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Morse code to Text Convertor for Marine Communication

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Abstract: ***We propose a compact system for communication using Morse code for transmission of messages. The system uses VHF antenna and small transmitter circuit which transmits Morse code using Morse key. These transmitted signals are received by the walkie-talkie handset. The received messages are in the form of 'dots' and 'dashes' of Morse code. This code is the converted into text format and is directly displayed on the desktop screen. As the Morse code needs a skilled person to decode the proposed system automatically converts the received message signal into text ad makes it easy to use. Although the tested range of to which the system can communicate is 25-50m. But this range can be increased by enhancing parameters like current supply, crystal frequency, height of antenna.***
Keywords: VHF antenna, Morse code, Morse key, walkie-talkie, crystal frequency.

I. INTRODUCTION

The use of Morse code as means for Assistive Technology has verified to be rewarding, because its generation requires the execution of a single event which controls the communication based only on a time factor.
The primary disadvantage of using Morse code in Human-Computer Interfaces is that it must be learned First. Though learning is a factor but it can be used for wireless communication as its time-based signal and consists of only dots and dashes.
Wireless communication is essential where the communication is needed but cable or line of sight is not possible like in marine communication, air communication as well as some very important authorities like army, navy, air force and other defense services and various government organizations. Morse code plays an important role in satellite communication. As the message is transmitted in the form of dots and dashes the messages are completely encoded and can only be decoded by specific decoder at receiving side. Whereas, when power consumption and other factors are taken into consideration worldwide Morse code are used to convey a message into simplest and shortest form. A fact that may discourage some users at the early stages of testing the system. Nevertheless, if remembering the full alphabet is not required, a short list of codes is feasible to be learned fast. This would facilitate access to a minimum set of tasks in the computer. For instance, a code that represents the Up, Down, Left, Right directions should not be hard to memorize. Additionally, it has been argued that long-term Morse code users find that the encoding becomes automatic, which means that the duration of the cognitive task is reduced and the character associated with the code is input automatically. Other than the point that skills are required to operate the Morse key to transmit a message. While at receiver end the received message is either visual (LED blinks) or audible (Audio "dits" and "daahs"). It needs to be understood whether if it is a "dot" or "dash" visually or audibly and the received message needs to be read at the very instant at which it is received . and even if the received code is read it is in the form of dots and dashes which again needs to be decoded, i.e. to be converted in the form of text.so that we can obtain proper message this again needs the knowledge of Morse code. Considering the previous issues, in this paper we propose an system which makes the transmission of Morse code easier and at receiver side the sent code is decoded recorded directly in the text form so that no message is lost even if there is no one present at the receiver end at the instant at which the message is received.

II. RELATED WORK ON MORSE CODE ITS CONVERSION AND TRANSMISSION

It has been 50 years since the first known article on Morse code as a communication method in Assistive Technology was published. Since then various application of Morse code have published and are still under work.

A. Morse Code

The code in which letters are represented by combination of dots and dashes is called as Morse code

1) It is the language of communication
2) Morse code can also transmit text information as a series of tones or light that can be understood by skilled listener .

