GAS LEAKAGE MONITORING AND ALERTING SYSTEM FOR INDUSTRIES

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TEAM ID	PNT2022TMID26516
PROJECT NAME	GAS LEAKAGE MONITORING AND ALERTING SYSTEM FOR INDUSTRIES

An Introduction To IoT-Based Gas Leakage Detection And Monitoring Systems :

Safety plays a critical role in today's world and it is vital that certain solutions are implemented in places of work and living. Whether it is electricity or oil and gas, working or living in hazardous conditions demand certain safety protocols.

Liquefied Petroleum Gas (LPG) is a type of natural gas liquefied under extreme pressure and contained in a metal cylinder. LPG is extremely sensitive to fire and causes a great disaster if exposed to any fire source without precaution

LPG is more widely available than any other natural gas and is primarily used for cooking. Unfortunately, its broad use makes the event of gas leakage or even a blast standard. Therefore, there is a need to develop a gas leakage detection and monitoring system.

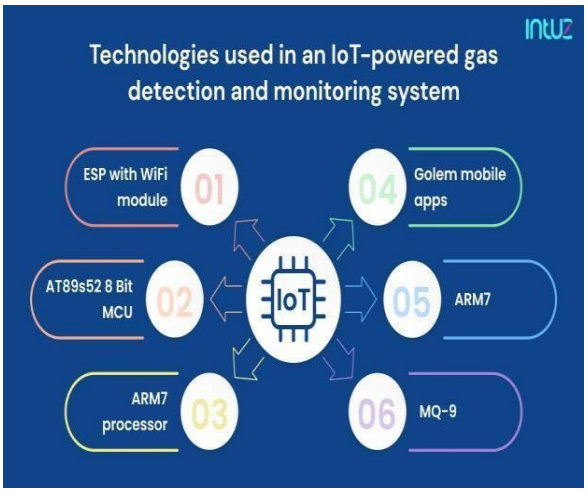
The solution could detect gas leakage, send an alert to the end-user via an SMS or a buzzer, and feature an exhaust fan that gets activated once the gas or fire is detected.

Suppose the gas in the cylinder indicates a value where the remaining percentage level falls below the threshold level set for gas. In that case, the gas cylinder company should be notified immediately to refill the cylinder or replace it. The sensor is also handy for monitoring gas usage over a period.

Benefits of IoT-based apps used in gas leakage detection :

A human nose comprises 400 different types of scent receptors that enable us to smell approximately 1 trillion various odour. However, most of us cannot identify between the different gasses present in the atmosphere. That is where gas detection sensors come in handy.

They are most commonly used to develop an IoT-powered system and identify the variation of toxic gasses in an industrial facility. It helps benefit the refineries and factories by safeguarding them from unexpected threats such as gas leakage and explosions. Here are the top benefits of IoT-based apps used in gas leakage detection.



