

IOT VEHICLE FUEL THEFT DETECTION SYSTEM USING ARDUINO

Submitted in partial fulfillment of the requirements for the award of

**Bachelor of Engineering Degree in Electrical and
Electronics Engineering**

BY

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SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with Grade "A" by NAAC

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **BHARATHI.S (39140009), PAVITHRA.P (39140036), AMUDHA.S (39140002) and PARKAVI.V (39140035)** who carried out the project entitled "**IOT VEHICLE FUEL THEFT DETECTION SYSTEM USING ARDUINO**" under our supervision from November 2021 to May 2022.

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ABSTRACT

In this project we have focused on developing an enhancement of the vehicle alarm security system. The safety of vehicles fuel is extremely essential for public so this project came to our notice due to the alarming rate at which vehicles fuel are being stolen in our country. Today's world need digital techniques for measurement of any quantity conventional fuel meter are Analog so that we trying to make it digitized to show the fuel value digitally. In our project we show the amount of fuel Present in fuel tank digitally i.e. 1 liter, 1.5 liter, 2 liter etc. Also fuel theft is measure problem in all over world. In our project if fuel gets theft then text message will send to owner

of bike also buzzer makes noise so that owner of bike get aware. In traditional vehicle system such kind of system not implemented like display fuel availability digitally & fuel Theft of bike can be avoided. Fuel prices are soaring day by day. Due to this, there is a lot of increase in fuel theft cases. In order to aid people in their vehicle's fuel theft detection, we have developed this project called "IOT and Arduino based Vehicle fuel theft detection". This project would turn ON a buzzer and would also send data over IOT to a website whenever someone is trying to steal fuel from any vehicle.

The project works in the field of the fuel management system, which handles the theft alert and sensors, logs which determines the live situation of the fuel tank.

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LIST OF SYMBOLS AND ABBREVIATIONS

Arduino IDE	-	Arduino Integrated Development Environment
DAC	-	Digital to analog convertor
ESP 32-S3	-	Series of SoCs (System-on-a chip)
ESP32 DEV KIT V1 – DOIT -		ESP32 Development kit
ESP32	-	External Flash and SRAM
ESP32-C3	-	Series of SoCs (System-on-a chip)
GPIO	-	General Purpose input/output
I2C	-	Inter-integrated circuit
Node MCU	-	Node Micro Controller Unit
SPI	-	Serial Peripheral Interface

CHAPTER 1

INTRODUCTION

1.1 GENERAL INTRODUCTION

Now a days all world become digital so that we can easily deal with real time system. At same time digital fuel meter which is implemented in recent vehicle system has drawback that is actual fuel present in fuel tank of bike is not shown in term of digits instead shown in terms of bar or deflecting needle. Due to this we did not get idea about actual fuel present in fuel tank of bike it only shows the level of fuel present in fuel tank. Sometimes customer fill fuel from petrol filling pump they filled the petrol in digitally but in our vehicle there is no digital system there is bar or deflection needle system. The figure shows the existing fuel meter in bikes and cars. But it cannot give the accurate value of fuel filled, so the petrol filling pump owner is cheated on customer but customer do not know about cheating due to existing fuel metering system. All benefit goes to the petrol filling pump owner so that they many times cheated with customer. To solve this problem we developed a system of digital fuel meter that indicate value of fuel in digits such as 1lits, 1.5lits, 2lits etc. The digital fuel meter is applicable for all type of vehicles like car and bikes etc. Vehicle Petrol theft is one of the main concerns of many bike owners and car owners. Many times we have heard or some of us have already faced that petrol from their bike or cars has been stolen. The bike owner or car owner is unaware about the fuel theft. When he ride bike next time because of fuel thefting he have to face lot of problems. To avoid such problem Digital Fuel Meter and antitheft system should be implemented in vehicle. In this system we used the arduino, level sensor for finding the level of fuel by using Blink app we are monitoring the fuel level . While implementing the model, we have used telecommunication, to be specific; SMS is integrated or improvised to the present vehicle security system. Instead of human to human telecommunication, this system create new entity which is machine to human

telecommunication. This project aims to use GSM technology to monitor security of fuel.

1.2 LITERATURE SURVEY

- 1) Sharma A, Sharma P, Bhardwaj D, Mishra D, Soni A. Load Cell Based Fuel Theft Detection System Journal of Electronics and Communication Systems MAT Journals.2016; 3(1):1-4

Today, a lot of efforts are being taken all over the world to maximize the utilization of fuel use in engines of vehicles. Rising fuel prices and depletion of nonrenewable resources are the main reasons behind such concerns. Technology plays a very important role in our lives. In our project, we have worked in the direction to save fuel from being stolen directly from fuel tanks at commercial and individual levels by implementing a system which detects any change in the fuel level in the fuel tanks and reports to the owner through a call and a message immediately. Vehicle fuel theft has always been one of the major concerns for both bike and car owners and especially for goods and transport agencies. The main intention of this project is to avoid theft of fuel and minimize the financial loss

- 2) Katkar G, Lanke S, Kumar A, Khawate S. Fuel Checker and Theft Detection IJARIE.2017; 9(3):1813-1815

IoT has been a great area of research for providing excellence in area of designing smart cities and intelligent systems. Fuel theft from standing vehicles is a major problem which can be very easily resolved using this technique. In this paper we have proposed a system for detection of fuel theft from vehicle using the concept of IoT as well as wireless sensor networks. The method has shown very good results as compared to other state of the art methods.

