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Ultrasonic Height Gauge using Ardunio

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Abstract: Due to advanced technology embedded system has great impact in today's life.. Because of emerging trends in embedded system it is necessary to develop a portable system. This paper presents a transportable embedded system which might be wont to measure the peak using ultrasonic sensor. The solution for accurate height measurement can be tackled by this system The ultrasonic sensor is the heart of this system which measures the height of the object. It also includes a Arduino, and a liquid display (LCD). This method of measurement is efficient thanks to measure distances precisely. The device are created for people to use it on their own with ease without requiring help. the target is to create it both aesthetically pleasing, easy to use, and as cost effective as possible..
Keywords: Ultra sonic sensor, LCD, Arduino, LED, push-buttons.

I. INTRODUCTION

This is the 21st century hence there are adventures are present in every field. Ineache field it is essential to do minor change. By using different sources we are able to modify it as our requirements and implement in various field. The existing system of height measurement is by using the measuring devices manually. But now a day's it is all things can be done digitally. Therefore we use an accurate display unit for measurement of distance. We can measure the height by using ultrasonic sensors and convert this wave for the measurement of various units like distance, speed. Continuous pulses of echo method are used as a technique of distance measurement , a number of pulses is distributed for transmission medium and is reflected by an object kept at specific distance. The time taken for the wave to propagate from transmitter to receiver is proportional to the between the sensor and the object. during this distance measurement system we had ultrasonic sensorHC-SR04 interfaced with arduino Uno. Ultrasonic sensors are very versatile in distance measurement. they're also providing the foremost affordable solutions. Ultrasonic waves are also used for air and underwater. Ultrasonic sensors can be used for common and simple applications. In simpler system an occasional cost version of 8-bit microcontroller could even be utilized within the system to lower the value. Programming and hardware a component of ultrasonic sensor interfacing with Ardunio Uno. this may well be an efficient due to measure small distances precisely. during this project we've used an Ultrasonic Sensor to work out the gap of an obstacle from the sensor. Basic principal of ultrasonic height measurement relies on ECHO. Top of Form

II. PROBLEM STATEMENT

Nowadays the height of any object can be measured by using some measuring devise. The measurement is quite inaccurate and inappropriate, as the measurement is done manually there can be some variations between the actual object height and measured height.

III. NECESSITY OF PROJECT

The mainobjectiveof this project is to provide a useful system to measurethe height which will be easy to configure and handle as well as it provide good accuracy and data is saved digitally.

IV. LITERATURE SURVEY

A. An Ultrasonic Sensor for Distance Measurement in Automotive Applications

Allasio Carullo and Marco Parvis, Senior Member, IEEE [1]Low-cost distance sensor is described in this paper that isto self-adapt to the environmental conditions. The sensor contains a noise measurement system and an auto-change facility of the signal that is used to drive the transmitter, thus producing the best accuracy under different conditions .Tests have been performed in real driving conditions and have shown a regular behaviour of the sensor under all typical driving maneuvers for speed so up to 33m/s(120km/h).The sensor features a simple and costless analogue processing of the signal without employing microprocessors. Despite its simplicity and low-cost, the sensor allows resolutionsofbetterthan1mmto be obtained in quiet conditions .The sensor output is updated every 20ms; andan additional digital output allows an easy implementation of smoothing techniques by means of the car computing system. The obtained measurements are accurate enough for headlight levelling as well as for giving an important piece of information to active suspension Systems.

B. Distance Estimation With a Long-Range Ultrasonic Sensor System

Jarosław Majchrzak, Mateusz Michal ski, and Grzegorz Wiczyn ´sk [2]The selection of a distance estimator discussed above wasbased on the measurement results obtained in constant environmental conditions. Clearly, changeable conditions mustbe taken into consideration when performing regular measurements. Therefore, the following measuring procedure is suggested:

1) Determine environmental conditions (temperature, humidity, air movements);

2) Perform a large-sized measurement series (e.g., 100 measurements) for distance close to the sonar's maximal Measuring range;

3) Analyze the results: build the histogram and determine the Maximal value, the modal value, and evaluate the Scatter of the results;

4) If the scatter is small enough, determine the probability of occurring in the range; otherwise, omit the next Steps as the measurement results are not reliable;

5) Determine the minimal number of measurements for the assumed probability [according to (10).