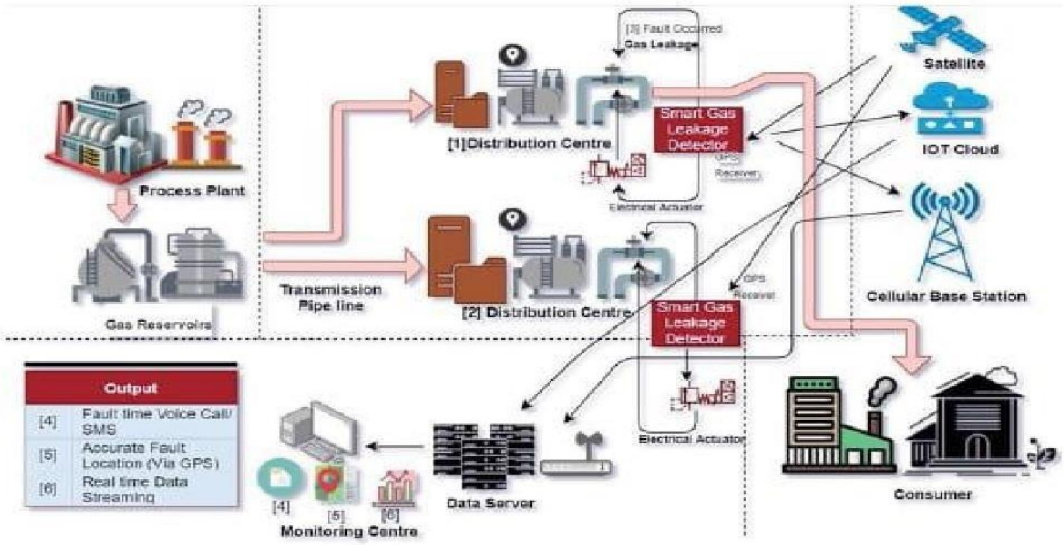
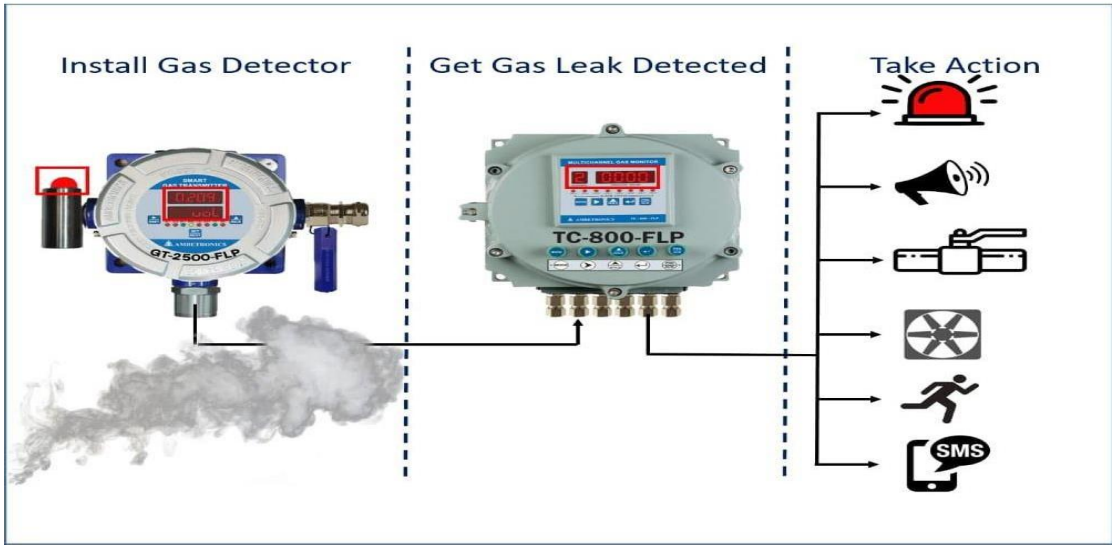
