serial.println("AT+CMGD=6");  
  
delay(10);  
  
Serial.println("AT+CMGD=7");  
  
delay(10);  
  
Serial.println("AT+CMGD=8");  
  
delay(10);  
  
pinMode(cinp, INPUT_PULLUP);  
  
pinMode(cinp11, INPUT_PULLUP);
```



```
delay(1000);
```

```
Serial.print("AT+CMGS=\"+919790699882\"\\r")  
;
```

```
delay(1000);
```

```
//The text of the message to be sent.
```

```
Serial.print("SYSTEM NORMAL");
```

```
Serial.print("MOTORON");
```

```
delay(1000);
```

```
Serial.write(0x1A);
```

```
delay(1000);
```

```
cin();
```

```
break;
```

```
case 'B': // your hand is close to the sensor
```

```
Serial.println("AT+CMGF=1\\r");
```

```
delay(1000);
```

```
Serial.print("AT+CMGS=\"+919790699882\"\\r")
;
delay(1000);
//The text of the message to be sent.
Serial.print("SYSTEM NORMAL");
Serial.print("MOTOROFF");
delay(1000);
Serial.write(0x1A);
delay(1000);
cin();
    break;
    case 'C': // your hand is a few inches from
the sensor
        Serial.println("AT+CMGF=1\\r");
delay(1000);
```



```
Serial.print("AT+CMGS=\"+919790699882\"\\r")
;
delay(1000);
//The text of the message to be sent.
Serial.print("SYSTEM ERROR");
Serial.print("MOTOROFF");
delay(1000);
Serial.write(0x1A);
delay(1000);
cin();
    break;
    case 'T': // your hand is nowhere near the
sensor
        Serial.println("AT+CMGF=1\\r");
delay(1000);
```

```
Serial.print("AT+CMGS=\"+919790699882\"\\r")
;
delay(1000);
//The text of the message to be sent.
Serial.print("SYSTEM ERROR");
Serial.print("MOTOROFF");
delay(1000);
Serial.write(0x1A);
delay(1000);
cin();
    break;

case 'L':
    if(a>8)
    {
```

```
Serial.println("AT+CMGF=1\r");  
  
delay(1000);  
  
Serial.print("AT+CMGS=\"+919790699882\"\r")  
;  
  
delay(1000);  
  
Serial.print("LIGHTON PRESS TO 'M' LIGHT  
OFF");  
  
delay(1000);  
  
Serial.write(0x1A);  
  
delay(1000);  
  
a=0,b=10,c=10,d=10,e=10,f=10;  
  
}  
  
digitalWrite(LIGHT1,HIGH);  
  
cin();  
  
break;
```

```
case 'M': // your hand is nowhere near  
the sensor
```

```
if(b>8)
```

```
{
```

```
Serial.println("AT+CMGF=1\r");
```

```
delay(1000);
```

```
Serial.print("AT+CMGS=\"+919790699882\"\r")
```

```
;
```

```
delay(1000);
```

```
Serial.print("LIGHTOFF PRESS TO 'L' LIGHT  
ON");
```

```
delay(1000);
```

```
Serial.write(0x1A);
```

```
delay(1000);
```

```
a=10,b=0,c=10,d=10,e=10,f=10;
```

```
}
```

```
    digitalWrite(LIGHT1,LOW);

    cin();

    break;

    case 'F': // your hand is nowhere near
the sensor
        if(c>8)
        {
            Serial.println("AT+CMGF=1\r");

            delay(1000);

            Serial.print("AT+CMGS=\""+919790699882+"\r")
;
            delay(1000);

            Serial.print("FANON PRESS TO 'G' FAN OFF");

            delay(1000);

            Serial.write(0x1A);

            delay(1000);
```

```
a=10,b=10,c=0,d=10,e=10,f=10;
}
digitalWrite(FAN,HIGH);
cin();
break;
case 'G': // your hand is nowhere near
the sensor
if(d>8)
{
Serial.println("AT+CMGF=1\r");
delay(1000);

