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Automatic Beach & Garden Umbrella with Rain Sensor

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Abstract: ***The aim of this project report is to form a sensible umbrella which may cut back human effort to its practicality and may target the market to its distinctive style, is basically vital in trendy society in danger of rain and wind while not coverage the aim of this project is to form such associate umbrella that's extremely sensitive within the incidences of rain and daylight at domestic and market level. Specifically, in summer season the ground of open areas gets thus heat to sun lightweight that produces problem for operating. This umbrella covers the whole hall throughout the rain and daylight. This umbrella operates with the assistance of various sensors like temperature sensors, water sensors and wind sensors. The gap and shutting of umbrella is being controlled through a motor. Motor will provides a fast and instant response to the shaft so shaft will play a significant role of power transmission for gap and shutting of umbrella. Motor provides needed rate to the shaft. Whenever temperature of the atmosphere goes on top of 28°, temperature device sends signal to Arduino that is management unit box. Then Arduino sends signal more to the motor so motor might activate and deliver needed rate to the coupling shaft. This project could be a cost-efficient method of providing machine-controlled controlled shade from high intensity daylight and rain. So, the issues of open and large areas is solved by mistreatment such kinds of machine-controlled umbrellas***.

Keywords: Rainy and summer Season, mechanically Rain device, Arduino, CAD, Crop Saving System

I. INTRODUCTION

An umbrella may be a folding cover (overhead roof) supported by metal or wood ribs that's sometimes mounted on a wood, metal or plastic pole. it's designed to safeguard an individual against daylight and rain. Umbrellas and parasols square measure primarily hand-held moveable devices sized for private use. the most important hand-portable umbrellas square measure golf umbrellas. Umbrellas will be divided into 2 categories: absolutely collapsible umbrellas, during which the metal pole supporting the cover retracts, creating the umbrella sufficiently little to suit in an exceedingly purse and non-collapsible umbrellas, during which the support pole cannot retract and solely the cover will be folded. In summer season temperature of the atmosphere rises to high level and it's not bear ready. Individuals square measure searching for shady places as a result of sun's temperature is thus high. Temperature in summer days is often higher than 28°C thus there's would like of a system that provides shadow usually, sun shading huge umbrellas is employed at beaches, swimming pools or in courtyards, tons of occasional outlets or restaurants conjointly use sun- shading huge umbrellas on tables and rain- shielding however conjointly for providing an honest mood of being within the encompassing. Therefore, the large umbrellas square measure quite sensible. For such varieties of functions, an automatic umbrella is needed that is provided with trendy technology During monsoon, sellers with an open shop, neighbours drying clothes outside and many similar situations cause inconveniences in our life. In case of street vegetable sellers, they need to protect the vegetables, fruits and customers from rains in monsoon season. Even the tarpaulins don't prove to be of any use during torrential rains accompanied by a thunderstorm. To overcome such problems and help us live with the inconvenience raining system. This auto rain-sensing umbrella smart system comes up with a solution. This smart rain sensing system can detect the rain and opens up the umbrella. In this smart system, we have a raindrop sensing system, which gives a reading proportional to the amount of rain pouring on it.

The smart system consisting of a rack and pinion system, the rack is fixed to umbrella such that when a sensor senses the exceeding value of raindrops, it gives a signal to the pinion attached to a motor. Then the motor starts rotating and the umbrella opens.

II. LITERATURE SURVEY

A. A. Hans Haupt et.al (1928) [1]

An automated umbrella implies that it works cleanly. In 1928, Hans Haupt fictitious the pocket umbrella. In Vienna, Hans Haupt was a student learning sculpture once she developed a paradigm for Associate in Nursing improved compact folded umbrella that she received a patent in Sept 1929. The umbrella was created by Associate in Nursing Austrian company. In Germany, the small folded umbrellas were created by the company Knirps. At the North yank country University of central state students worked on automatic umbrella. They designed associate automatic umbrella that worked with the help of a bearing system. The umbrella canopies of the 1600's were plain-woven out of silk, that provided restricted water resistance once place

