

# Design and Implementation of Smart Boat Technique

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**Abstract-**The Aqua smart boat which has inbuilt automatic fishing technique is designed by using DTMF technology, as it is a wireless, it can be easily mobilized and also controlled. Remote control fishing is a fishing technique accomplished by using a remote control boat. This project utilizes two DC Motors which are connected to the propellers of the aqua smart boat which are used to move the boat in several directions. Advantages of a brushed DC motor include low initial cost, high reliability, and simple control of motor speed. The driver used for DC Motors is L293D. The ARDUINO Microcontroller takes the input from the DTMF decoder and fishing rod sensor and communicates with the motor driver to perform necessary actions. LED indicator which it can indicate the motor ON/OFF in case of directions. The mobile phone acts as remote control. In this project we use ARDUINO micro controller, which is programmed to control the input and output modules present in the aqua smart boat. With the help of mobile keypads operations will be done. The aqua smart boat can be operated in a lake or a pond which is best suitable for fishing using a mobile phone which the users carry it daily. The boat has a motor which is connected to the fishing string hold a sensor which is covered by bait(fish food) at the end of the string. Once the boat enters into the lake/pond and when the fish catches the bait the sensor gets activated and the fish is pulled in to the boat.

**Index Terms-** Aqua smart boat, DTMF Decoder , DC Motor, Propellers ,Fish Bait

## INTRODUCTION

Telecommunication signaling employs Dual-tone multi frequency (DTMF) over analog telephone lines in the voice frequency band between telephone handsets and other communication devices. The trade mark term touch tone is the version of DTMF is used for telephone tone dialing and it is standardized by ITU-T. The remote control fishing boats are almost exclusively battery operated, since batteries provide several benefits when compared with glow engines: less noise during operation, consume no power during idle time, requires no oxygen, easier to maintain, finer power and speed control, etc. The aqua smart boat is mainly used to catch the fish automatically by operating it wirelessly by the user as the user need not to enter into the water or require a huge boat to go for fishing.

## STUDIES AND FINDINGS

This research paper uses experimental method with DTMF (Dual tone multiple frequency) decoder design. The decoder decodes the DTMF tone into its equivalent binary digit and this binary number is sent to the micro-controller (ATmega328). This research is collected from Design and Implementation of mobile operated Toy Car by DTMF. In the existing system this technique was implemented for designing a car, here we replaced car with boat using DTMF technique for smart fishing.