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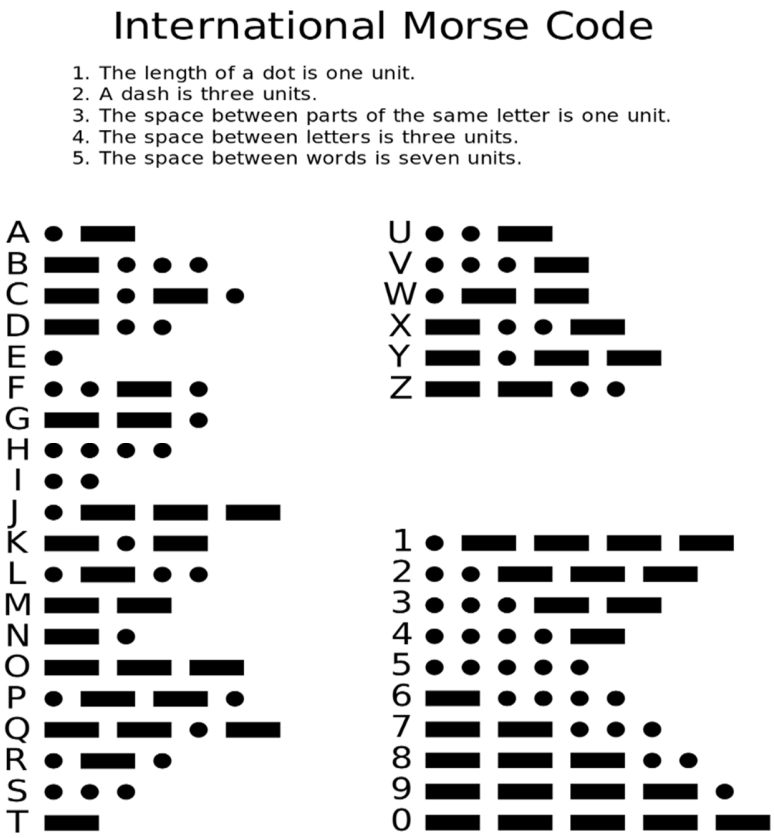
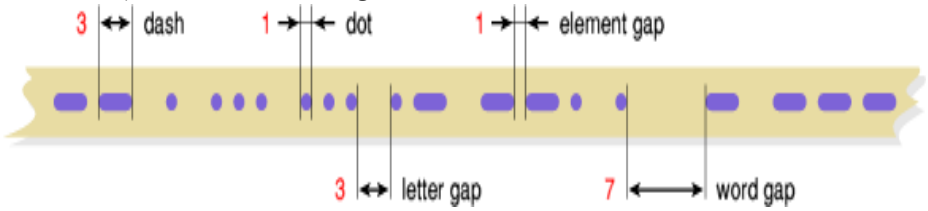


International Morse code is composed of five elements:[1]

a) Short mark, dot or "dit" (▬): "dot duration" is one time unit long
b) Longer mark, dash or "dah" (▬▬▬): three time units long.
c) Inter-element gap between the dots and dashes within a character: one dot duration or one unit long
d) Short gap (between letters): three time units long
e) Medium gap (between words): seven time units long



B. Transmitter

To keep the system non bulky and to get a good range for the communication system we have used VHF frequency specifically at 150MHz. Transmitter circuit consisting of 1 meter silgle wired omnidirectional antenna, am oscillator circuit with 50MHz crystal a transistor BC546 for tone generation, and a power amplifier circuit consisting of C2458 transistor . The whole transmitter circuit is driven on a 9V battery.

C. Reciever

We have walkie-talkie as receiver. A **walkie-talkie** (more formally known as a **handheld transceiver**, or **HT**) is a hand-held, portable, two-way radio transceiver.

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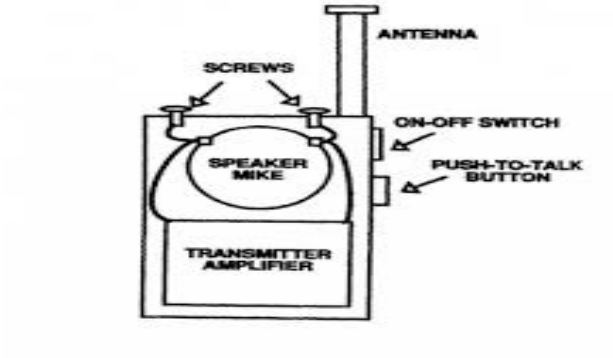


1) What are the Parts of a Walkie-Talkie?

a) *LCD Display:* Displays channel number, remaining **battery** life, and so on

b) *Antenna:* Send and receive **radio waves**

c) *Monitor:* Switches the walkie-talkie to monitoring mode so it can be used as a listening device or baby **monitor**.

