JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue

JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

IOT BASED OIL SKIMMER ROBOT

Pulugujju Rajesh, P. Anjana Reddy, P. Sai Charan, P. Sainath Reddy, P. Nandana, P. Sai Krishna Reddy

Department of Electronics and Communication Engineering

B V RAJU INSTITUTE OF TECHNOLOGY, NARSAPUR

ABSTRACT

An oil skimmer is used to extract oil from an aqua-oil combination. It creates a very acidic, alkaline, and salty environment that endangers aquatic life and pollutes coastal regions. Every year, 706 million gallons of used oil enter rivers, causing pollution. Oil spills have contaminated sea water, causing aquatic creatures to suffer. So, we suggest developing a tiny boat that functions as an oil skimmer to extract oil from water. A swarm of such tiny boats working together may clean up oil spills while also recovering the oil spilt. The boat is controlled by a dc motor powered system with two rudders, and the operator directs it with a remote. The boat has an on-board oil skimmer system that filters oil from water and collects it in a separate tank. This enables for the recovery of oil from the water as well as its cleaning.

Keywords: Skimmer, Alkaline, Rudders, Contaminated, Gallons

1. INTRODUCTION

A wellhead rupture at the Midway- Sunset oilfield in California produced the worst unintentional oil leak in history on March 14, 1910. A pillar of oil and sand soared more than 50 metres from the earth, destroying the drilling equipment. The Lakeview Gusher Number One discharged 1.4 million cubic metres of crude oil, more than double the quantity leaked by the offshore drilling rig Deepwater Horizon in 2010. Workers inserted sand bags around the gusher to restrict the oil, and by October, the gusher was under control. Less than half of the oil spilled was retrieved, with the remainder allowed to evaporate or sink into the earth. (San Joaquin Geological Society, 2013) Since then, there has been a great shift in environmental consciousness. Water contamination is at the forefront of the European population's main environmental concerns today (Eurobarometer, 2005).

The Deepwater Horizon tragedy, in which massive amounts of oil were dumped into the Gulf of Mexico, is thought to be a major reason for this. Oil skimming, a mechanical technique of separating oil from water, is one way of dealing with and managing oil spills. Skimming may be done in a number of ways and is the only large-scale approach for actually extracting the oil. (Beyer, 2013) The enormous media coverage of the Deepwater Horizon disaster sparked a spike of interest in oil spill treatment and technology, particularly oil skimming. Nonetheless, oil skimming is widely utilized in industrial settings, where skimmers are used to collect lubricants and tramp oils, for example, in steel mills and food processing facilities. The competitive environment of the twenty-first century is complicated, with severe competition between huge, worldwide firms and inventive up-and-comers. In this context, businesses are always striving to expand their operations and discover new ways to benefit from their core skills. As societal and political awareness of pollution and sustainability has grown in recent years, more businesses are looking to this sector for new opportunities. Sandvik Process Systems manufactured their first steel belt in Sandviken in 1901 and has since been a prominent player in many various steel belt-based processing technologies. In the 1960s, an oil skimmer based on steel belt technology was created as a way of diverging and growing. Following an early burst of interest, the skimming industry gradually faded as other, more profitable, business fields arose. 2013 (Karlsson) However, interest in the oil-skimming area has returned, and this thesis will examine the attractiveness of the oil skimmer market and provide Sandvik Process Systems with a foundation for deciding which strategic course to take.

Waste oil that has been removed can be beneficial to other companies that create goods using the waste oil. For example, companies that produce vegetable oils or animal fats as a byproduct can sell this valuable oil to other sectors, which can be used to generate goods like biodiesel, soap, and animal feed. Waste petroleum oil may also be recycled and cleaned before being used to generate new petroleum oil. The removal of oil prior to treatment lowers costs and increases efficiency, generally resulting in a lower premium. Some plants recycle their treated water, while others transfer it to a city treatment facility. It's a computerized procedure. An automatic oil skimmer, as opposed to time-consuming and costly hand skimming, continually removes oil unattended. The installation of an oil skimmer significantly reduces the expense of hiring an outside contractor to take away oil. Because an oil skimmer collects oil rather than water, the facility does not charge for water removal.