next to today' s rain umbrellas, but the distinct cowl kind was unchanged from the earliest documented designs., even rain umbrellas were still thought-about a product only for distinguished girls, whereas men facing ridicule if they were seen with one. Hanway came up and took the rain umbrella on the streets of London in 1750. Infect, at intervals the late 1700's and early 1800's, a "Hanway" evolved to become another name for a rain umbrella (Vaghela et al., 2017). Through the 1800's until now, the materials accustomed build rain umbrellas have evolved, but identical basic cowl kind remains. one in each of the foremost necessary discoveries came at intervals the first amount, once prophet Fox took the thought of exploitation "U" formed metal rods on the ribs and stretcher to make a straightforward, stronger frame. Previously, English umbrellas were factory-made from cane or whalebones. stylish umbrellas ar created by a hand-assembled methodology that, with the exception of form of sensitive areas, unit of measurement about to be created by practiced workers. First, a shaft - whether or not or not or not or not of wood, metal, or artefact - is created and along the ribs and tails ar connected. Next, the nylon cowl is overhand in sections. They were large and unpopular . Ribs and stretchers ar generally seen alone recently on parasols and space umbrellas. Advances in metal technology have created spherical metal ribs and holes merely accessible, but some manufacturers ar producing umbrellas with these choices. Current rain umbrellas ar factory-made from materials (nylon, most commonly) that ar proof against rain that pulls, dries quickly, folds merely and is out there throughout a spread of colors and designs.

B. Abhijit G Kalbande at.el (2017) [2]

Survey contend a awfully very important role during this project, we have a tendency to analyzed the prevailing merchandise for cover of vehicles and garments throughout rain {there we have a tendency tore|there have been} several demerits that we detected throughout the survey, a number of them area unit the prevailing merchandise area unit to be operated manually. And if just in case there isn't any one within the home to control the switch. the garments simply get wet and therefore the product are going to be of no use, and second if there is a disabled person within the house then he/she won't be ready to operate the system this sort of system wants information relating to the operation. So, we have a tendency to selected to try and do automatic system which does not need any manual operation, that has rain sensors that get activated throughout anytime of the day or night. Some ways through varied papers that we've surveyed area unit as follows. CONCLUSION 1. this can be real time model that is employed to automatic rain water and crop saving system protects crops from excess quantity of rain water and additionally saves water from wastage. By victimisation Arduino operations of the whole system goes to be controlled these system saves the electricity, 2. The productivity throughout each season and sunny season. alternative energy is additionally the most effective outcomes of this project. dominant of system on users' virtue also can be achieved through device like GSM. Hardware implementation area unit reliable and low cost of this project.

C. S.N.Palod at.el (2018) [3]

Our main objective is that, the farmers UN agency got to face adversity throughout the unseasonal rain, so that they have voluminous loss. thus we have a tendency to area unit creating such AN umbrella for useful that the farmer will facilitate our umbrella is such. Whenever the temperature can inflated then the umbrella can open mechanically and whenever the rain is coming back its sense the rain and it'll open itself. however the necessity of water and daylight is within the field that the farmer also can open and shut umbrella sitting reception. As so much because the application of umbrella, {we will|we will|we are able to} place it in any center of sq. so traffic police can shake off the sun and water.

- victimisation umbrella we will save the crops from unwanted and unseasonable rains.
- shield Traffic police from sun rays.

D. Deepak Gupta Ayush Gupta Nishikant Singh Quazi Mohd Affan Atul Kumar et al. (2020) [4]

The basic plan so as to develop the good umbrella that is intelligent similarly as automatic, it's to be created by the involvement of the many microprocessors and sensors along side correct mechanical structure. a chargeable battery was used because the power offer which might be blocked into a steam-powered charging purpose. The sensing element was interfaced to the Arduino Uno as indicated within the chart and delineated within the following section. The operating of the model relies on the intensity of rain. The water sensing element on the sensing the intensity in real as rain intensity augmented and becomes over the previous price then turn out the signal to motor controller to begin motor that ultimately exposes the umbrella. 1. The model planned is meant and represent the terribly basic plan regarding the general structure of the system which can represent completely different components and replicate the entire plan regarding the items needed whereas fabricating it. 2. All the elements that square measure designed and within the amount they need been North American nationed is mentioned within which provide us basic plan of needed amount of every represent to proceed with development of model. 3. the entire every half has its own importance that ultimately adds significance to the model.