- 3) Huang, H., Xiao, S., Meng, X., and Xiong, Y., "A Remote Home Security

System Based on Wireless Sensor Network and GSM Technology”,
Proceedings of Second International Conference on Networks Security,
Wireless Communications and Trusted Computing, 2010

In this project, a low-power consumption remote home security alarm system developed by applying WSN and GSM technology is presented. It can detect the theft, leaking of raw gas and fire, and send alarm message remotely. The hardware of this system includes the single chip C5081F310, wireless receiving and sending chip CC1100 as well as the SIMENS TC35 GSM module. The system software developed in C51 language has the ability of collecting, wireless receiving and sending data, and can send a piece of alarm short message to the users mobile phone when some dangerous condition has been detected.

- 4) B.G. Nagaraja, Ravi Rayappa, M. Mahesh, Chandrasekhar M. Patil, Dr.T.C. Manjunath:-“Design & Development of a GSM Based Vehicle Theft Control System” 978-0-7695-3516-6/08 ©2008 IEEE, DOI 10.1109/ICACC.2009.154,pp.148-15

Today, a lot of efforts are being taken all over the world to maximize the utilization of fuel use in engines of vehicles. Rising fuel prices and depletion of nonrenewable resources are the main reasons behind such concerns. Technology plays a very important role in our lives. In our project, we have worked in the direction to save fuel from being stolen directly from fuel tanks at commercial and individual levels by implementing a system which detects any change in the fuel level in the fuel tanks and reports to the owner through a call and a message immediately. Vehicle fuel theft has always been one of the major concerns for both bike and car owners and especially for goods and transport agencies. The main intention of this project is to avoid theft of fuel and minimize the financial loss.

- 5) B.G. Nagaraja, Ravi Rayappa, M. Mahesh, Chandrasekhar M. Patil, Dr. T.C. Manjunath:- “Design & development of a gsm based vehicle theft

control system” 978-0-7695-3516-6/08 ©2008 iee, doi 10.1109/icacc.2009.154,pp.148-15

This paper presents Design & Development of Multi level Anti theft security system to control the theft of a vehicle using GSM and Biometrics. The main objective of this is to offer an advanced security system in multiple levels to protect the car from unauthorized access using GSM technology. It provides a protected password to unlock the car and real time biometric user authentication in second level to start the ignition after finger print verification is done. If the fingerprint does not match with that in database, ARM produces the interrupt signal to disable the ignition and initiates an alarm and also inform the car owner about the unauthorized access via short Message Services (SMS) by means of GSM modem.

- 6) R. Rilwano, “Sistem pengukuran konsumsi bahan bakar pada sepeda motor berbasis arduino”. Diploma thesis, Universitas Andalas, Padang, 2016.

Fuel shortage is a common problem in Indonesia. This prompted many cases of vehicle fuel theft. As a solution to this problem, an Arduino-based vehicle fuel theft detector system is implemented. Arduino-based vehicle fuel theft detector system is a prototype that uses Arduino UNO as a microcontroller, I Com Sat v1.1 SIM900 GSM/GPRS Shield to communicate with mobile phone, fuel level sensor as a volume detector, and push button as a detector to check whether the fuel tanks lid is open or closed. The working principle of this system is to detect the state of the fuel tank lid. When the lid is open, the system will make a phone call. Then, the system will keep track of fuel volume. If there is a drastic decrease in volume, the system will send information about the decreasing volume in the form of a short message to the owner of the vehicle. The success rate of the communication system between Arduino UNO and other electronic devices is 100%. Accuracy of fuel level sensor is 90%. Success rate of push button switch in detecting the state of fuel tanks lid is 100%. Success rate of GSM Shield communication is 90%.

- 7) A. Avinashkumar, U. Singaravelan, T.V. Premkumar
and

K. Gnanaprakash, Digital fuel level indicator in two-wheeler along with distance to zero indicator. IOSR Journal of Mechanical and Civil Engineering (IOSRJMCE), 11:80-84 Mar- Apr. 2014

Today in this digitized world, if the fuel indicator in the automobiles is also made digital it will help to know the exact amount of fuel available in the fuel tank. The above furnished fact is considered in our project and we found out a proper solution for indicating the exact availability of fuel in the tank digitally . Here, we are indicating the amount of fuel in the tank in litres. This value in litres will be in numerical digits (ex:1.2, 1.3, 1.4). This project mainly concentrates about the indication of fuel level in two- wheeler tanks. Various other features like the distance can be travelled to the corresponding fuel, is added with this arrangement which will explain the clear performance of the vehicle to the corresponding fuel.