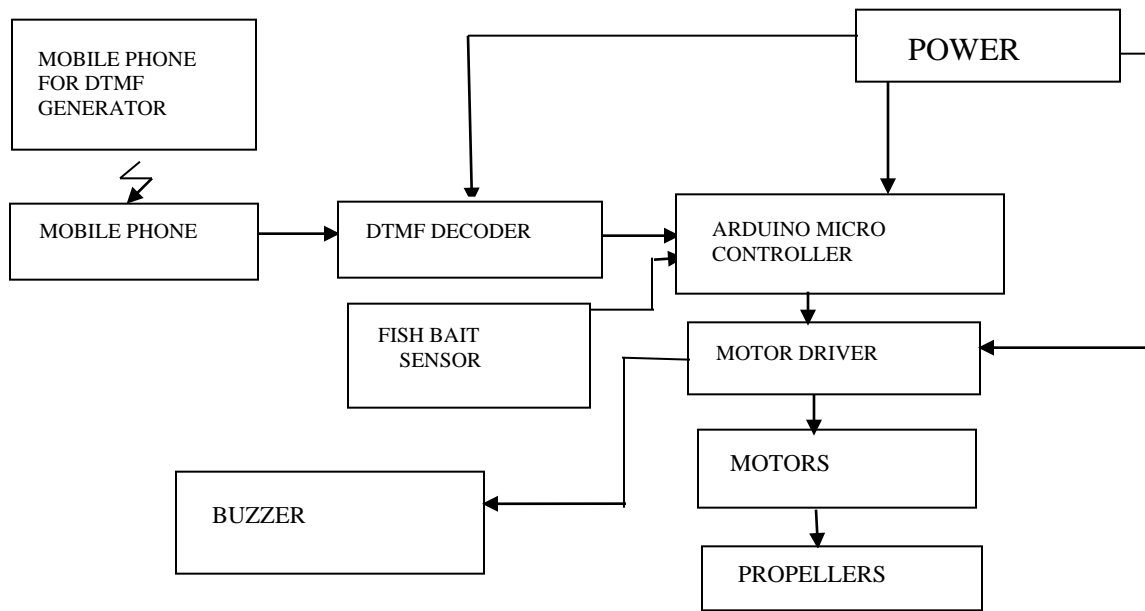


Figure 1: Block diagram of Smart Boat

The important components of this boat are DTMF Decoder, microcontroller (ATmega328), Motor driver(L293D),Power supply module(LM2596).A mobile phone that makes a call to another mobile phone attached to the boat which acts as a remote. For that reason this paper does not require any receiver and transmitter units. DTMF Decoder detects the DTMF tones and generates binary sequence corresponding to the key pressed in the DTMF keypad. The pins (d0,d1,d2,d3) of DTMF Decoder are connected to the digital pins(2,3,4,5) of microcontroller(ATmega328).The operating voltage of microcontroller is 5V,flash memory is 32kb in which 0.5kb is used by boot loader and it contains a 16Mhz crystal oscillator. The pins(8,9,10,11)of microcontroller are connected to (IN1,IN2,IN3,IN4)pins of motor driver(L293D).Motor driver is used to provide bi-directional drive currents to drive the motors. The 293D consist of four drivers. Pins IN1 through IN4 and OUT1 through OUT4 are the Input and output pins respectively, of driver1 through driver4.The boat has one more motor which is directly connected with power supply module with ken switch. Which is connected to the fishing string hold a ken switch which is covered by bait at the end of the string , once the boat enters into the lake, when the fish catches the bait the ken switch get activated and the fish is pulled into the boat.

### B. Use of IDE software

In this research we used Arduino software written in Embedded C on windows .The Arduino Integrated Development Environment (IDE) is a cross platform application(for windows, mac-OS ,Linux)that is written in programming language java. The arduino IDE supports the languages C and C++ using special rules of code structuring. Most Arduino boards contain a LED and current limiting resistor connected between pin13 and GND, which is convenient feature of many tests and program functions.

## EXPERIMENTS AND RESULTS

DTMF is used to here to train the commands for the Boat. DTMF consists of four output pins D0-D3.Whenever a command is given , the binary values of the address is given to the output pins D0-D3.The key tone commands as shown in table 1:

Table 1: Commands

COMMAND	ADDRESS	DTMF module outputs(D0-D3)
Forward	2	0100
Backward	1	1000
Left	4	0010
Right	3	1100
Stop	5	1010

- ( a ) when key 2 is pressed boat moves FORWARD direction.
- ( b ) when key 1 is pressed boat moves BACKWARD direction.
- ( c ) when key 4 is pressed boat moves LEFT direction.
- ( d ) when key 3 is pressed boat moves RIGHT direction.
- ( e ) when key 5 is pressed boat STOPS.

### EXPLANATION AND RESULTS

The components we are using for making the smart boat module is 12v Battery, Power supply module(LM293D) which is connected to PCB's(Printed circuit board) with 12v and 5v, DTMF(Dual tone multiple frequency) which generates the tones in binary sequence , Arduino UNO with ATmega328, Motor driver which is used to provide bi-directional drive currents, BO(Battery operation) which converts electrical energy into mechanical energy, Two DC motors which are connected to propellers and a switch which acts like a sensor as shown in FIGURE 2:

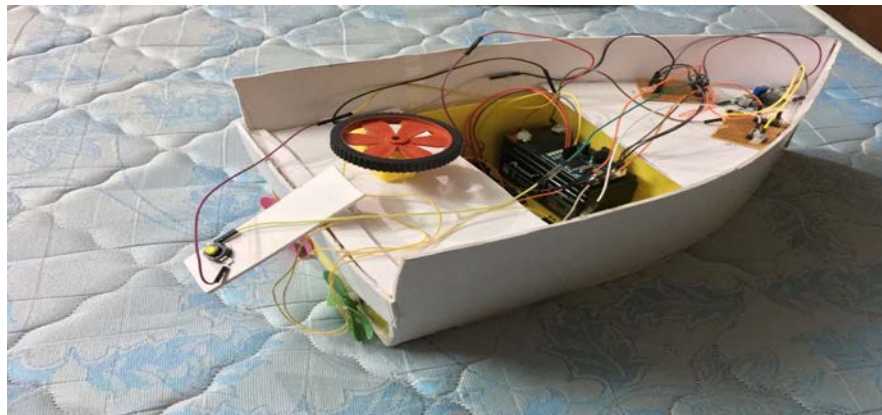


FIGURE 2. Smart Boat Module

This Boat works in Lakes , Ponds and Rivers which consist of less content of water . By giving the commands from DTMF Decoder through smart phone which acts like a remote the boat moves forward , reverse , left side and right side. The working of the boat in water is shown in FIGURE 3:



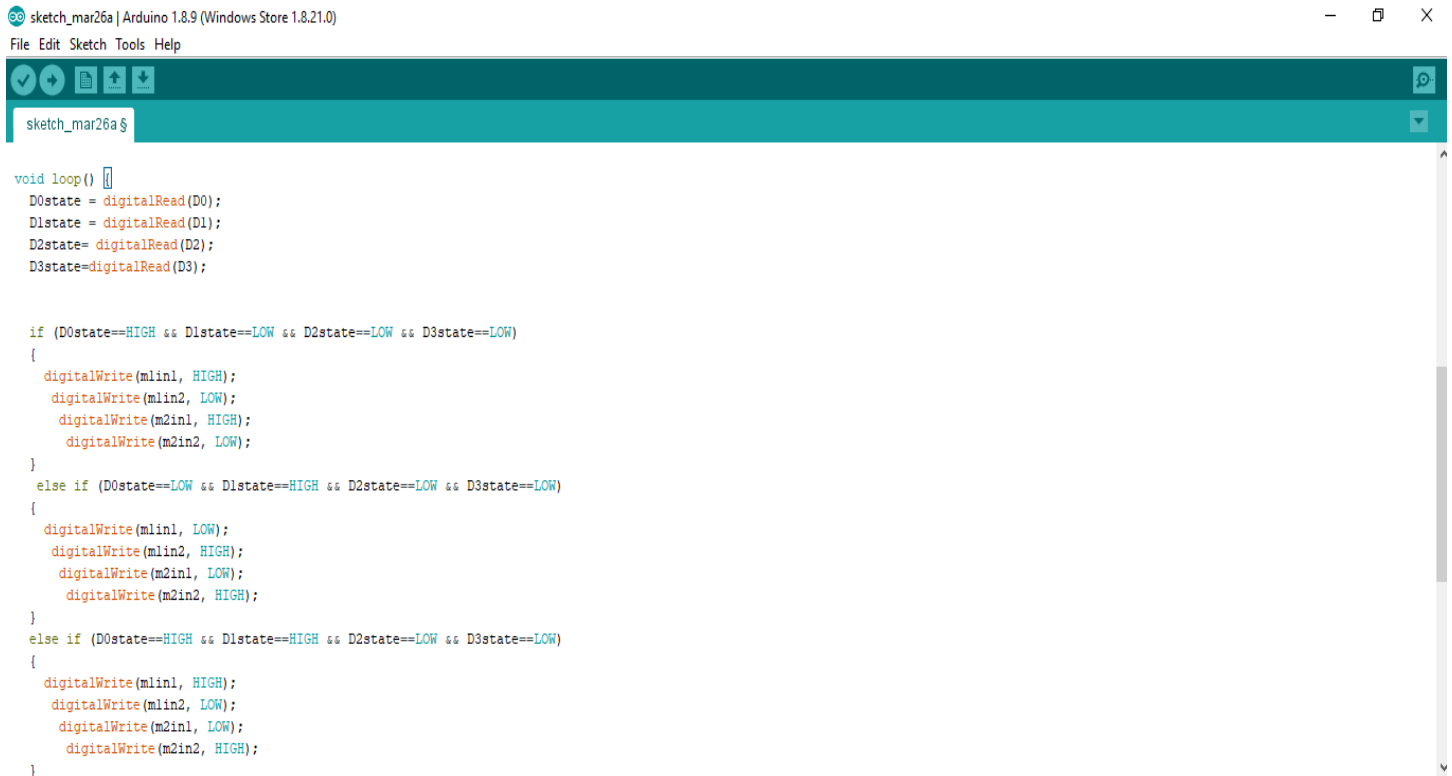
FIGURE 3 .Output of the project

### CONCLUSION

In this project, the boat is controlled by a mobile phone that makes a call to the mobile phone which is attached to the boat. In the course of a call, if a button is pressed, a tone corresponding to the button pressed is heard at the other end of the call. This is a wireless controller boat hence the limitation of wired is completely overcome by using latest technology of mobile phones. However there are lots of scope to improve the stability and ability of the system. The mobile phone that makes a call to mobile phone stacked in the boat acts as a remote. Hence this project does not require the construction of receiver and transmitter units.

### APPENDIX

The programming code for this model done in the programming language embedded c is given below:



```
sketch_mar26a | Arduino 1.8.9 (Windows Store 1.8.21.0)
File Edit Sketch Tools Help

sketch_mar26a $

void loop() {
  D0state = digitalRead(D0);
  D1state = digitalRead(D1);
  D2state = digitalRead(D2);
  D3state = digitalRead(D3);

  if (D0state==HIGH && D1state==LOW && D2state==LOW && D3state==LOW)
  {
    digitalWrite(m1in1, HIGH);
    digitalWrite(m1in2, LOW);
    digitalWrite(m2in1, HIGH);
    digitalWrite(m2in2, LOW);
  }
  else if (D0state==LOW && D1state==HIGH && D2state==LOW && D3state==LOW)
  {
    digitalWrite(m1in1, LOW);
    digitalWrite(m1in2, HIGH);
    digitalWrite(m2in1, LOW);
    digitalWrite(m2in2, HIGH);
  }
  else if (D0state==HIGH && D1state==HIGH && D2state==LOW && D3state==LOW)
  {
    digitalWrite(m1in1, HIGH);
    digitalWrite(m1in2, LOW);
    digitalWrite(m2in1, LOW);
    digitalWrite(m2in2, HIGH);
  }
}
```

FIGURE 4: Arduino software (IDE) with Embedded C code

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