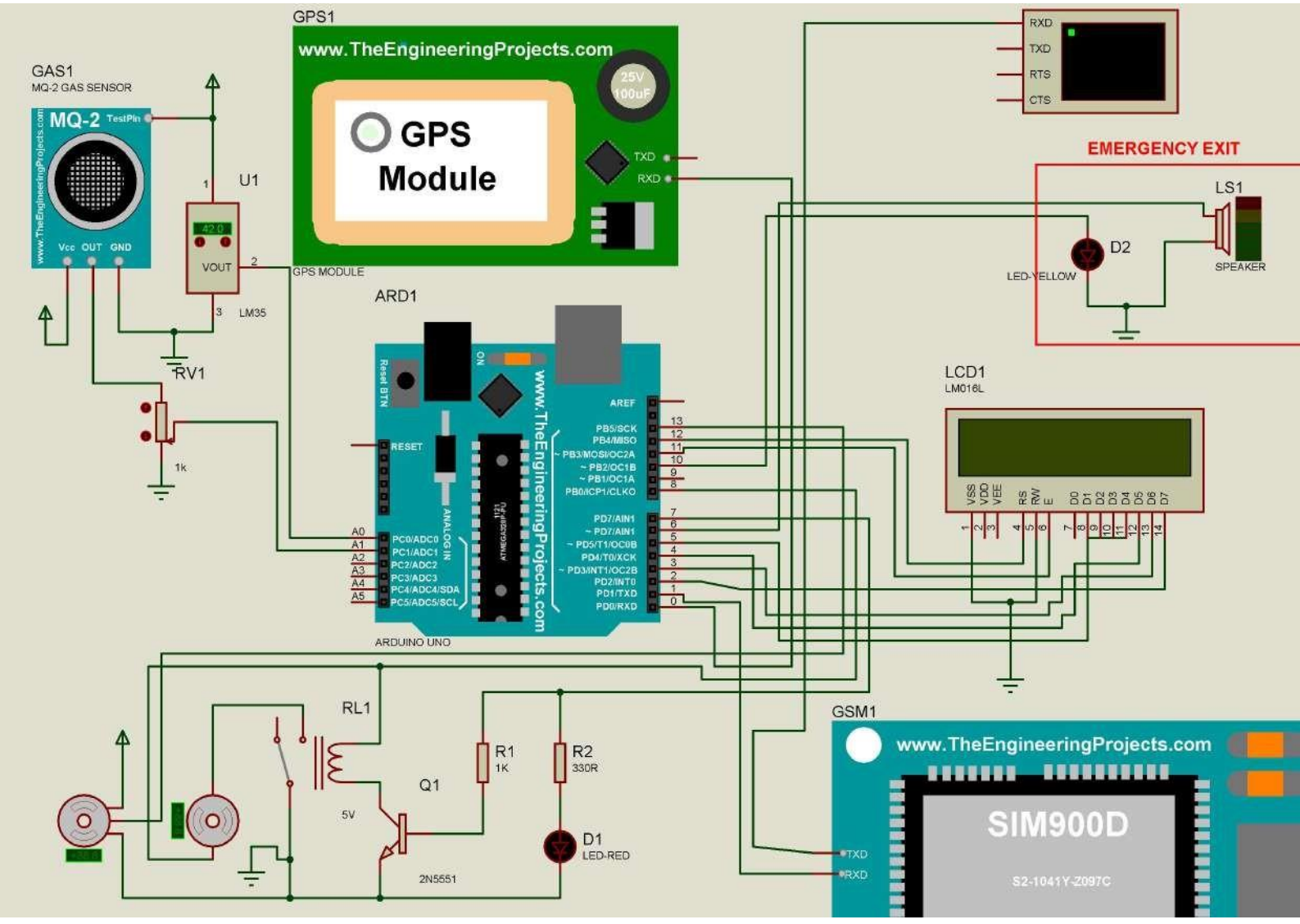