d) Menu select keys.

e) *Menu button:* Used for changing functions and settings. Can also be used to lock the keypad to prevent the channel or other settings from changing accidentally while the radio is in your pocket

f) PTT (Push-to-talk) button.

g) Loudspeaker.

h) On/off switch and volume control.

i) *Microphone:* Unlike some models, this walkie-talkie has a separate loudspeaker and microphone.

j) LED indicator light shows when channel are busy.

k) *Transmit Call Tone:* This sends a tone signal to other radios on the same.

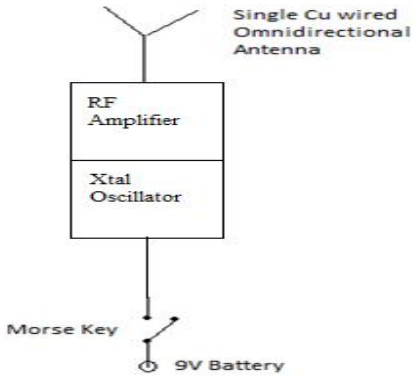
D. Morse to Text conversion

The conversion of Morse code to text is done using Arduino Atmega328. It is programmed so that if the receiver receives signal for about 5msec to 0.5 sec the signal is considered as dot, where as if the signal is received for time greater than 0.5 sec to 1 sec it is considered as dash. If no signal received for 0.5 sec it is considered as inter element gap and if there is no signal received for more than 1 sec it is considered as short gap between letters.

III. SYSTEM ARCHITECTURE

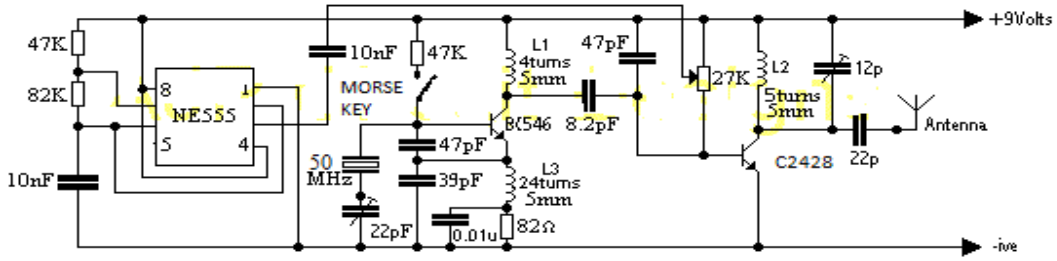
The input of characters is managed by two Timers: the inter Letter gap Wait Timer, and the letter Wait Timer. The inter letter gap is the time lapse between Dots and dashes of letters and letter gap is the time lapse between two letters.
The system is illustrated as follows:

A. Transmitter



This circuit is used on the 150MHz band, it could be used to track anything. Ranges of over 12m have been achieved using 58cm wire antenna, receiving the signal on a Icom IC F300 VHF 150MHz Handheld Transreceiver with single wired omnidirectional Cu Antenna and the transmitter being powered of the 9Volt. This narrowband crystal controlled VHF transmitter is modulated with a 700Hz Tone outputting approximately 300mW of RF power. The circuit is crudely phase modulated hence can be detected by an AM or FM receiver, An AM receiver will receive the signal slightly better. The circuit is designed around a LM555 flip/flop IC. The LM555 generates a 700Hz tone and modulates the output stage. If no more than 9Volts is being used, a fixed 27K resistor can be used in the O/P biasing circuit instead of a preset and the modulation fed directly to the Base. The emitter circuit of the oscillator/trippler stage is tuned to the Xtal frequency filtering the fundamental frequency. The collector circuit is tuned to 150MHz and outputs the required modulated frequency signal to the amplifier stage. 12pf trims the O/P power into the antenna for maximum power transfer and the 22pF trims the Xtal for spot frequency. This circuit will operate between 5.6Volts and 10Volts without any circuit alterations, but the range will be a lot less at lower voltages. 12Volts can be used by inserting a 82Ohm resistor in series with the positive lead. When using above 9Volts, a heatsink should be used on the 2SC2658 as it will get very hot. It is Ideal to tune up this circuit using a wave detector meter placed 25-50cm away from the transmitter.