Using an oil skimmer reduces unpleasant odors. When an oil film builds on the water's surface, it inhibits oxygen from reaching the water, allowing anaerobic bacteria to flourish. This bacterium is responsible for the odour. If oil is allowed to accumulate, it might provide a fire threat. An oil skimmer mitigates this problem by removing the oil.

2. LITERATURE SURVEY

Oil skimming is a developing business with several firms and technology. As the literature analysis began, we learned that the skimming market lacks the structure found in many other industries. Interviews with specialists were organised to minimise common problems and to swiftly access relevant material. Four interviews were held with specialists from various disciplines who were interested in oil skimming or related applications.

- • Per-Olof Persson, Royal Institute of Technology University Lecturer in Industrial Ecology: Mr. Persson has come into touch with oil skimming on several occasions as a lecturer on technical environmental protection. Mr. Persson's knowledge also extends to various types of oils and oil treatment processes.
- Örjan Nilsson, Application Technology – Purchase, Sandvik Process Systems: Mr. Nilsson is in charge of the oil skimmer at Sandvik Process Systems and has tested it. Mr. Nilsson also has knowledge of contemporary uses for the oil skimmer.
- Tommy Carlsson and Lars Mattson, Rescue Coordinators at the Swedish Coast Guard's Regional Control Centre: Mr. Carlsson and Mr. Mattson worked as rescue coordinators for the Swedish Coast Guard, where they organized rescue operations to

counteract oil spills. They have also been involved in the process of procuring new equipment to mitigate oil spills, giving them a thorough understanding of the technological solutions that are available.

- Jonas Johnson, CEO, Surf Cleaner: Mr. Johnson understands the dynamics and evolution of the oil skimming sector as the CEO of a firm that manufactures oil skimming equipment. Mr. Johnson's knowledge also covers new technology on the oil skimming markets and its applications, as Surf Cleaner delivers a novel solution. 15 The interviews were semi-structured. Some questions were planned; however, interview subjects were invited to create their responses and go deeper into the issue. These exploratory interviews served as a foundation for the literature review.
- As oil skimming as a business is an underdeveloped market, not much literature has been produced on the topic. Instead, a lot of the information was acquired from interviews with companies within the market. As a means of reaching many companies at once, we travelled to Houston, Texas, USA, in order to participate in the 2013 Offshore Technology Conference. At the conference we met with a series of oil skimming equipment manufacturers as well as companies working with oil spill response. The conference gave a great insight into the market and resulted in a number of unstructured interviews on the exhibition floor which were combined with follow-up email conversation.

3. METHODOLGY

3.1 Division of project in to different modules

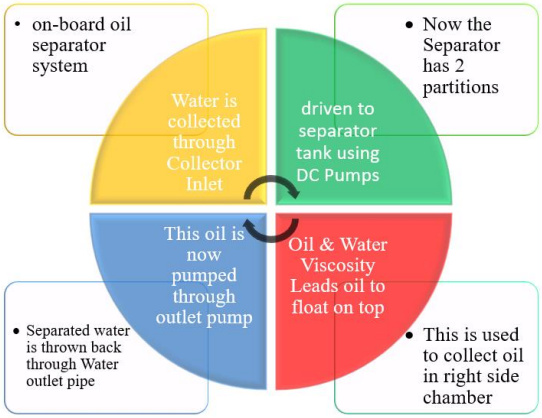


Figure 3.1(a) Modules

This system includes NodeMCUesp8266micro controller which is interfaced with two L293D motor Driver units, one for the boat control and other for the motor pump. This system is integrated with a IOT based Blynk Server through which we can control the Boat and also control the OIL skimming Process via Blynk mobile APP. The Motor pump will suck all the oil whichis floating on the water and it is stored in the tank.