Serial.print("AT+CMGS=\""+919790699882+"\r")
;
delay(1000);
Serial.print("FANOFF PRESS TO 'F' FAN ON");
delay(1000);
```

```
Serial.write(0x1A);  
  
delay(1000);  
  
a=0,b=10,c=10,d=0,e=10,f=10;  
  
}  
  
digitalWrite(FAN,LOW);  
  
cin();  
  
break;  
  
case 'P': // your hand is nowhere near  
the sensor  
  
if(e>8)  
  
{  
  
Serial.println("AT+CMGF=1\r");  
  
delay(1000);  
  
  
Serial.print("AT+CMGS=\"+919790699882\"\r")  
;  
  
delay(1000);
```

```
Serial.print("POWERON PRESS TO 'S' POWER  
OFF");
```

```
delay(1000);
```

```
Serial.write(0x1A);
```

```
delay(1000);
```

```
a=10,b=10,c=10,d=10,e=0,f=10;
```

```
}
```

```
digitalWrite(SHUTDOWN,HIGH);
```

```
cin();
```

```
break;
```

```
case 'S': // your hand is nowhere near  
the sensor
```

```
if(f>8)
```

```
{
```

```
Serial.println("AT+CMGF=1\r");
```

```
delay(1000);
```



```
Serial.print("AT+CMGS=\"+919790699882\"\\r")
;
delay(1000);
Serial.print("POWEROFF PRESS TO 'P'
POWERON");
delay(1000);
Serial.write(0x1A);
delay(1000);
    digitalWrite(SHUTDOWN,LOW);
cin();
a=10,b=10,c=10,d=10,e=10,f=0;
    }
    break;
}
}
```

```
}
```

```
void cin()
```

```
{
```

```
    int cinp1=digitalRead(cinp);
```

```
    int cinp2=digitalRead(cinp11);
```

```
    if(cinp1==LOW)
```

```
    {
```

```
        delay(10000);
```

```
        int cinp1=digitalRead(cinp);
```

```
        int cinp2=digitalRead(cinp11);
```

```
        if((cinp1==LOW)&&(cinp2==HIGH))
```

```
        {
```

```
            Serial.print("AT");
```

```
            delay(1000);
```

```
            Serial.println("ATD+919790699882;");
```

```
            delay(60000);
```

```
Serial.println("ATD\"+919790699882;\"r");  
  
delay(60000);  
  
Serial.println("ATD\"+919790699882;\"");  
  
delay(60000);  
  
Serial.println("AT+CMGF=1\"r");  
  
delay(1000);  
  
Serial.print("AT+CMGS=\"+919790699882\"\"r")  
;  
  
delay(1000);  
  
Serial.print("Unauthorised person access");  
  
delay(1000);  
  
Serial.write(0x1A);  
  
delay(1000);  
  
Serial.println("AT+CMGF=1\"r");  
  
delay(1000);
```

```
Serial.print("AT+CMGS=\"+919790699882\"\\r")
;  
delay(1000);  
Serial.print("Unauthorised person access");  
delay(1000);  
Serial.write(0x1A);  
delay(1000);  
Serial.println("AT+CMGF=1\\r");  
delay(1000);  
  
Serial.print("AT+CMGS=\"+919790699882\"\\r")  
;  
delay(1000);  
Serial.print("Unauthorised person access");  
delay(1000);  
Serial.write(0x1A);
```

```
delay(1000);
```

```
}
```

```
else
```

```
{
```

```
}
```

```
}
```

```
}
```

```
//
```

```
*****
```

```
//
```

```
// GR-Lychee's awesome solution for Security  
and Health
```

```
//
```

```
+++++
```

```
+++++//
```

```
// Designed for GR Lychee India Design  
Contest-2018 //
```

```
//  
+++++  
+++++  
//_Aqaponics system control unit code_//  
  
int i=10,j=10,k=10;  
  
int val;  
  
int tempPin = A0;  
  
int pir=2;  
  
int MOTOR=4;  
  
int FLOATSWL=5;  
  
int FLOATSWH=6;  
  
float cel=0;  
  