1.3 ADVANTAGES AND APPLICATIONS OF PROPOSED TECHNIQUE

- The advantage of using the IOT and Arduino based vehicle fuel theft detection system is that the thieves can be caught and any further theft can be avoided.
- This project can be used in all vehicles, even in government vehicles like buses etc.,
- IOT and Arduino based vehicle fuel theft detection system can be further developed to location details over IOT module.

CHAPTER 2

PROJECT DESCRIPTION

2.1 BLOCK DIAGRAM

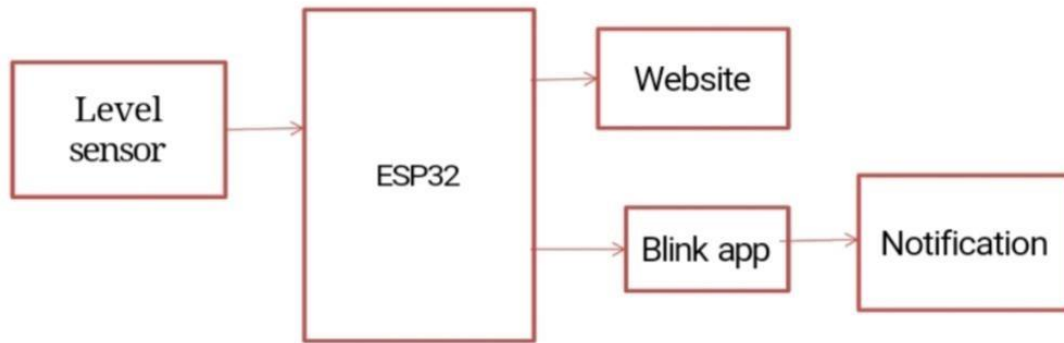


Fig. 2.1: Proposed Block diagram

2.2 BLOCK DIAGRAM EXPLANATION

- This is the proposed block diagram of our project ' IoT vehicle fuel theft detection system using arduino '.
- The above mentioned in the block diagram are the components used in the hardware.
- Let us see the explanation of how this block diagram is works.
- The first component level sensor, indicates the level of fuel present in the vehicle tank.
- The next component that is connected with level sensor is Esp32. ESP32 - It can interface with other systems to provide Wi-Fi and Bluetooth functionalities then the next blocks is where Esp32 connected with website and Blynk app.
- Website is where the ESP32 sends theft information. Whereas the Blynk app is a mobile application.
- It is a new platform that allows us to build interface for controlling and

monitoring the hardware for input output systems and Android devices.

- The next block is notification.
- When the theft occurred we will get the indication of theft through the Blynk app installed in mobile as notification.

2.3 FLOW CHART

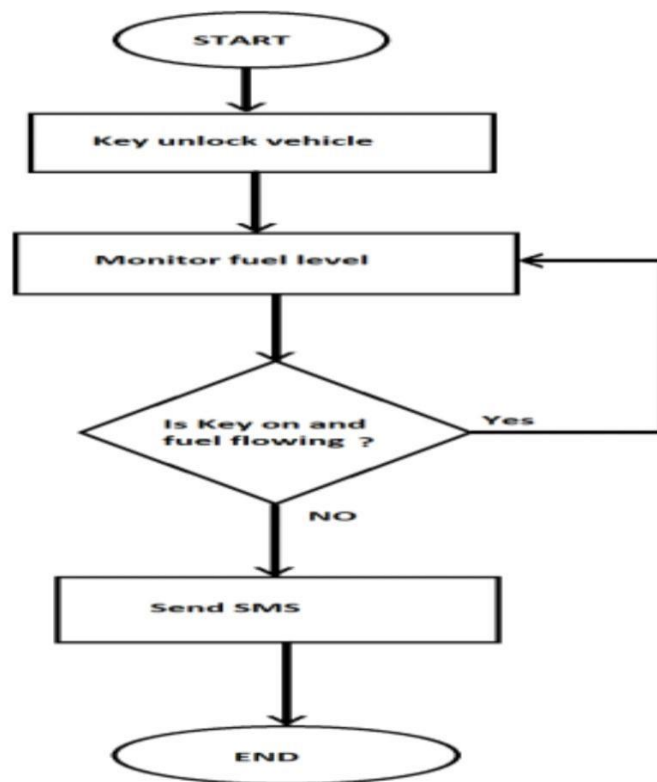


Fig. 2.2: Flow chart

Step 1: Start the process

Step 2: Insert key lock

Step 3: Check fuel level

Step 4: Is fuel below the range? If “YES” then go to Step 5. If “NO” the message will not be sent to owner

Step 5: Send text message to owner

Step 6: Buzzer is "ON".

Step 7: Check the buzzer is stopped within 2 minutes.

Step 8: Send message owner.