Block Diagram:

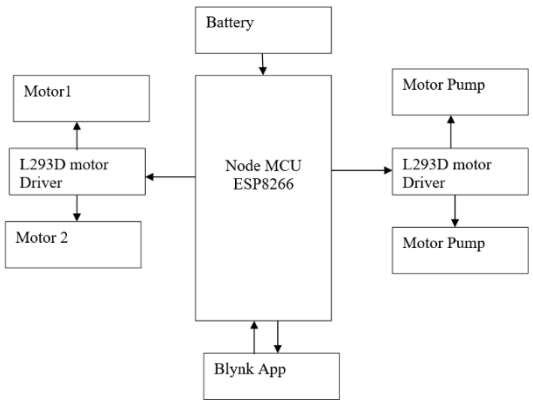


Figure 3.1(b) Block Diagram

4. COMPONENTS USED

4.1 SYSTEM HARDWARE DESIGN

The monitoring system contains several components. This chapter gives a detailed review of each of this part along with its working.

POWER SUPPLY

Power supplies are intended to convert high voltage alternating current mains power into a stable low voltage supply for electronic circuits and other devices. A power supply can be divided into a number of blocks, each of which performs a specific purpose. A DC power supply that keeps the output voltage constant regardless of the power source.

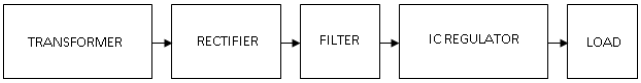


Figure 4.1(a) Power Supply

This circuit, as shown in the picture above, is a method for obtaining both 12V and 5V DC power supplies. To produce the requisite voltages, the circuit employs two integrated circuits, 7812 (IC1) and 7805 (IC2). The transformer T1 will step down the AC mains voltage, which will then be rectified and filtered by capacitor C1 to provide a stable DC level. This voltage is regulated by IC1 in order to bridge B1 and get a constant 12V DC. The IC2 will control the IC1's output to achieve a constant 5V DC at its output. This method yields both 12V and 5V DC. This type of circuit is particularly beneficial when we require two DC voltages to operate a circuit.

The TO-220 packaging and a variety of preset output voltages are available for the LM78XX family of three terminal positive regulators, making them suitable in a wide range of applications. Internal current limiting, thermal shutdown, and safe operating area protection are used by each kind, making it almost indestructible. They can provide more than 1A output current if appropriate heat sinking is given. Although these devices are generally intended to be fixed voltage regulators, they may be used in conjunction with external components to provide adjustable voltages and currents.

The power supply portion provides +5V for the components to function. The IC LM7805 is used to provide a consistent voltage of +5V. The alternating current voltage, commonly 220V, is linked to a transformer, which reduces the alternating current voltage to the required dc output level. A diode rectifier then produces a full-wave rectified voltage, which is first filtered by a simple capacitor filter to generate a direct current voltage. The resultant dc voltage generally contains some ripple or alternating current voltage change.

TRANSFORMER

Transformers transfer alternating current (AC) electricity from one voltage to another with little power loss. Transformers only function with alternating current (AC), which is one of the reasons why mains power is alternating current. Step-up transformers raise voltage, whereas step-down transformers lower voltage. A step-down transformer is used in most power supply to decrease the dangerously high mains voltage (230V in India) to a safer low voltage.

The primary coil is the input coil, while the secondary coil is the output coil. The two coils are not electrically connected; instead, they are linked by an alternating magnetic field formed in the transformer's soft-iron core. Because transformers lose relatively little electricity, the power out is (almost) equal to the power in. It should be noted that when voltage is reduced, current increases.

The transformer reduces the power supply voltage (0-230V) to (0-6V). The secondary of the potential transformer is then linked to the bridge rectifier, which is built of PN junction diodes. The use of a bridge rectifier has the benefit of producing a DC peak voltage

output.

RECTIFIER

There are numerous ways to link diodes to form a rectifier that converts alternating current to direct current. The most essential rectifier is the bridge rectifier, which generates full-wave fluctuating DC. If a center-tap transformer is employed, a full-wave rectifier may be produced with just two diodes, although this approach is rarely utilized now that diodes are cheaper. A single diode can be used as a rectifier; however, it can only create half-wave changing DC by using the positive (+) sections of the AC wave.