The formulae for the LM555 being Frequency in Hz =1/((R1+(2xR2))xCx0.7 R1=47K, R2=82K, C=10nF



300mW 150MHz Tracking Transmitter

1) Wavelength Transmitted

入 = C/f

= $(3*10^8$ m/sec)/$(150*10^6$ Hz)

= 2m

Therefore, circuit transmit 2m wavelength.

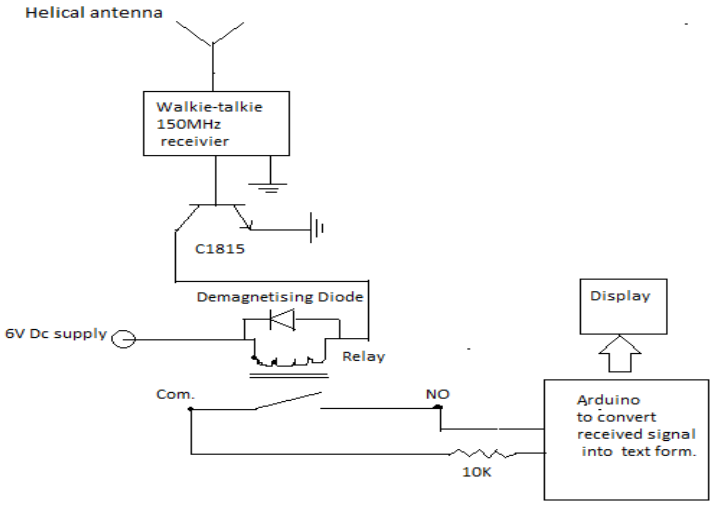
2) Height of Antenna

H= (入/4) = 2/4

= 0.5 m

Hence, height of antenna is 0.5m

B. Receiver



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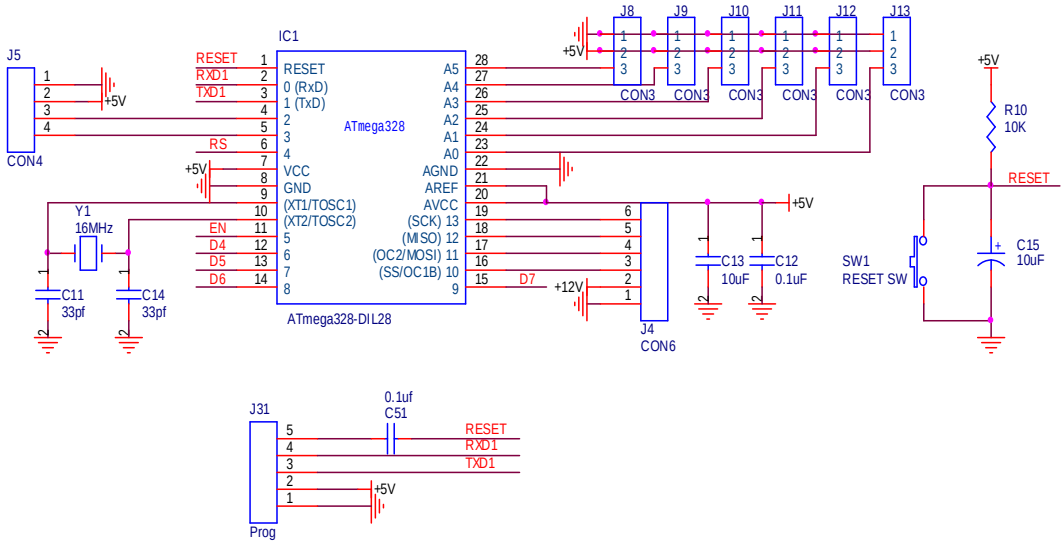
At receiver end we have VHF walkie-talkie set for receiving 150MHz frequency. It receives signals at 150MHz frequency via its helical antenna. It is programmed at 0.35micro volt squelch control sensitivity. As the received signals are frequency modulated when the received signal is above 0.35 microvolt the squelch control which is normally on gets switched off and allows the signal to appear on speaker in audio form. The squelch control is normally 0V when the signal is received the voltage becomes 0.8V. this 0.8V is given to transistor base which causes emitter current that activates the relay. The relay coil is connected to transistor and input supply of 6V.