Step 9: Stop

CHAPTER 3

PROPOSED SYSTEM

3.1 PROPOSED SYSTEM EXPLANATION

In this proposed system efficient anti-theft that allows users to efficiently monitor the condition of the vehicle over the internet. This technology is the wireless sensor network technology, which mainly uses interconnected intelligent sensors to sense and monitoring. Our system uses a microcontroller Node MCU for processing all user commands. We have used Node MCU because it has an inbuilt Wi-Fi module that is used to connect to the internet and receive user commands.

3.2 SOFTWARE SIMULATION

```
#include <WiFi.h>

#include <WiFiClient.h> #include
<BlynkSimpleEsp32.h>

char auth[] = "J54GSK6BNikCA5rLImM5D2-nm0SbugxS";
char ssid[] = "iotdata"; char
pass[] = "12345678";
int fuel,fuellevel,diff;
int ignition; int
buzz=4; void
setup()
{
  pinMode(ignition,INPUT);
  pinMode(0,INPUT_PULLUP);
```

```

pinMode(buzz,OUTPUT);
digitalWrite(buzz,LOW);
Serial.begin(9600);
  Serial.println("FUEL THEFT");
  Blynk.begin(auth, ssid, pass);
}
void loop()
{
  Blynk.run();
  if(digitalRead(0)==LOW){
    Serial.println("IGNITION OFF");
    fuel=analogRead(32);
    Serial.println(fuel);
    while(digitalRead(0)==LOW){
      Blynk.run();
      fuellevel=analogRead(32);
      Blynk.virtualWrite(V0, fuellevel);
      diff = fuel-fuellevel;  diff =
      abs(diff);  if(diff>100){
        Serial.println("petrol theft");
        Blynk.notify("fuel theft");
        digitalWrite(buzz,HIGH);
        Serial.println(fuel);
        delay(1000);  break;
      }
      else{
        Serial.println("petrol          same");
        digitalWrite(buzz,LOW);