E. Abhijit G Kalbandeet at.el (2018) [5]

Prabhakarhegadeet al. conferred a method of protective garments from rain. this method protects garments in rainy weather mechanically. The controllers used is 8051 IC and a driver ULN 2803. ULN 2803 is employed to manage relay for shift between drivers. this method works in advanced electronic equipment. the planning ARRC is easy. This image is straightforward to create and perceive. Abhijit G Kalbandeet al. contemplated an inspiration of sensible automation exploitation GSM module. By the accession of notification module with the automation is applaudable. however the module with notification is beneath deemed. GSM module has some demerits still. GSM isn't secure, and contains a fastened most cell web site vary of 35km. Gsm becomes noncurrent with intervention of latest telecommunication networks. In ARRC, notification module is constructed with Wi-Fi enabled system. this method notifies the command with the net server designed for the user. In each flourishing operation the info is shipped to server that the user will read it at anytime, anywhere, with a smartphone or laptop.

III. RESEARCH AND METHOLODGY

A. part for Automatic Beach & Garden Umbrella with Rain device Microcontroller (MCU for microcontroller unit) could be alittle PC on one metal-oxide-semiconductor (MOS) circuit (IC) chip. A microcontroller contains one or further CPUs (processor cores) beside memory and programmable input/output peripherals.

A. Regulator

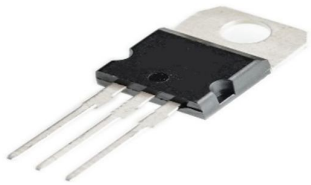

Fig: Regulator

Pin No	Function	Name
1	Input voltage(5V-18V)	Input
2	Ground (0V)	Ground
3	Regulated Output 5V (4.8V-5.2V)	Output

Table Regulator

1) *Pin Description:* 7805 is also a electrical device electrical circuit. it is a member of 78xx series of fixed linear electrical device ICs. The voltage offer in Associate in Nursing passing circuit may have fluctuations and would not offer the fixed voltage output. The electrical device IC maintains the output voltage at a unbroken value. The xx in 78xx indicates the fixed output voltage it's designed to provide. 7805 offers +5V regulated power provide. Capacitors of acceptable values are going to be connected at input and output pins relying upon the varied voltage levels.

B. LCD

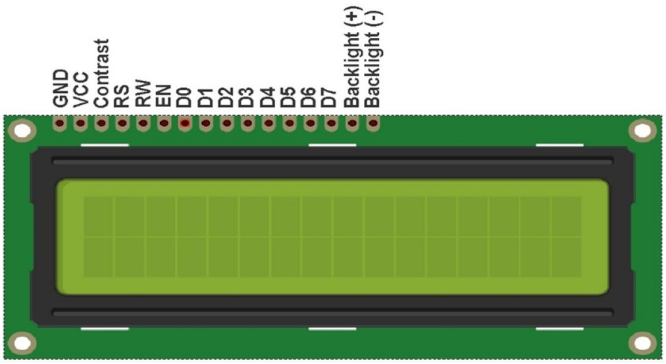

Fig: LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs.

C. Lead Screw

Fig Lead Screw

A leadscrew also known as a power screw or translation screw, is a screw used as a linkage in a machine, to translate turning motion into linear motion.

D. Ultrasonic Sensor

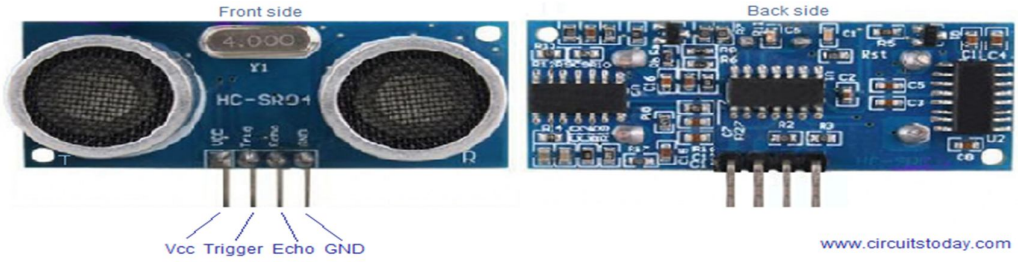

Fig Ultrasonic Sensor

HC SR04 is an ultrasonic range finding module with an accuracy of 0.3cm. The sensing range of this module is from 2cm to 5 meter. Working current of this sensor is 15mA and the measuring angle is 15°. The photograph of front and back side of the HC-SR04 sensor.