The NO of relay is connected to the A3 pin of Arduino which is an active low circuit. Here the received signals are processed by the Arduino and displayed on the LCD screen alphabetically and the complete message is displayed and saved on the pc screen.

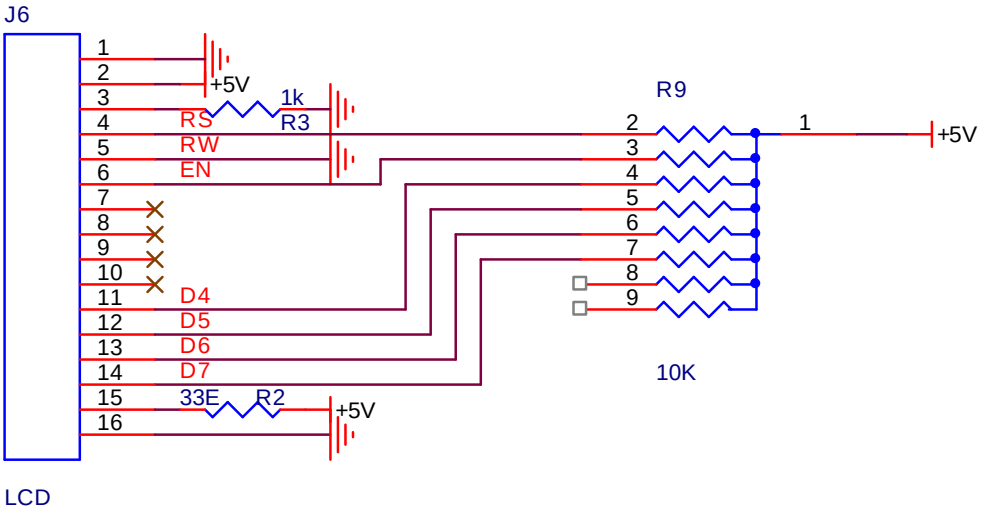
C. Morse to text conversion Circuit

The Morse code signals are completely time based as it consists of only two symbols that are dots and dashes.

These time-based signals are received by the receiver and is given as an input to the converter circuit. This signal is given to A0(input) and A3(output) pin of Arduino. Arduino is programmed to converts the received time varying signal into dots and dashes and then into text form and displayed on LCD. and is saved on PC screen which is interfaced to Arduino by HDMI to USB Cable.



Schematics of Arduino Interfacing



Schematics of LCD Interfacing

IV. CONCLUSION

The difficulties occur in receiving data manually and at the very instant at which it is sent this can be overcome by using this design. In this project, the Morse code data is transmitted and decoded accurately and directly displayed on LCD screen. This will help to reduce the errors made by human operators. Also, it improves the data transmitting speed. The whole system is specially designed for marine communication. The most popular current use of Morse code is by amateur radio operators, although it is no longer a requirement for amateur licensing in many countries. It also continues to be used for specialized purposes, including identification of navigational radio beacon and land mobile transmitters. Morse code is designed to be read by humans without a decoding device, making it useful for sending automated digital data in voice channels. For emergency signaling, Morse code can be sent by way of improvised sources that can be easily "keyed" on and off.