C. A New Ultrasonic-Based Device For Accurate Measurement Of Oil, Emulsion, And Water Levels In Oil Tanks

Marabou, M., Habli, M., Al-Naamany, A., & Al-Busied, K. [3] In this report, the results obtained following an initial testing of new acquired ultrasound sensors were shown and the proposed MLLM device initial design was conducted. The results suggest

That interface detection of oil and water using ultrasound is not only reasonable from a physics point of view, but also form an integrated electronics point of view. The advantages of our new proposed technique over the current available techniques can be summarized as follows:

1) High accuracy, safety, and can be used in multi-layers level detection (e.g. more than one emulsion layer can be measured).

2) No physical contact with the liquid because the transducers are mounted inside a stand.

3) No possibility of leakage or contamination.

D. Ultrasonic Measurements Of Molecular Relaxation In Ethane And Carbon Monoxide

Martins' son, P.-E., &Delsing, J. (n.d.). Ultrasonic measurements of molecular relaxation in ethane and carbon monoxide. [4] The major problem that occurred during the measurementswas that the pulse generator used was not powerful enough to

Transmit pulses trough the gases. This can be overcome by the use of a more powerful transmitter. A higher efficiency can also be achieved by excite the transducer with pulses of a period time that is half the period time of the resonance frequency. A larger frequency span have to be covered in order to determine the relaxation strength and the relaxation time as described

above. This can be done by using an extremely broadband transducer or by using several narrow band transducers in order tocover a large frequency to pressure region. Also lower staticpressures, near vacuum, can be used together with a high power pulsar in order to reach high up on the frequency to pressure scale.

V. .METHODOLOGY

A. Switch on the circuit and make all connection

B. When the circuit turns on it displays the height from the base to the ultrasonic sensor.

C. Place the object under circumference of the ultrasonic sensorhc-sr04& it will display the height of object, then press the switch (Green) it will set the reference height.

D. Place the another object whose height is to be measured and Press the Switch (Red) so that it will compare the objects height with the reference height ,hence displayed on LCD.

E. Press the Switch (Black) so it will indicate whether the height is under or over the set as/reference height.

F. When we press the black switch it will compare the height of the object, when the object is below the set reference height the Red LED turns on as it indicates the object is smaller.

G. When we press the black switch it will compare the height of the object, when the object is above the set reference height the Yellow LED turns on as it indicates the object is Larger.

H. When we press the black switch it will compare the height of the object, when the object is equal the set reference height the Green Red LED turns on as it indicates the object is equal.

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VI. BLOCK DIAGRAM

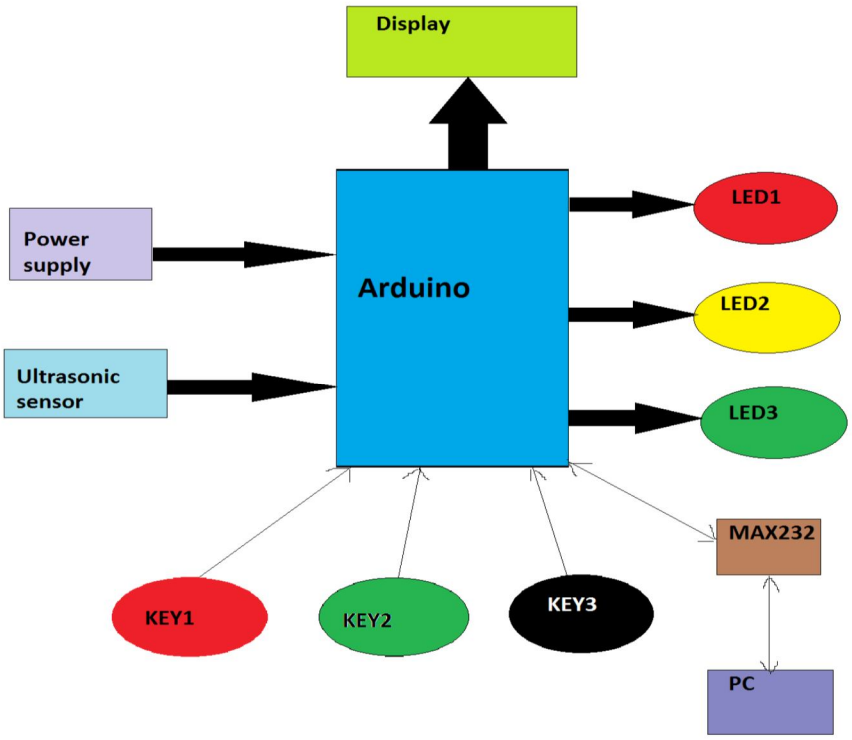

Fig No.1 Block Diagram

1) *Description:* The Ultrasonic height gauge has various components like Ardunio, keys, led's ,power supply, LCD,Ultrasonic sensor ,Max232 and server. The Ultrasonic sensor is employed to live the peak of object.It is displayed on LCD with all the calculations.LED is employed the indicate the measured object is correct or undersize/oversize. 3 switches are accustomed handle the operation. All the info is send through MAX232 and saved on computer. .