E. Crystal Oscillator

Fig Crystal Oscillator

A crystal oscillator is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a constant frequency.

IV. CIRCUIT DIAGRAM

A. Circuit Diagram LCD Range Finder

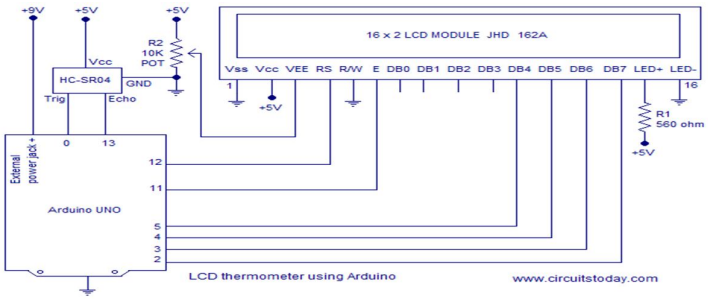

***Fig circuit diagram LCD range finder**:*

In this circuit a 16×2 show|LCD|digital display|alphanumeric display} display is employed for displaying the space. the space in cm and in. square measure displayed at the same time on the alphanumeric display screen. Before trying the alphanumeric display version, bear this article: Interfacing alphanumeric display to Arduino. Circuit diagram of the alphanumeric display vary finder.

B. Block Diagram

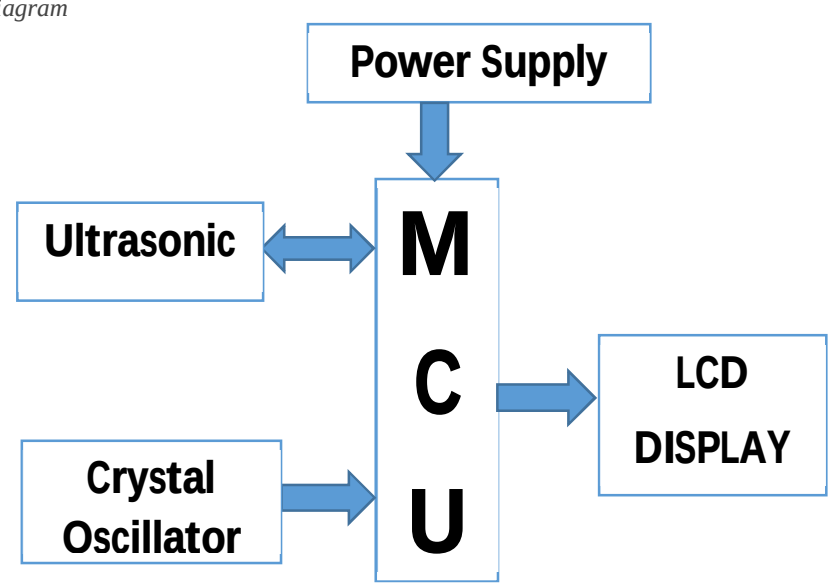

Fig Block Diagram

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A diagram could be a specialised, high-level flow chart utilized in engineering. it's accustomed style new systems or to explain and improve.

C. Circuit Diagram

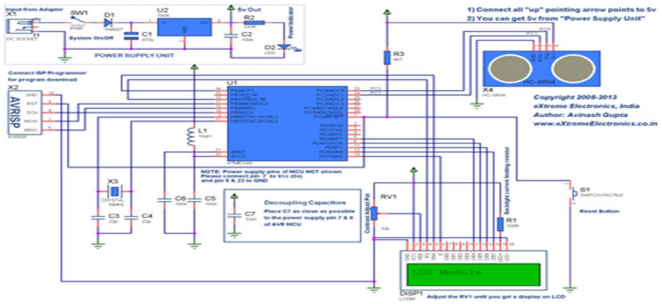


Fig Circuit Diagram

A circuit diagram (also referred to as associate degree electrical diagram, elementary diagram, or electronic schematic may be a simplified typical graphical illustration of associate degree electric circuit Arrangement of the elements interconnections on the diagram doesn't correspond to their physical locations within the finished device.