VOLTAGE REGULATORS

Voltage regulators are a type of IC that is commonly utilized. Regulator IC units combine the circuitry for a reference source, comparator amplifier, control device, and overload protection into a single integrated circuit. IC units regulate either a fixed positive voltage, a fixed negative voltage, or a variable voltage. The regulators may be configured to operate with load currents ranging from hundreds of milliamperes to tens of amperes, with power ratings ranging from milliwatts to tens of watts.

A fixed three-terminal voltage regulator has an uncontrolled dc input voltage, Vi, applied to one input terminal, a regulated dc output voltage, Vo, applied to a second terminal, and the third terminal linked to ground.

The series 78 regulators offer fixed positive regulated voltages ranging from 5 to 24 volts. The series 79 regulators, likewise, give set negative regulated voltages ranging from 5 to 24 volts. Voltage regulator integrated circuits can have fixed (usually 5, 12, and 15V) or variable output voltages. They are also graded according to the highest current they can carry. There are negative voltage regulators available, primarily for use with dual supply. The majority of regulators feature some form of automated protection against high current ('overload protection') and overheating ('thermal protection').

Many fixed voltage regulator ICs have three leads and resemble power transistors, such as the 7805 +5V 1Amp regulator. They have a hole for connecting a heat sink if necessary.

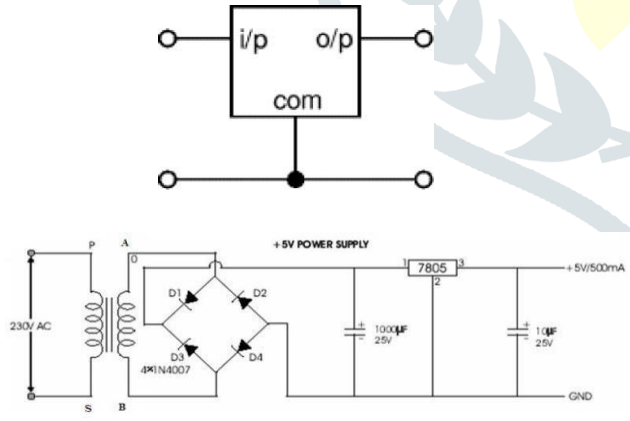


Figure 4.1(b) 7805 voltages

RECHARGEABLE BATTERY

A sort of electrical battery is a rechargeable battery, storage battery, or accumulator. It is a form of energy accumulator that consists of one or more electrochemical cells. Because its electrochemical processes are electrically reversible, it is referred to as a secondary cell. Rechargeable batteries exist in a wide range of forms and capacities, from button cells to megawatt systems linked to stabilise an electrical distribution network. Many other chemical combinations are employed, including lead–acid, nickel cadmium (NiCd), nickel metal hydride (NiMH), lithium ion (Li-ion), and lithium–ion polymer (Li-ion polymer). Rechargeable batteries offer a lower overall cost of usage and an impact on the environment than disposable batteries. Some rechargeable battery types come in the same sizes as disposable batteries.

NODE MCU:

The Node MCU is an open-source firmware and development kit that allows you to prototype your IoT device with just a few lines of Lua code. The ESP8266 is a microcontroller created by Expressive Systems. This module has a USB connection and a wide range of pin-outs. You may attach the Node MCU devkit to your laptop through a micro-USB connection and flash it exactly like an Arduino. It is also immediately breadboard-compatible.

Features:

- Open-source
- Interactive
- Programmable
- Low cost
- Simple
- Smart
- WI-FI enabled

ESP8266 INTRODUCTION

The ESP8266 is a low-cost MCU with built-in Wi-Fi. It may be combined with another host microcontroller, such as an Arduino, to give Wi-Fi networking functionality for a basic IoT development platform. Furthermore, the ESP8266 may be utilized as a stand-alone MCU because it has a 32-bit 80 MHz CPU, 16 GPIO pins (4 PWM enabled), an Analog-to-Digital converter, SPI and I2 interfaces, and more... The MCU has an operational voltage range of 2.5V – 3.6V and an average operating current of 80 mA.