```

}
 }
 }
 }

3.3 PROTEUS SOFTWARE-SCHEMATIC DIAGRAM

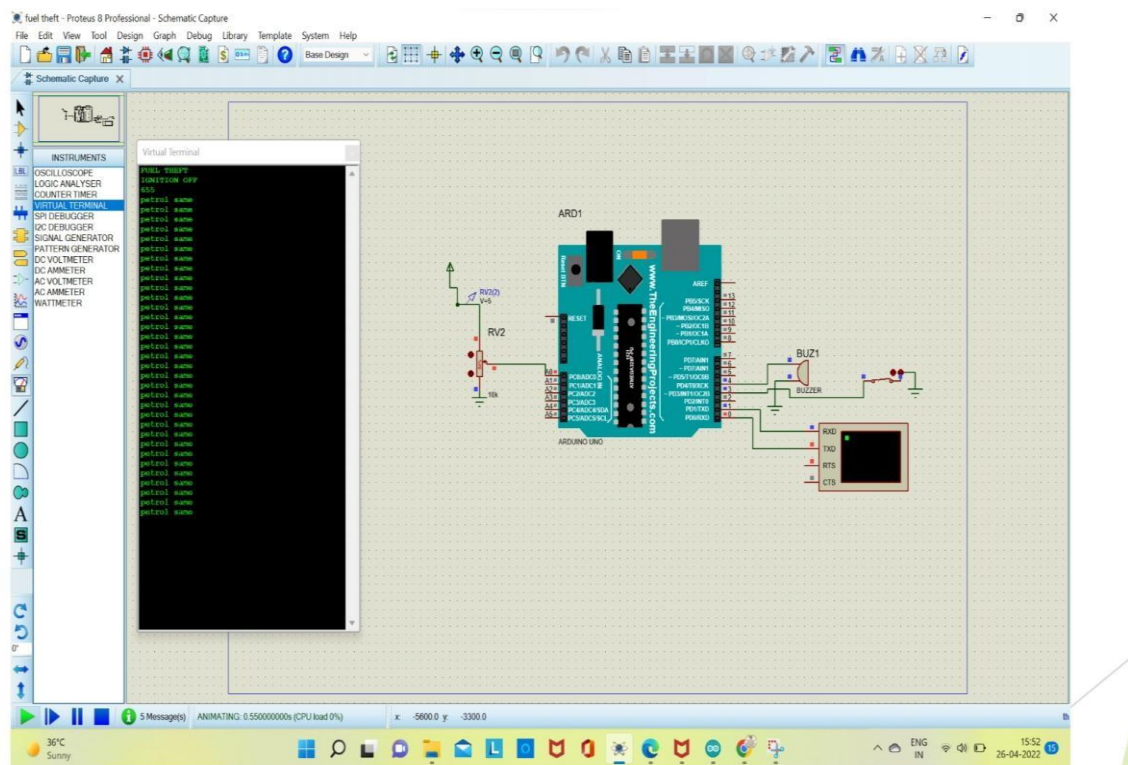


Fig. 3.1: Schematic capture of no change in fuel tank

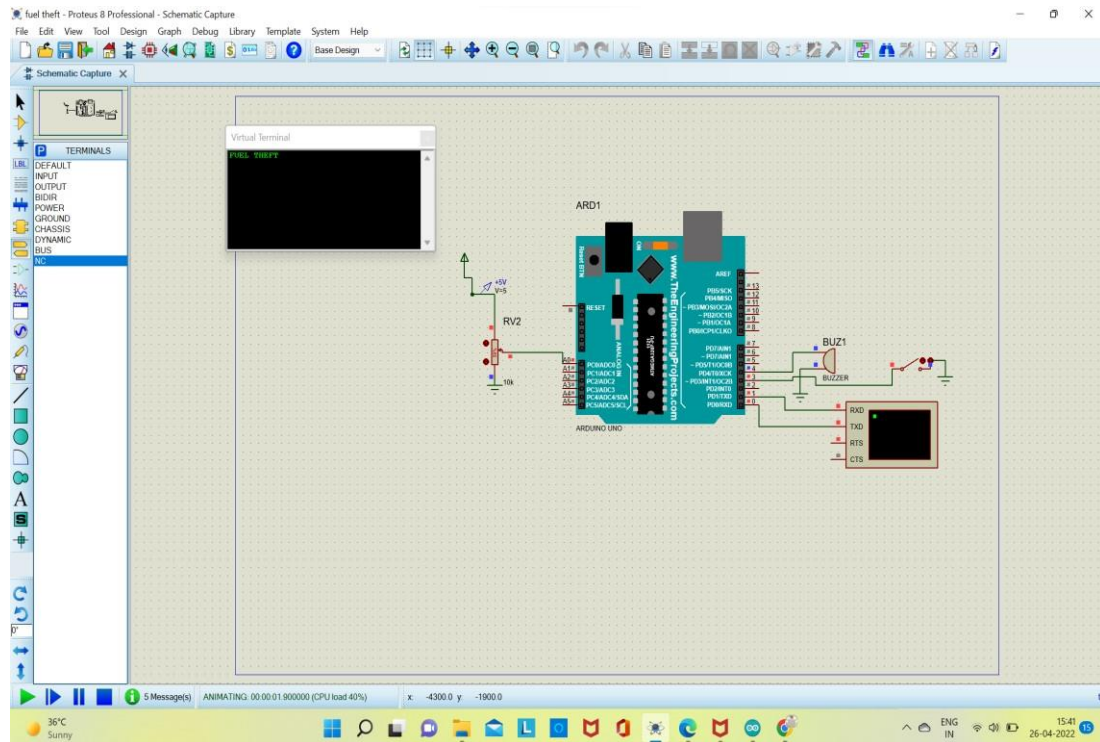


Fig. 3.2: At fuel theft

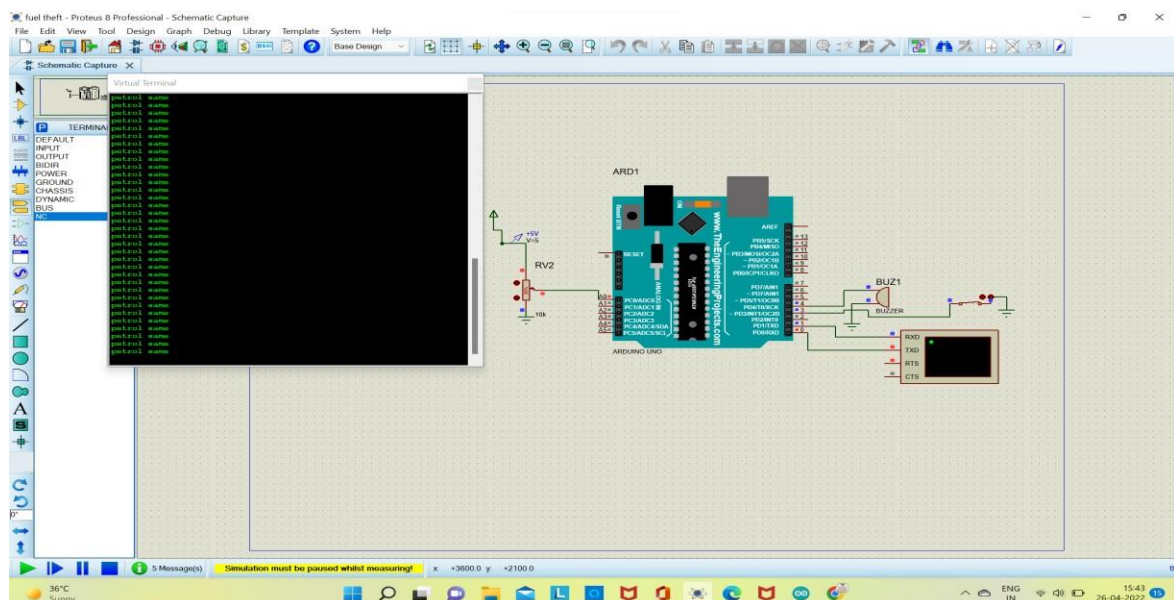


Fig. 3.3: After the indication of theft again the level of petrol is displayed

CHAPTER 4

HARDWARE & SOFTWARE DESCRIPTION

4.1 HARDWARE COMPONENTS

- Esp32
- Level sensor

4.1.1 *ESP32*

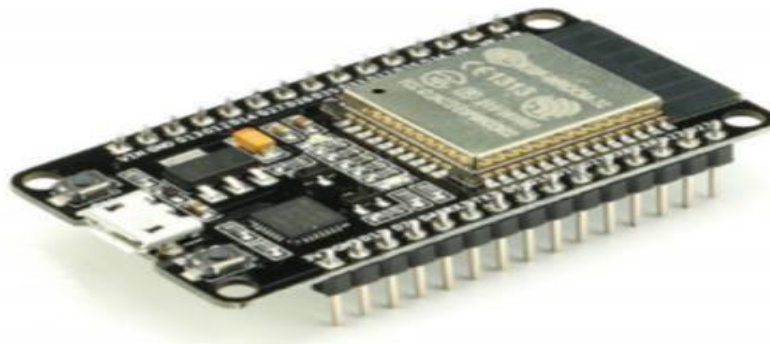


Fig. 4.1: ESP32 kit

The ESP8266 NodeMCU CP2102 board has ESP8266 which is a highly integrated chip designed for the needs of a new connected world. It offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor.

4.1.2 *Features*

- Small volume, easily embeded to other products
- Strong function with support LWIP Protocol, Freertos

- Supporting three modes : AP, STA, and AP+STA
- Supporting Lua program, easily to develop □ Includes CP2102 USB-UART bridge.

4.1.3 *ESP32 Family*