A. Arduino
B. LCD Display 16X2
C. LED
D. Ultrasonic SensorHC-SR04
E. Push Buttons
F. Power Supply
G. Max232
H. PC

1) *Arduino:* The Arduino Uno is an open source micro controller board supported the Microchip At mega 328p micro controller and developed by Arduino.cc. The board is provided with sets of digital and analog input/output (I/O) pins which will be interfaced to varied expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a kind B USB cable. Arduino is employed for interfacing with LCD and ultrasonic sensor. It is wont to operate the sensor as per the programming. It the center of the system. It acts as an influence source. The Ardunio/Genuine Uno encompasses a number of facilities for communicating with a computer, another Arduino/Genuine board, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is obtainable on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the pc.

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Fig 2: Ardunio Uno Board

2) LCD Display: LCD modules are very commonly employed in most embedded projects, the reason being its cheap price, availability and programmer friendly. Most folk would have come across these displays in our day to day life, either at PCO's or calculators. LCD Display's the total height of the thing, Reference Height, compared height. It deals with the data presentation.

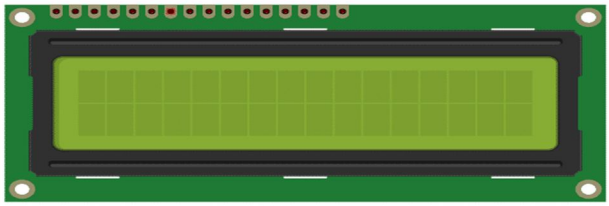

Fig.3 LCD

3) LED

Fig no.4 LED

A crystal rectifier (LED) may be a semiconductor light that emits light when current flows through it. Electrons within the semiconductor recombine with electrons holes releasing energy within the type of photons. the colour of the sunshine (corresponding to the energy of the photons) is decided by the energy required for electrons to cross the band Gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor unit. The Green Led is employed to point the compared height is Equal.The Red Led accustomed indicate the tiny height and therefore the Yellow Led is employed to the measured height is larger.

4) Ultrasonic Sensor HC-SR04

Fig.5 Ultrasonic sensorhc-sr04

Ultrasonic transducers or ultrasonic sensors are a sort of acoustic sensor divided into three broad categories: transmitters, receivers and transceivers. Transmitters convert electrical signals into ultrasound, receivers convert ultrasound into electrical signals, and transceivers can both transmit and receive ultrasound. It emits an ultrasound at 40 000 Hz which travels through the air and if there's an object or obstacle on its path it'll recuperate to the module. Considering the amount and thus the speed of the sound you'll calculate the height. The ultrasonic sensor acts as a Brain of the system The HC-SR04 Ultrasonic Module has 4 pins, Ground, VCC, Trig and Echo. The underside and thus the VCC pins of the module must be connected to the underside and thus the 5 volts pins on the Arduino Board respectively and thus the trig and echo pins to any Digital I/O pin on the Arduino Board.Top of Form

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Features

a) Measurable distances of 10cm to 400cm (4 Meters)
b) 5V DC Supply voltage
c) Compact sized SMD design
d) Accuracy of +-1cm
e) Modulated at 40 kHz
f) Serial data of 9600 bps TTL level output for easy interface with any microcontroller.

5) Push Buttons

Fig.6 Push Button

For managing the switch mechanism process the Push buttons are made.. They are usually made up of plastic or metal. For easy downcast or pushed the surface is flat to accommodate the human finger or hand. The Red button is employed to line the overall height, Green button is employed to line the item height, black button is employed to check the peak

6) MAX -232: MAX232 is employed to interface the controller to straightforward RS-232 port of GPS Receiver and GSM Modem. it's a sign level converter necessary for conversion between TTL and RS-232 standards. The MAX232 requires 5 external 10uF capacitors. These are employed by the inner charge pump to make +10 volts and -10 volts. The MAX232 includes 2 receivers and a couple of transmitters so two serial ports is used with one chip.