Figure 4.1 (c) ESP8266 – ESP-12E version

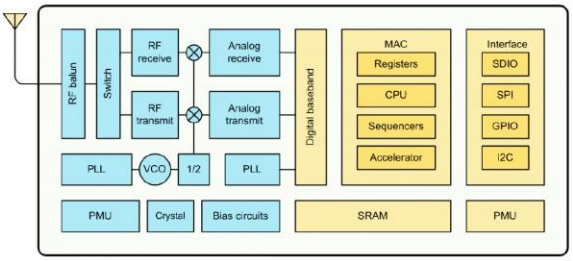
The Node MCU team has built an open source, complete development board based on the ESP8266 that includes an extra USB to Serial UART converter, a micro-USB connector for programming, and a 3.3v regulator. The Node MCU board comes ready to connect to your computer, install USB drivers, and begin creating applications that connect to your Wi-Fi network right out of the box! On eBay, all of this costs an average of $4 USD.

ESP8266 is the most popular and low-cost Wi-Fi SoC with TCP/IP stack and a low power 32-bit microcontroller manufactured by express if, a Shanghai based Chinese manufacturer. Nowadays IoT (Internet of Things) is an emerging field. This is the one of the most popular and low-cost solution for connecting 'Things' to internet via Wi-Fi.

The ESP8266 is part of Express if System's Smart Connectivity Platform (ESCP), which is a collection of high performance, high integration wireless SoC (System on Chip) designed for mobile platform builders with little power and space. It is a self-contained Wi-Fi networking solution, which means we can store and operate the program without using any additional processors. If necessary, we can integrate it with another application processor through SPI/SDIO or I2C/UART interface.

Figure 4.1(d) ESP8266 – Block Diagram

Features of ESP8266:



• 802.11 b/g/n

- Integrated low power 32-bit MCU, 10-bit ADC, TCP/IP protocol stack, Integrated TR switch, balun, LNA, power amplifier and matching network, Integrated PLL, regulators, and power management units
- Wi-Fi 2.4 GHz, support WPA/WPA2
- Supports STA/AP/STA+AP operation modes, antenna diversity, Smart Link Function for both Android and iOS devices SDIO 2.0, (H) SPI, UART, I2C, I2S, IR Remote Control, PWM, GPIO
- Deep sleep power < 5uA
- Wake up and transmit packets in < 2ms
- Standby power consumption of < 1.0mW (DTIM3)
- +20 dBm output power in 802.11b mode
- Operating temperature range -40C ~ 125C
- FCC, CE, TELEC, Wi-Fi Alliance, and SRRC certified
- The switch SW2 (Programming Switch) should be held pressed to hold the GPIO-0 pin to ground. This way we can enter into the programming mode and upload the code. Once the code is released the switch can be released.

ESP8266 Pin Configuration:

Pin No.	Pin Name	Alternate Name	Normally used for	Alternate purpose
1	**Ground**	-	Connected to the ground of the circuit	-
2	**TX**	GPIO – 1	Connected to Rx pin of programmer/uC to upload program	Can act as a General-purpose Input/output pin when not used as TX
3	**GPIO-2**	-	General purpose Input/output pin	-
4	**CH_EN**	-	Chip Enable – Active high	-
5	**GPIO – 0**	Flash	General purpose Input/output pin	Takes module into serial programming when held low during start up
6	**Reset**	-	Resets the module	-
7	**RX**	GPIO – 3	General purpose Input/output pin	Can act as a General-purpose Input/output pin when not used as RX
8	**Vcc**	-	Connect to +3.3V only	

Table 4.1 ESP8266 Pin Configuration

Usage of the ESP8266 Module:

There are so many methods and IDEs available to with ESP modules, but the most commonly used on is the Arduino IDE. The **ESP8266 module** works with 3.3V only, anything more than 3.7V would kill the module. Program an **ESP-01** by using the FTDI board that supports 3.3V programming. One commonly problem that everyone faces with ESP-01 is the powering up problem. The module is a bit power hungry while programming and power it with a 3.3V pin on Arduino or just use a potential divider. So, it is important to make a small voltage regulator for 3.31v that could supply a minimum of 500mA. One recommended regulator is the LM317.