#include <LiquidCrystal.h>  
  
const int rs = 8, en = 9, d4 = 10, d5 = 11, d6 =  
12, d7 = 13;  
  
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);  
  
void setup()
```

```
{  
  
  lcd.begin(16, 4);  
  
  pinMode(pir, INPUT_PULLUP);  
  
  pinMode(MOTOR, OUTPUT);  
  
  pinMode(FLOATSWL, INPUT_PULLUP);  
  
  pinMode(FLOATSWH, INPUT_PULLUP);  
  
  Serial.begin(9600);  
  
}  
  
void loop()  
{  
  
  int pir1=digitalRead(pir);  
  
  int FLOATSWL1=digitalRead(FLOATSWL);  
  
  int FLOATSWH1=digitalRead(FLOATSWH);  
  
  int val = analogRead(tempPin);
```

```
float mv = ( val/1024.0)*5000;
```

```
cel = mv/10;
```

```
delay(1000);
```

```
delay(1000);
```

```
lcd1();
```

```
if((FLOATSWL1==HIGH)&&(FLOATSWH1==LOW  
)
```

```
{
```

```
lcd.setCursor(0, 2);
```

```
digitalWrite(MOTOR,HIGH);
```

```
lcd.print("MOTOR ON    ");
```

```
delay(1000);
```

```
lcd1();
```

```
if(i>8)
```


{

```
int val = analogRead(tempPin);  
float mv = ( val/1024.0)*5000;  
cel = mv/10;  
Serial.print('A');  
delay(1000);  
digitalWrite(MOTOR,HIGH);  
i=0;  
j=10;  
k=10;  
if(cel>35)  
{
```

```
int val = analogRead(tempPin);
```

```
float mv = ( val/1024.0)*5000;

cel = mv/10;

Serial.print('T');

delay(1000);

digitalWrite(MOTOR,HIGH);

}

}

}

else
if((FLOATSWL1==LOW)&&(FLOATSWH1==HIGH
))

{

lcd.setCursor(0, 2);

lcd.print("MOTOR OFF    ");

digitalWrite(MOTOR,LOW);