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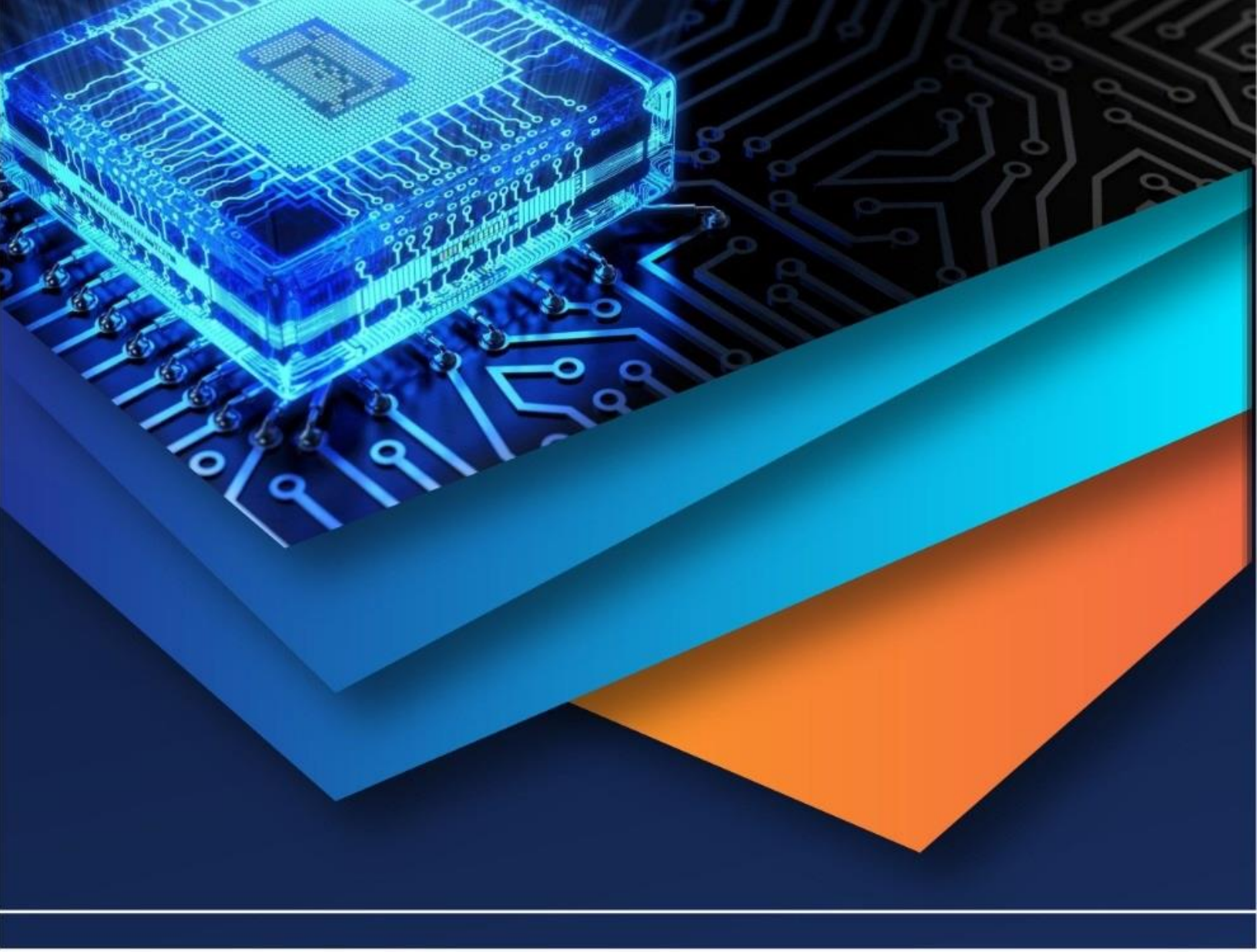

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