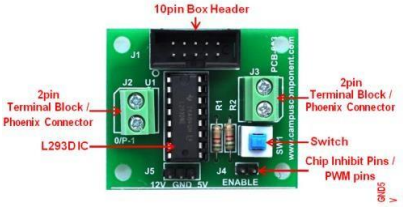


Figure 4.1(e) Circuit diagram

L293D Motor Driver

The L293D motor driver is offered for easy and user-friendly interface with embedded applications. The L293D motor driver is installed on a high-quality single-sided non-PTH PCB. For simple access to the driver IC's pin functionalities, the pins of the L293D motor driver IC are attached to connectors. The L293D is a Dual Full Bridge driver that can supply up to 24V and drive up to 1Amp per bridge. It can power two DC motors, relays, solenoids, and other devices. TTL compatibility is provided by the device. Two L293D H bridges coupled in parallel may boost the current capacity to 2 Amp.

Features

- Easily compatible with any of the system
- Easy interfacing through FRC (Flat Ribbon Cable)
- External Power supply pin for Motors supported
- PWM (Pulse Width Modulation) selection switch onboard 2pin Terminal
- Block (Phoenix Connectors) for simple Motor Connection
- H-Bridge base Motor Driver IC onboard (L293D)

Technical Specification:

- Power supply: 5V DC through FRC connection
- 9V to 24V DC external power supply
- Dimensions: 44 mm x 37 mm x 14 mm (l x b x h)
- Temperature range: 0 to +70 degrees Celsius

The driver IC L293D is a quad push-pull driver capable of providing output currents of up to 1A per channel. Each channel is controlled by a TTL-compatible logic input, and each pair of drivers (a complete bridge) has an inhibit input available at pins 1 and 9. The motor will only run when chip inhibit is set to high logic, i.e. when chip inhibit is activated.

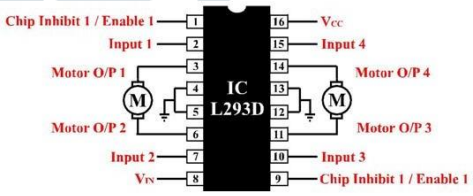


Figure 4.1(g) L293D pin setup

The controller controls the input to the motor driver IC through its motor driver input connection. Pin Headers with a plastic guide box around them are referred to as "Box Headers" or "Shrouded Headers," and are typically used in conjunction with a Flat Ribbon Cable (FRC) connection. A notch (key) in the guide box generally prevents connectors from being inserted the incorrect way around. Box Header (J1 on board) may be linked utilizing FRCs as well as Single Berg Wires for individual pin connections.

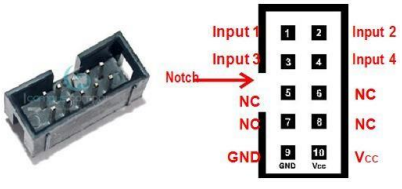


Figure 4.1(h) Pin box header

PWM

This is a DPDT (push-on, push-off) switch (denoted as SW1 on board). When the switch is turned off, 100 percent PWM (Pulse Width Modulation) is provided regardless of the voltage levels at the Enable pins (denoted as Chip Inhibit pins in the IC diagram, denoted as J4 onboard), whereas when the switch is turned on, the PWM is set according to the voltage levels at the enable pins.