D. Pin Diagram

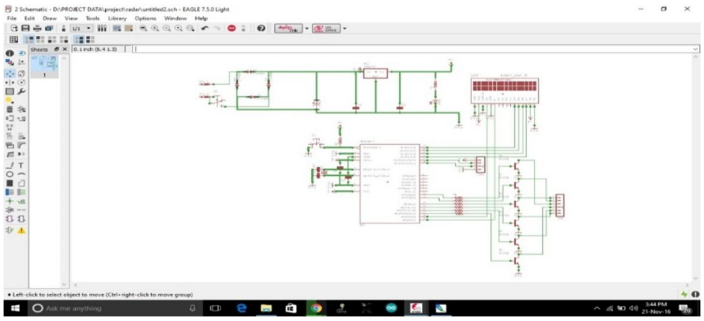


Fig Pin Diagram:

In physics, a pinout generally written pin-out could be a quotation between the contacts, or pins, of associate degree electrical connective or electronic element, and their functions. Pinout currently supersedes the term "basing diagram" that was the quality nomenclature utilized by the makers of vacuum tubes and also the RMA.

E. Design

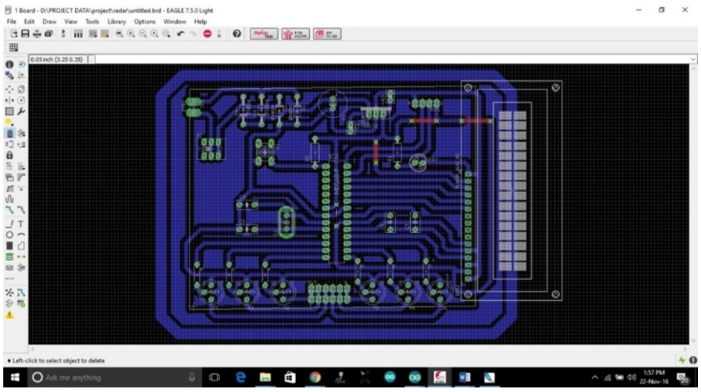
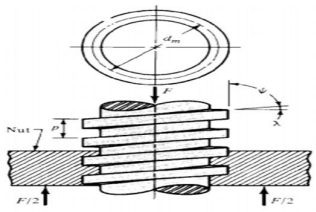


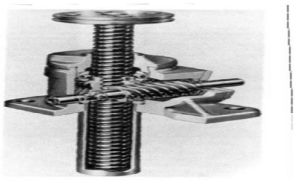
Fig Design Diagram

A diagram may be a symbolisation of data mistreatment visualisation techniques generally, the technique uses a three-dimensional visualisation that is then projected onto a two-dimensional surface. The word graph is typically used as a word for diagram.

V. RESULTS



Power Screw



Joyce worm-gear Screw Jack

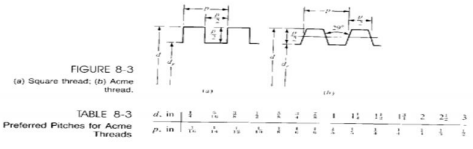
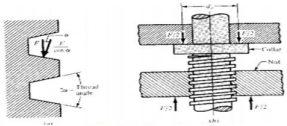


FIGURE 8-3
(a) Square thread; (b) Acme thread.

TABLE 8-3
Preferred Pitches for Acme Threads

Square And Acme Threads with Preferred Pitches for Acme Threads



Screw Thread with Thrust Collar

(a) From the square thread figure above, it can be seen the thread depth and width are the same and equal to half the pitch, or 2-mm. Also

$$d_m = d - \frac{P}{2} = 32 - \frac{4}{2} = 30mm$$
$$d_r = d - P = 32 - 4 = 28mm$$
$$l = nP = 2 \times 4 = 8mm$$