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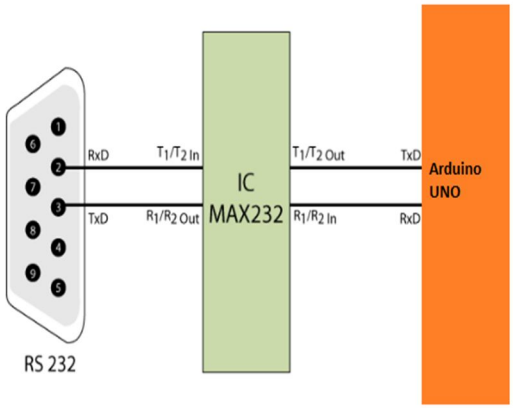

Fig.7 Max 232

7) *Serial Interface between Computer and Arduino:* Serial Interface between Computer and Arduino: Several devices collect data from sensors and wish to send it to a different unit, sort of a computer, for further processing. Data transfer/communication is usually exhausted two ways: parallel and serial. Within the parallel mode, data transfer is fast and uses more number of lines. This mode is sweet for brief range data transfer. Serial communication on the opposite hand, uses only 1 or two data lines to transfer data and is usually used for long distance communication. In serial communication the info is sent jointly bit at a time. This text describes the interfacing of ArduinoUNO with a computer via port, RS232. Serial communication is usually employed in applications like industrial automation systems, scientific analysis and certain consumer products.

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VII. FLOWCHART

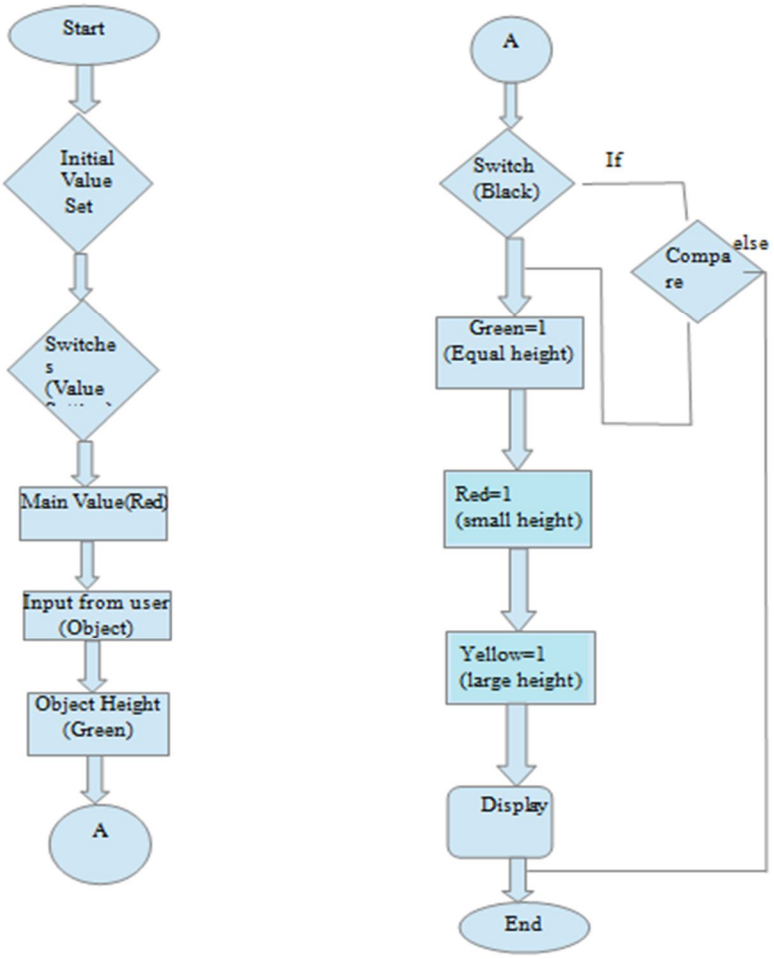

Fig no.8 Flowchart

VIII. APPLICATION

A. It can be used in industrial application.

B. It can be used in schools, hospitals for height measurement.

C. Distance and level measurement is also possible.

IX. FUTURE SCOPE

A. The data which is sending on a PC can be updated on smart phones by using specified application.

B. We can measure the height of any object by making some additional changes in the circuit

X. CONCLUSION

A. The best part about the sensor is that it does not get affect by any transparency. Thus, it makes the system user friendly.