Figure 4.1(i) reset, supply pins, enable pins

DC MOTOR

A direct current (DC) motor is an electric motor that runs on direct current (DC). The operation of any electric motor is based on basic electromagnetism. When a current-carrying conductor is put in an external magnetic field, it experiences a force proportional to the current in the conductor and the intensity of the external magnetic field. As you may recall from your childhood experiences with magnets, opposite (North and South) polarities attract, whereas like polarities (North and North, South and South) repel. A DC motor's internal arrangement is intended to create rotational motion by harnessing the magnetic interaction between a current-carrying wire and an external magnetic field.

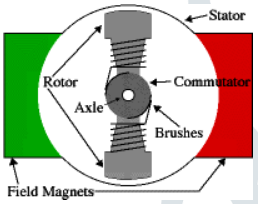


Figure 4.1(j) DC motor

Every DC motor has six fundamental components: an axle, a rotor (also known as an armature), a stator, a commutator, field magnet(s), and brushes. The external magnetic field in most popular DC motors is created by high-strength permanent magnets1. The stator is the motor's stationary component, which contains the motor casing as well as two or more permanent magnet pole parts. The rotor revolves around the stator. The rotor is made up of windings (usually on a core), which are electrically coupled to the commutator. The figure above depicts a typical motor configuration, with the rotor enclosed by stator (field) magnets. The brushes, commutator contacts, and rotor windings are designed in such a way that when power is provided, the polarities of the energized winding and the stator magnet(s) are mismatched, causing the rotor to revolve until it is almost aligned with the stator's field magnets.

The brushes advance to the next commutator contacts and activate the next winding as the rotor approaches alignment. In our two-pole motor example, rotation reverses the direction of current through the rotor winding, causing the magnetic field of the rotor to "flip," causing it to continue revolving.

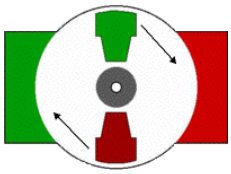


Figure 4.1(k) Rotor winding

However, in practice, DC motors will always have more than two poles (three is a very common number). This avoids "dead spots" in the commutator in particular. You can see how, in our two-pole motor example, if the rotor is exactly in the center of its revolution (completely aligned with the field magnets), it will become "stuck." Meanwhile, with a two-pole motor, the commutator occasionally shorts out the power supply (i.e., both brushes touch both commutator contacts simultaneously). This would be detrimental for the power supply, waste energy, and maybe damage motor components. Another downside of such a small motor is that it exhibits a lot of torque "ripple."

4.2 SOFTWARE DESCRIPTION

Creating project

ARDUINO IDE

In this section, we will learn how to install the Arduino IDE and link the Arduino uno to the Arduino IDE.

Step 1: First, we need an Arduino board (we may use whatever board we like) and a USB wire. We will need a conventional USB cable (A plug to B plug) if we are using Adriana UNO, Arduino Duemilanove, Nano, Arduino Mega 2560, or Diecimila, and an A to Mini-B cable if we are using Arduino Nano.

Step 2: Install the Arduino IDE software. We must choose software that is compatible with our operating system.

Step 3: Turn on our board.

Make sure it's connected to the two pins nearest to the USB port.

Using the USB cord, connect the Arduino board to our PC.

The green power LED (labelled PWR) should be illuminated.

Step 4: Start the Arduino IDE.

After downloading the Arduino IDE program, we must unzip the folder. We may discover the application icon with an infinite label within the folder (application.exe).

Step 5: Initiate our first project.

We have two alternatives after the program begins.

* Create new project

* Open existing project example.

Select File New to start the project.

Select File Example Basics Blink to open an existing project example.

Step 6: Choose our Arduino board.

Step 7: Choose a serial port.

Step 8: Upload the software to Wer.

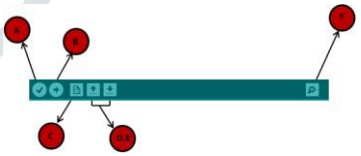


Figure 4.2(a) Arduino IDE Taskbar

A - used to determine whether or not there is a compilation mistake.
B - This function is used to upload a program to the Arduino board.
C - Shortcut for creating a new drawing.
D - Used to open one of the sample drawings directly.
E - is used to save the wer drawing.
F - The serial monitor receives serial data from the board and sends serial data to the board. Now, in the environment, just click the "Upload" button. Wait a few seconds for the RX and TX LEDs on the board to flash. If the upload is successful, the status bar will display the message "Done uploading."