Figure 6. System and control diagram of outdoor gas leakage detection.



CIRCUIT DIAGRAM:



CODE:

```
#include<Seívo.h>
Seívo myseívo;
int pos = 0;
int val;int motoí = 8; include
#<LiquidCíystal.h>
LiquidCíystal lcd(12, 11, 5, 4, 3, 2);
#include <l'inyGPS.h>
#include <SoftwaíeSeíial.h>
SoftwaíeSeíial mySeíial(9, 10);byte
tx=1;
l'inyGPS gps; / Cíeates a new instance of the l'inyGPS object

const int SPEAKER = 6; const
int LED_RED = 7; const int
LED_YELLOW = 10;int
Relay=7;
int tempC_1 = 0; / set initial tempC 0° foí all LM35int
smkC_1 = 0; / set initial tempC 0º foí all MQ 2 const
int SensoíPin1 = A0; / fiíe input sensoí pin const int
SensoíPin2 = A1;
Stíing textFoíSMS;
void setup()
{
pinMode(motoí, OUl'PUl');
pinMode(tx, OUl'PUl');
pinMode(Relay, OUl'PUl');
myseívo.attach(13);
pinMode(SPEAKER,
OUl'PUl');lcd.begin(14, 2);
delay(100);
pinMode(SensoíPin1, INPUl');
pinMode(SensoíPin2, INPUl');
pinMode(SPEAKER,
OUl'PUl');

pinMode(LED_RED,   OUl'PUl');
pinMode(LED_YELLOW, OUl'PUl'); / Set contíol pins to be outputs
digitalWíite(LED_RED, LOW);
digitalWíite(LED_YELLOW, LOW);//set both motoís off foí staít-up
mySeíial.begin(9600);
Seíial.begin(9600); / Staít the seíial connection with the computeí
}
void loop()
{
int tempC_1 = analogRead(SensoíPin1);int
SmkC_1 = analogRead(SensoíPin2);
tempC_1 = analogRead(SensoíPin1); / íead the value fíom the LM35 sensoí
tempC_1 = (5.0 * tempC_1 * 100.0) / 1024.0; / conveít the analog data to tempeíatuíesmkC_1 =
analogRead(SensoíPin2); / íead the value fíom the MQ 2 sensoí
smkC_1 = (5.0 * smkC_1 * 100.0) / 1024.0; / conveít the analog data to tempeíatuíedelay(50);

bool newData = false;
unsigned long chaís;
unsigned shoít sentences, failed;
```

```
foí (unsigned long staít = millis(); millis() -staít < 1000;)
{
while (Seíial.available())
{
chaí c = Seíial.íead();if
(gps.encode(c))
newData = tíue;
}
}

if (tempC_1 >= 50 || smkC_1 >= 50)
{
digitalWíite(Relay,HIGH);
val = analogRead(pos);
val = map(val, 0, 1023, 0, 180);
myseívo.wíite(val);
delay(50); digitalWíite(motoí,
HIGH);
digitalWíite(LED_RED,
HIGH);
digitalWíite(LED_YELLOW,
HIGH);lcd.cleaí();
lcd.setCuísoí(0, 0); lcd.píint("
l'HERE IS FIRE ");
lcd.setCuísoí(0, 1);
lcd.píint(" NO1' SAFE HERE ");
delay(100);
lcd.cleaí(); lcd.píint("Sending
SMS...");delay(100);

tone(SPEAKER, 1047, 500);
delay(200);
tone(SPEAKER, 1109, 1000);
delay(200);
tone(SPEAKER, 1175, 100);
delay(5);

float flat, flon; unsigned
long age;
gps.f_get_position(&flat, &flon, &age);
Seíial.píint("Al'+CMGF=1\í"); delay(100);
Seíial.píint("Al'+CMGS=\"+233266302607\"\í");
Seíial.píint("FIRE ALERl'!\í");
delay(100);
Seíial.píint("Al'+CMGS=\"+233266302607\"\í");
Seíial.píint("FIRE OCCURED!\í");
delay(100);
Seíial.píint("Al'+CMGS=\"+233266302607\"\í");
Seíial.píint("FIRE OCCURED! in\í");
delay(200);
Seíial.píint("Latitude = ");
Seíial.píint(flat == l'inyGPS::GPS_INVALID_F_ANGLE ? 0.0 : flat, 6);
Seíial.píint(" Longitude = ");
```

```
Seíial.píint(flon == l'inyGPS::GPS_INVALID_F_ANGLE ? 0.0 : flon, 6);
delay(200);
Seíial.píintln((chaí)26); /  End A1' command with a ^Z, ASCII code 26
delay(200);
Seíial.píintln();
}
else
{
digitalWíite(Relay,LOW);
delay(50);
digitalWíite(LED_RED,
LOW);
digitalWíite(LED_YELLOW,
LOW);digitalWíite(motoí, LOW);
lcd.cleaí();
lcd.setCuísoí(0, 0);
lcd.píint("     NO FIRE   ");
lcd.setCuísoí(0, 1);
lcd.píint("  ALL SAFE  ");
}
}
```

OUTPUTS:

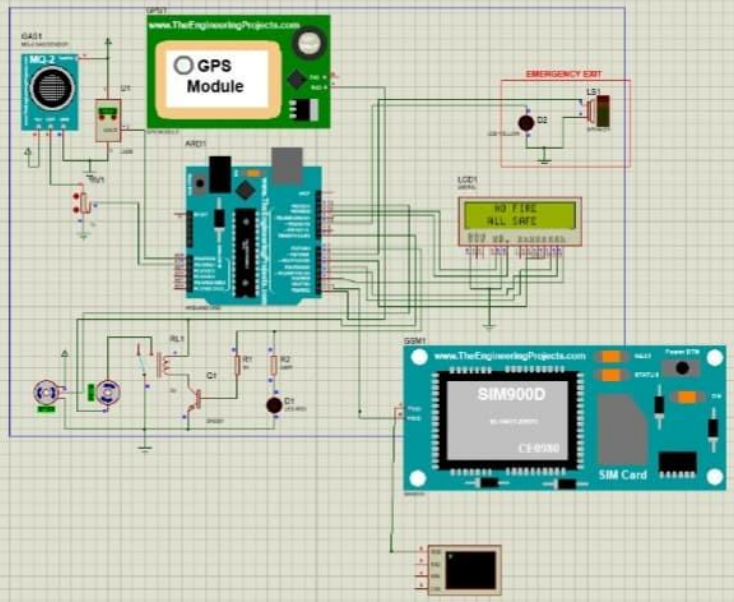
File Edit View Tool Design Graph Debug Library Template System Help