Since the release of the original ESP32, a number of variants have been introduced and announced. They form the ESP32 family of microcontrollers. These chips have different CPUs and capabilities, but all share the same SDK and are largely code-compatible. Additionally, the original ESP32 was revised (see ESP32 ECO V3, for example).

4.1.3.1 *ESP32-S2*

- Single-core Xtensa LX7 CPU, up to 240 MHz
- 320 kiB SRAM, 128 kiB ROM, and 16 kiB of RTC memory
- WiFi 2.4 Ghz (IEEE 802.11b/g/n)
- No Bluetooth
- 43 programmable GPIOs
- USB OTG

4.1.3.2 *ESP32-C3*

NodeMCU board with an ESP32-C3-32S

- Single-core 32-bit RISC-V CPU, up to 160 MHZ
- 400 kiB of SRAM and 384 kiB ROM
- WiFi 2.4 Ghz (IEEE 802.11b/g/n)
- Bluetooth 5 LE
- 22 programmable GPIOs

- Pin compatible with ESP8266

4.1.3.3 ESP32-S3

- Dual-core Xtensa LX7 CPU, up to 240 MHz
- Added instructions to accelerate machine learning applications
- 384 kiB of RAM and an additional 384 KiB of SRAM
- WiFi 2.4 Ghz (IEEE 802.11 b/g/n)
- Bluetooth 5 LE
- 44 programmable GPIOs
- USB OTG

4.1.4 ESP32 Peripherals

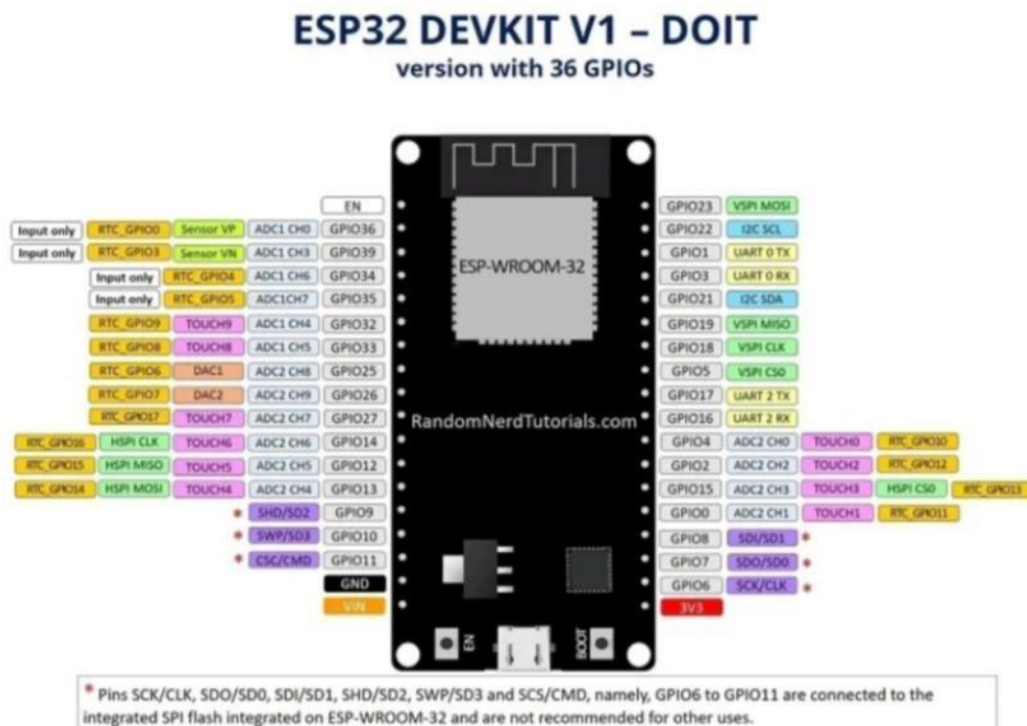


Fig. 4.2: ESP-WROOM-32

The ESP32 peripherals include:

- 18 Analog-to-Digital Converter (ADC) channels
- 3 SPI interfaces
- 3 UART interfaces
- 2 I2C interfaces
- 16 PWM output channels
- 2 Digital-to-Analog Converters (DAC)
- 2 I2S interfaces
- 10 Capacitive sensing GPIOs

The ADC (analog to digital converter) and DAC (digital to analog converter) features are assigned to specific static pins. However, you can decide which pins are UART, I2C, SPI, PWM, etc . We just need to assign them in the code. This is possible due to the ESP32 chips multiplexing feature.

Although you can define the pins properties on the software, there are pins assigned by default as shown in the following figure (this is an example for the ESP32 DEVKIT V1 DOIT board with 36 pins – the pin location can change depending on the manufacturer).

There are totally 39 digital Pins on the ESP32 out of which 34 can be used as GPIO and the remaining are input only pins. The device supports 18channels for 12-bit ADC and 2-channel for 8-bit DAC. It also has 16 channels for PWM signal generation and 10 GPIO pins supports capacitive touch features.

4.1.4.1 Important ESP32 Peripherals

Now that we have seen a little bit about ESP32 Pinout. Let us now focus on some of the important peripherals of ESP32 and their associated pins. ESP32 Microcontroller has:

- 34 Programmable GPIOs
- 18 12-bit ADC Channels

- 2 8-bit DAC Channels
- 16 PWM Channels
- 3 UART Interfaces
- 3 SPI Interfaces
- 2 I2C Interfaces
- 2 I2S Interfaces
- 10 Capacitive Touch Sensing GPIOs
- 16 RTC GPIOs

GPIO

The most commonly used peripheral is the GPIO. ESP32 has 34 GPIO pins with each pin carrying out more than one function (only one will be active). You can configure a pin as either a GPIO or an ADC or an UART in the program.

ADC and DAC pins are predefined and you have to use the manufacturer specified pins. But other functions like PWM, SPI, UART, I2C etc. can be assigned to any GPIO pin through program.

RTC GPIO

ESP32 has 16 RTC GPIOs, which are part of the RTC Low-Power subsystem. These pins can be used to wake ESP32 from deep sleep as external wake-up source.

ADC

ESP32 has two 12-bit SAR Analog to Digital Converter Modules with 8-channels and 10-channels each. So, ADC1 and ADC2 blocks combined together have 18 channels of 12-bit ADC.

With 12-bit resolution, the output Digital values will be in the range of 0 – 4093.

DAC

ESP32 Microcontroller has two independent 8-bit Digital to Analog Converter channels to convert digital values to analog voltage signals. The DAC has internal resistor network and uses power supply as input reference voltage.

The following two GPIO Pins are associated with DAC functionalities.

DAC1 GPIO25

DAC2 GPIO26

Capacitive Touch GPIOs

The ESP32 SoC has 10 capacitive-sensing GPIOs, which can detect variations in capacitance on a pin due to touching or approaching the GPIO Pin with a finger or stylus. These Touch GPIOs can be used in implementing capacitive touch pads, without any additional hardware.

SPI

The ESP32 Wi-Fi chip features three SPI blocks (SPI, HSPI and VSPI) in both master and slave modes. SPI is used to interface with Flash Memory. So, you have two SPI interfaces.

I2C

There are two I2C interfaces in ESP32 with complete flexibility on assigning pins i.e., SCL and SDA pins for both I2C interfaces can be assigned in the program by the user.

If you are using Arduino IDE, then the default I2C pins are:

SDA – GPIO21

SCL – GPIO22

Programming language

- Programming languages, frameworks, platforms, and environments used for ESP32 Visual Studio Code with the officially supported Espressif Integrated Development Framework (ESP-IDF) Extension
- Arduino IDE with the ESP32 Arduino Core
- Micro Python A lean implementation of Python 3 for microcontrollers
- Espruino JavaScript SDK and firmware closely emulating Node.js
- Lua Network/IoT toolkit for ESP32-Wrover Mongoose OS – an operating system for connected products on microcontrollers; programmable with JavaScript or C. A recommended platform by Espressif Systems,[58] AWS IoT, and Google Cloud IoT.
- M ruby for the ESP32
- Node MCU Lua-based firmware
- Ze rynth Python for IoT and microcontrollers, including the ESP32

4.1.5 Level Sensor

Level sensors detect the level of liquids and other fluids and fluidized solids, including slurries, granular materials, and powders that exhibit an upper free surface. Substances that flow become essentially horizontal in their containers (or

other physical boundaries) because of gravity whereas most bulk solids pile at an angle of repose to a peak. The substance to be measured can be inside a container or can be in its natural form (e.g., a river or a lake). The level measurement can be either continuous or point values. Continuous level sensors measure level within a specified range and determine the exact amount of substance in a certain place, while point-level sensors only indicate whether the substance is above or below the sensing point. Generally the latter detect levels that are excessively high or low.