BLYNK APP

Blynk was created with the Internet of Things in mind. It can operate gear remotely, show sensor data, save data, visualize it, and do a variety of other fascinating things.

The platform is made up of three primary components:

- **Blynk App -** allows you to develop stunning interfaces for your projects by utilizing the many widgets we offer.
- **Blynk Server** - is charge of all smartphone-to-hardware communications You have the option of using our Blynk Cloud or running your own private Blynk server locally. It's open-source, capable of supporting thousands of devices, and can even run on a Raspberry Pi.
- **Blynk Libraries** - Enable connectivity with the server and handle all incoming and outgoing commands for all major hardware platforms.

Consider this: whenever you hit a Button in the Blynk app, the message is sent to the Blynk Cloud and mysteriously finds its way to your device. It works in the reverse direction as well, and everything happens in the blink of an eye.

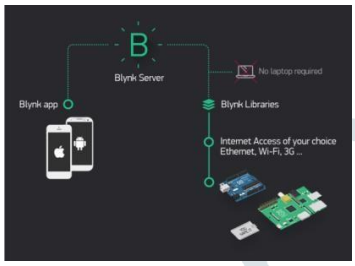


Figure 4.2(b) Blynk app

- Connection to the cloud using:
  - WIFI
  - Bluetooth and BLE
  - Ethernet
  - USB (Serial)
  - GSM
- A collection of simple Widgets
- Direct pin manipulation without the need for coding
- Virtual pins make it simple to integrate and add new features.
- Tracking historical data with the Super Chart widget
- Bridge Widget for device-to-device connectivity
- Sending emails, tweets, and push alerts, among other things.
- New features are updated on a regular basis!
- Example drawings covering fundamental Blynk features are available. They are part of the library. All of the sketches are intended to be simply merged with one another.

5. FUTURE SCOPE

Speed of the belt cannot be varying so it is to be improving by providing multispeed arrangement. Stirrer mechanism can be used to improve the oil removal rate.

6. RESULT

This oil skimmer is particularly successful in skimming oil spills from the water's surface. It is also utilized in oil refineries near the coast and other sectors that dispose of waste oil. In the event of a mishap, the deep-water horizon rig areas can employ the sea swarm.

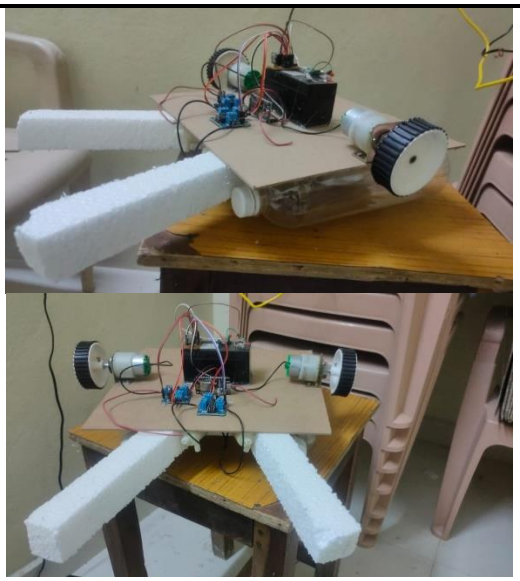


Figure 7 Results

7. CONCLUSIONS

This project has given us a fantastic opportunity to put our little expertise to work. Removing unnecessary oil from water, which saves the environment and money. In comparison, the belt skimmer produces the best results. Considering all of the limitations, the separator is easy to develop and quite dependable. The polyurethane oil separator belt has a higher oil skimming capacity and is more convenient to use in low-noise environments. It is extremely beneficial to operators since it eliminates the time-consuming task of skimming the oil and grease from waste water. This tiny, compact, low-cost, self-organizing system is proposed for collecting and skimming surface oil spills.