Base Design

Schematic Capture

INSTRUMENTS

- OSCILLOSCOPE
- LOGIC ANALYSER
- COUNTER TIMER
- VIRTUAL TERMIN
- SPI DEBUGGER
- I2C DEBUGGER
- SIGNAL GENERAT
- PATTERN GENER
- DC VOLTMETER
- DC AMMETER
- AC VOLTMETER
- AC AMMETER
- WATTMETER



15 Message...

ANIMATING: 00:00:40.807275 (CPU load 79%)

x: +12900.0 y: -1800.0

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Base Design

Schematic Capture

INSTRUMENTS

- OSCILLOSCOPE
- LOGIC ANALYSER
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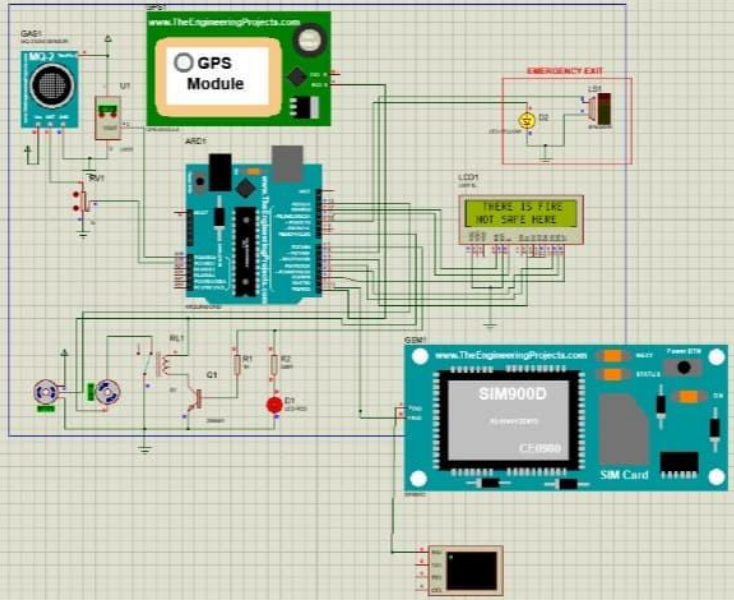
- AC AMMETER
- WATTMETER



15 Message

ANIMATING: 00:00:46.231822 (CPU load 73%)

x -3400.0 y +1600.0

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Base Design

Schematic Capture

INSTRUMENTS

- OSCILLOSCOPE
- LOGIC ANALYSER
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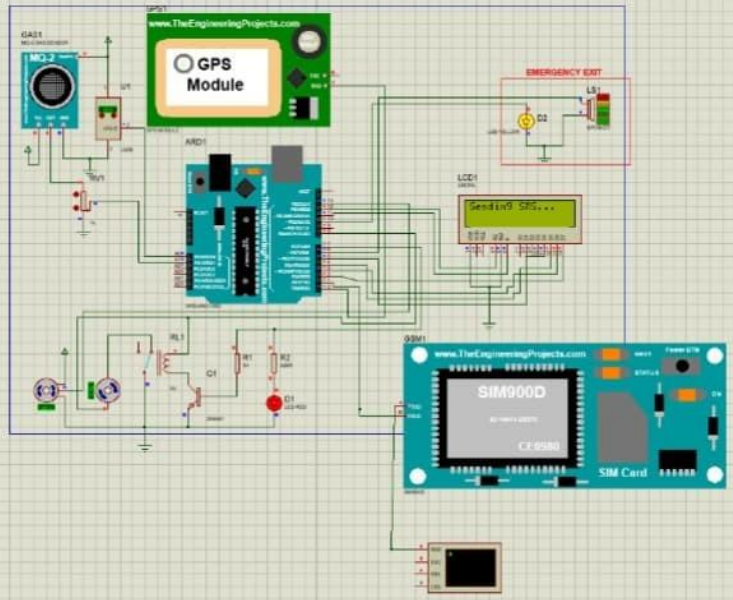
- PATTERN GENER
- DC VOLTMETER
- DC AMMETER
- AC VOLTMETER
- AC AMMETER
- WATTMETER