Fig. 4.3: Level sensor

There are many physical and application variables that affect the selection of the optimal level monitoring method for industrial and commercial processes. The selection criteria include the physical: phase (liquid, solid or slurry), temperature, pressure or vacuum, chemistry, dielectric constant of medium, density (specific gravity) of medium, agitation (action), acoustical or electrical noise, vibration, mechanical shock, tank or bin size and shape. Also important are the application constraints: price, accuracy, appearance, response rate, ease of calibration or programming, physical size and mounting of the instrument, monitoring or control of continuous or discrete (point) levels. In short, level sensors are one of the very important sensors and play very important role in a variety of consumer/

industrial applications. As with other types of sensors, level sensors are available or can be designed using a variety of sensing principles. Selection of an appropriate type of sensor suiting to the application requirement is very important .A liquid level control system by using a float sensor works on the principle of buoyancy, which states, “A float immersed in a liquid is buoyed towards upward direction by an applied equal force to the weight of the displaced liquid.

Types

- Capacitance Level Sensors. The capacitance level sensors are operated by using a probe for checking changes in the level.
- Optical Level Sensors.
- Conductivity Level Sensors.
- Vibrating (Tuning fork)
- Float Switch Sensor
- Industrial ultrasonic level sensors.

4.1.6 Working Principle

Using static pressure measurement principle:

When the liquid level transmitter is thrown into a certain depth in the measured liquid, the formula for the pressure on the liquid surface of the sensor is:

$$P = \rho \cdot g \cdot H + P_o$$

Where:

P: Pressure on the face of the transmitter ρ : Density of the measured liquid g:

local gravitational acceleration

P_o : Atmospheric pressure on the liquid surface

H: the depth of the transmitter into the liquid

At the same time, the pressure of the liquid is introduced into the positive

pressure cavity of the sensor through the gas-conducting stainless steel, and then the atmospheric pressure P_o on the liquid surface is connected to the negative pressure cavity of the sensor to offset the P_o on the back of the sensor, so that the pressure measured by the sensor is: $p \cdot gH$, obviously, the liquid level depth can be obtained by measuring the pressure p .

4.1.7 Features

- 1) Flexible installation, convenient use, simple effect, and can be displayed on site
- 2) Signal isolation and amplification, cut frequency interference design, strong anti-interference ability
- 3) Anti-condensation, anti-lightning, anti-corrosion, anti-blocking design
- 4) Probe diameter 19mm~42mm is optional
- 5) Wiring reverse and overvoltage protection, current limiting protection
- 6) Ultra-wide price range, easy to choose.

4.1.8 Hardware Connection



Fig. 4.4: Hardware connection setup

4.2 SOFTWARE COMPONENTS

- ARDUINO IDE – 1.8.5
- EMBEDDED C
- Blynk app

4.2.1 *Arduino*

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike. Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide

4.2.2 *Embedded C*

Embedded c is a set of language extension for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically embedded C

programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. Embedded C uses most of the syntax and semantics of standard C, e.g., main() function, variable definition, data type declaration, conditional statements(if, switch, case), loops(while, for), functions, arrays and strings, structures and union, bit operations, macros, etc. During infancy years of microprocessor based systems, programs were developed using assemblers and fused into the EPROMs. There used to be no mechanism to find what the program was doing. LEDs, switches, etc. were used to check for correct execution of the program .But they were too costly and were not quite reliable as well .As time progressed, use of microprocessor-specific assembly-only as the programming language reduced and embedded systems moved onto C as the embedded programming language of choice. C is the most widely used programming language for embedded processors/controllers.

4.2.3 BLYNK APP

This is the mobile application used in our hardware to get notification. The basic idea of this BLYNK app is that when the fuel theft occurs and it is detected through alarm sound which is a 50% call for the user, after the alarm sound immediately we get notification of the theft through this BLYNK app. This BLYNK app is a harmless application, which not even take 2 minutes for installation. Easy user application. Below mentioned is the log of this BLYNK app.



Fig. 4.5: BLYNK application

CHAPTER 5

CONCLUSION & FUTURE SCOPE

5.1 CONCLUSION

This is we have designed a the theft of fuel by using embedded c and to monitor we have designed blynk app .to reduce the theft we have designed in latest technology. The Proposed scheme will help us to solve the fuel theft problem.

5.2 FUTURE SCOPE

IOT and Arduino based vehicle fuel theft detection system can be further developed to location details over IOT module.

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