B. The system is inexpensive, and high quality of measurement is possible. Also the ultrasonic sensor has good calibration.

C. As compare to any other system it has best accuracy. Minimum hardware is employed, so it easy to grasp and therefore the problem can recognize likewise as solved quickly.

D. The ultrasonic height gauge is straightforward to use and not dangerous during operation to nearby objects, people or the other equipment.

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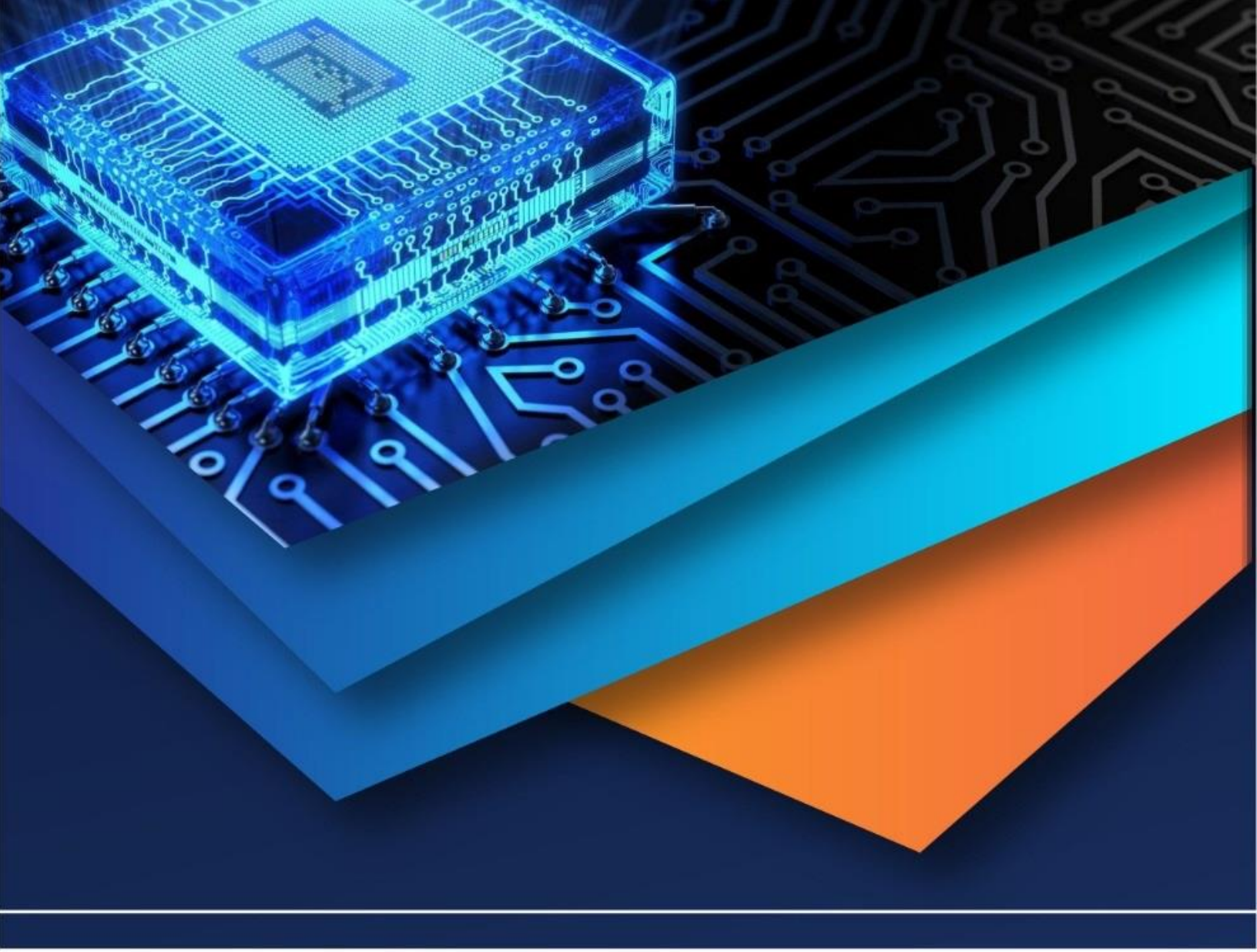

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