15 Message...

ANIMATING: 00:00:46.436024 (CPU load 76%)

x: 3400.0 y: +1600.0

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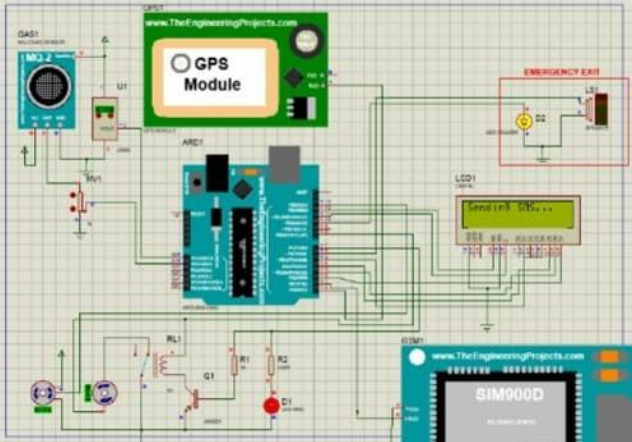
Base Design

Schematic Capture

INSTRUMENTS

- OSCILLOSCOPE
- LOGIC ANALYSER
- COUNTER TIMER
- VIRTUAL TERMIN
- SPI DEBUGGER
- I2C DEBUGGER
- SIGNAL GENERAT
- PATTERN GENER
- DC VOLTMETER
- DC AMMETER
- AC VOLTMETER
- AC AMMETER
- WATTMETER



Virtual Terminal

```
AT+CMGF=1
AT+CMGS="+233266302607"
>FIRE ALERT!
AT+CMGS="+233266302607"
FIRE OCCURED!
AT+CMGS="+233266302607"
FIRE OCCURED! in
Latitude = 0.000000 Longitude = 0.000000
```

15 Message

ANIMATING: 00:00:48.297069 (CPU load 77%)

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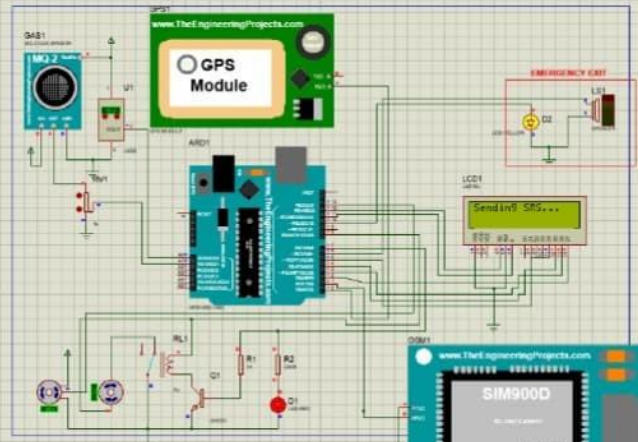
Base Design

Schematic Capture

INSTRUMENTS

- OSCILLOSCOPE
- LOGIC ANALYSER
- COUNTER TIMER
- VIRTUAL TERMIN
- SPI DEBUGGER
- I2C DEBUGGER
- SIGNAL GENERAT
- PATTERN GENER
- DC VOLTMETER
- DC AMMETER
- AC VOLTMETER
- AC AMMETER
- WATTMETER