delay(1000);
```

```
lcd1();
```

```
if(j>8)
```

```
{
```

```
int val = analogRead(tempPin);
```

```
float mv = ( val/1024.0)*5000;
```

```
cel = mv/10;
```

```
Serial.print('B');
```

```
delay(1000);
```

```
digitalWrite(MOTOR,LOW);
```

```
j=0;
```

```
k=10;
```

```
i=10;
```

```
if(cel>35)
```

```
{
```

```
Serial.print('T');
```

```
delay(1000);
```

```
digitalWrite(MOTOR,HIGH);
```

```
}
```

```
}
```

```
}
```

```
else{
```

```
  lcd.setCursor(0, 2);
```

```
  lcd.print("MOTOR OFF  ");
```

```
  digitalWrite(MOTOR,LOW);
```

```
  delay(1000);
```

```
lcd1();
```

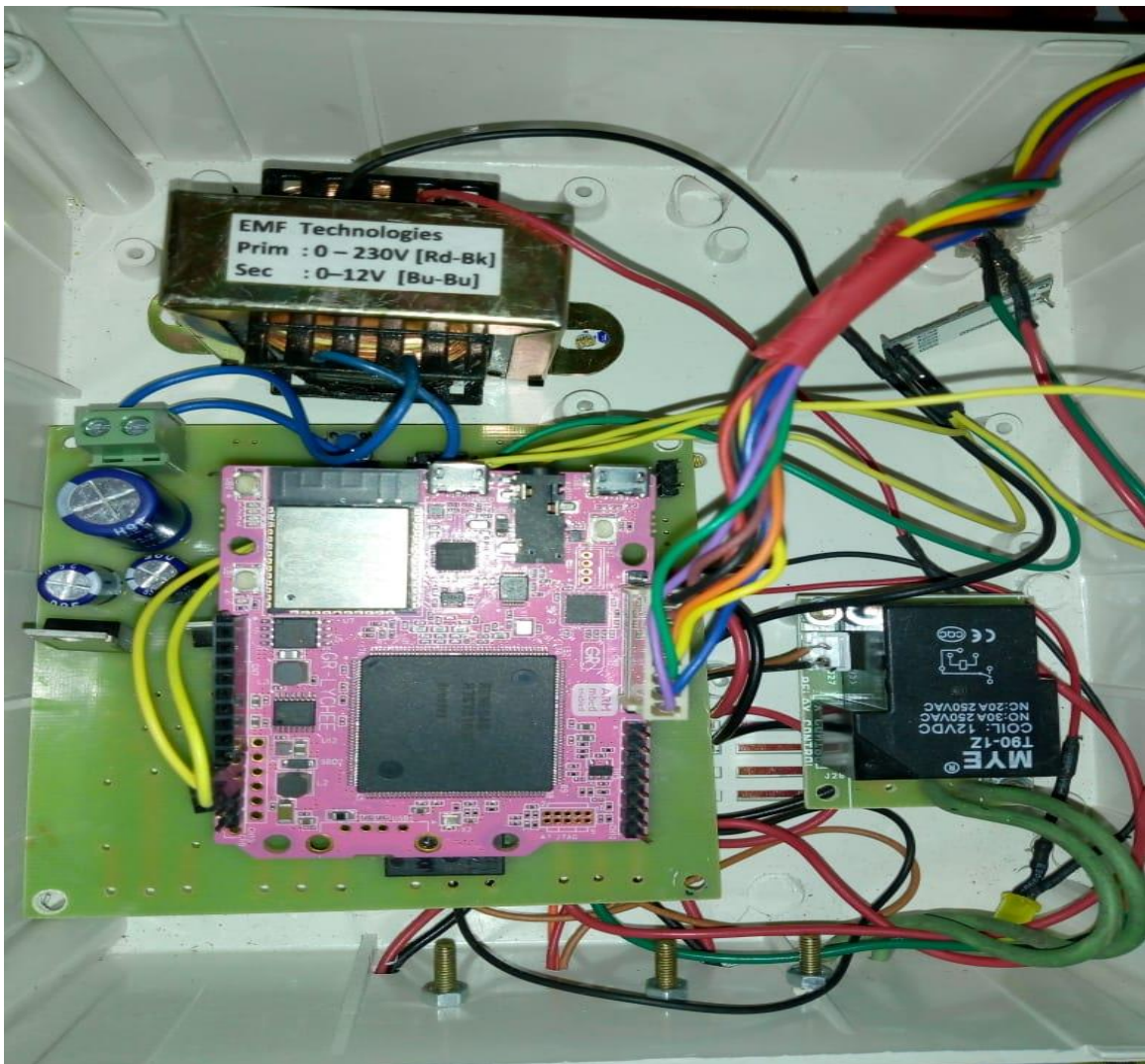
```
if(k>8)
```

```
{  
  
    digitalWrite(MOTOR,LOW);  
  
    int val = analogRead(tempPin);  
    float mv = ( val/1024.0)*5000;  
  
    cel = mv/10;  
  
    Serial.print('C');  
  
    delay(1000);  
  
    i=10;  
  
    k=0;  
  
    j=10;  
  
    if(cel>35)  
    {  
  
        int val = analogRead(tempPin);  
        float mv = ( val/1024.0)*5000;  
  
        cel = mv/10;
```



```
    lcd.print("Home automation");  
  
    lcd.setCursor(0, 2);  
  
    lcd.print("Aquaponics sys");  
  
    lcd.setCursor(0, 3);  
  
    lcd.print("TEMP:");  
  
    lcd.setCursor(7, 3);  
  
    int val = analogRead(tempPin);  
  
    float mv = ( val/1024.0)*5000;  
  
    cel = mv/10;  
  
    lcd.print(cel);  
  
    lcd.setCursor(12, 3);  
  
    lcd.print("C");  
  
}
```

Appendix-B : Photo story of project



Project ID : skalaiselvi95@gmail.com | GR-Lychee's awesome solution for Security and Health