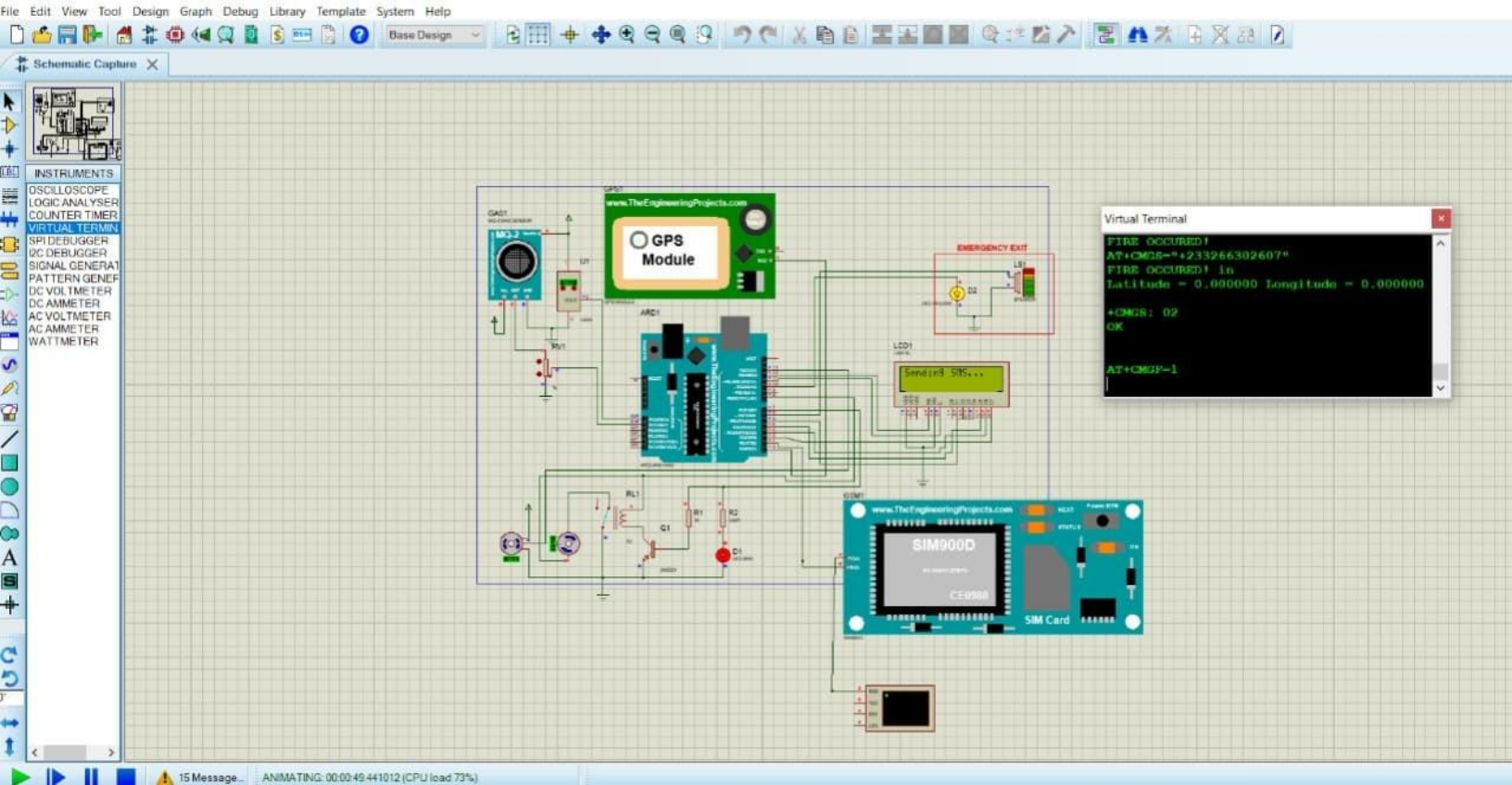
Virtual Terminal

```
AT+CMGS="+233266302607"
FIRE OCCURED!
AT+CMGS="+233266302607"
FIRE OCCURED! in
Latitude = 0.000000 Longitude = 0.000000

+CMGS: 02
OK
```

15 Message...

ANIMATING: 00:00:48.685706 (CPU load 71%)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Base Design
Schematic Capture
INSTRUMENTS
OSCILLOSCOPE
LOGIC ANALYSER
COUNTER TIMER
VIRTUAL TERMIN.
SPI DEBUGGER
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PATTERN GENER
DC VOLTMETER
DC AMMETER
AC VOLTMETER
AC AMMETER
WATTMETER
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GPS Module
MQ-2
EMERGENCY EXIT
Sending SMS...
SIM900D
SIM Card
Virtual Terminal
FIRE OCCURED!
AT+CMGS="+233266302607"
FIRE OCCURED! in
Latitude = 0.000000 Longitude = 0.000000
+CMGS: 02
OK
AT+CMGF=1
15 Message...
ANIMATING: 00:00:49.441012 (CPU load 73%)