(b) For a square thread, the torque required to raise the load is:

$$T_R = \frac{Fd_m}{2}\left(\frac{l + \pi\mu d_m}{\pi d_m - \mu l}\right) + \frac{F\mu_c d_c}{2}$$
$$T_R = \frac{6{,}400 \times 0.030}{2}\left(\frac{0.008 + \pi(0.08)(0.030)}{\pi(0.030) - 0.08(0.008)}\right) + \frac{6{,}400 \times 0.08 \times 0.040}{2}$$
$$T_R = 15.94 + 10.24 = 26.2\,Nm$$

(c) The torque required to lower the load, rotate the screw with the aid of the load is:

$$T_L = \frac{Fd_m}{2}\left(\frac{\pi\mu d_m - l}{\pi d_m + \mu l}\right) + \frac{F\mu_c d_c}{2}$$
$$T_L = \frac{6{,}400 \times 0.030}{2}\left(\frac{\pi(0.08)(0.030) - 0.008}{\pi(0.030) + 0.08(0.008)}\right) + \frac{6{,}400 \times 0.08 \times 0.040}{2}$$
$$T_L = -0.47 + 10.24 = 9.8\,Nm$$

The negative sign in the first term indicates the screw alone is not self-locking and would rotate under the action of the load except for the fact collar friction is present; and, must be overcome, too. That is, torque required to rotate the screw "with" the load is less than necessary to overcome collar friction alone.

(d) Overall efficiency is:

$$\eta = \frac{Fl}{2\pi T} = \frac{6{,}400 \times 0.008}{2\pi(26.2)} = 0.8$$

VI. SUMMARY

It is the most object of this invention to supply associate degree automatic umbrella management mechanism, that allows the user to open and shut the umbrella mechanically by suggests that of in operation a typical button. in line with this invention, the automated umbrella management mechanism includes a socket, the socket comprising a receiving chamber, a longitudinal slippery groove within the receiving chamber, a crosswise pivot disposed within the receiving chamber at a prime aspect, a hook turned concerning the crosswise pivot, a torsional spring mounted on the crosswise pivot and connected to the hook to force the hook in one direction, a compression spring mounted within the receiving chamber within the socket, a receptacle supported on the compression spring within the socket, the receptacle comprising a hollow bottom projection coupled to the compression spring, a rib coupled to the longitudinal slippery groove within the socket to guide vertical movement of the receptacle within the socket, a pressure strip disposed at one aspect opposite to the rib, and an oblong prime notch admire the pressure strip, and a button controlled to open/close the folding collapsible umbrella frame of the umbrella. When the button is depressed, the hook is canted and discharged from the umbrella shaft for sanctionative the folding collapsible umbrella frame assembly to be opened by spring suggests that. once the button is depressed once more, a retainer bit is discharged, sanctionative the opened umbrella frame assembly to be folded by suggests that of the operation of spring suggests that within the umbrella shaft of the folding collapsible umbrella frame assembly.

VII. CONCLUSION

After completing the present work with all the process involved in designing the automated umbrella which can be of reasonable cost analysis and effective way to providing the shelter and safety to the object and goods with high intensity of power and this type of umbrella should be used in the various place in village to protect crops and the vehicles, etc. It can be applies at large scale area for reduced human work. It included the rack and pinion gear which changes the motion rotation into reciprocating. It also used in future after some of modification algorithm can be developed to Working system of rain to identify weather condition based on set value. The designed system prototype can be used along with the renewable source of energy. The designed model is not only smart but also intelligent as it will take decision about folding and unfolding of umbrella. The system can be control by Arduino and stepper motor used for folding the roof with two or more switch fix along with the knowledge of next future direction.

VIII. FUTURE SCOPE

Using umbrella we can save the crops from unwanted and from unseasonable rains. It has used to multipurpose outlets to charge mobile like power bank also umbrella link with gps through Coding. So we track location of umbrella for another purpose. As we see now traffic signals indicating light are placed center at the square .Traffic police are standing in the sun in high temperature this causes to body from radiations from sun rays for using umbrella we prevent traffic control police from. Radiations from sun rays. As waste administration activities everywhere throughout the world, the Degree for the future work is this framework can be executed with time stamp in which continuous clock appeared to the worry individual at what time clean container is full and at what time the waste is gathered from the brilliant dustbins.

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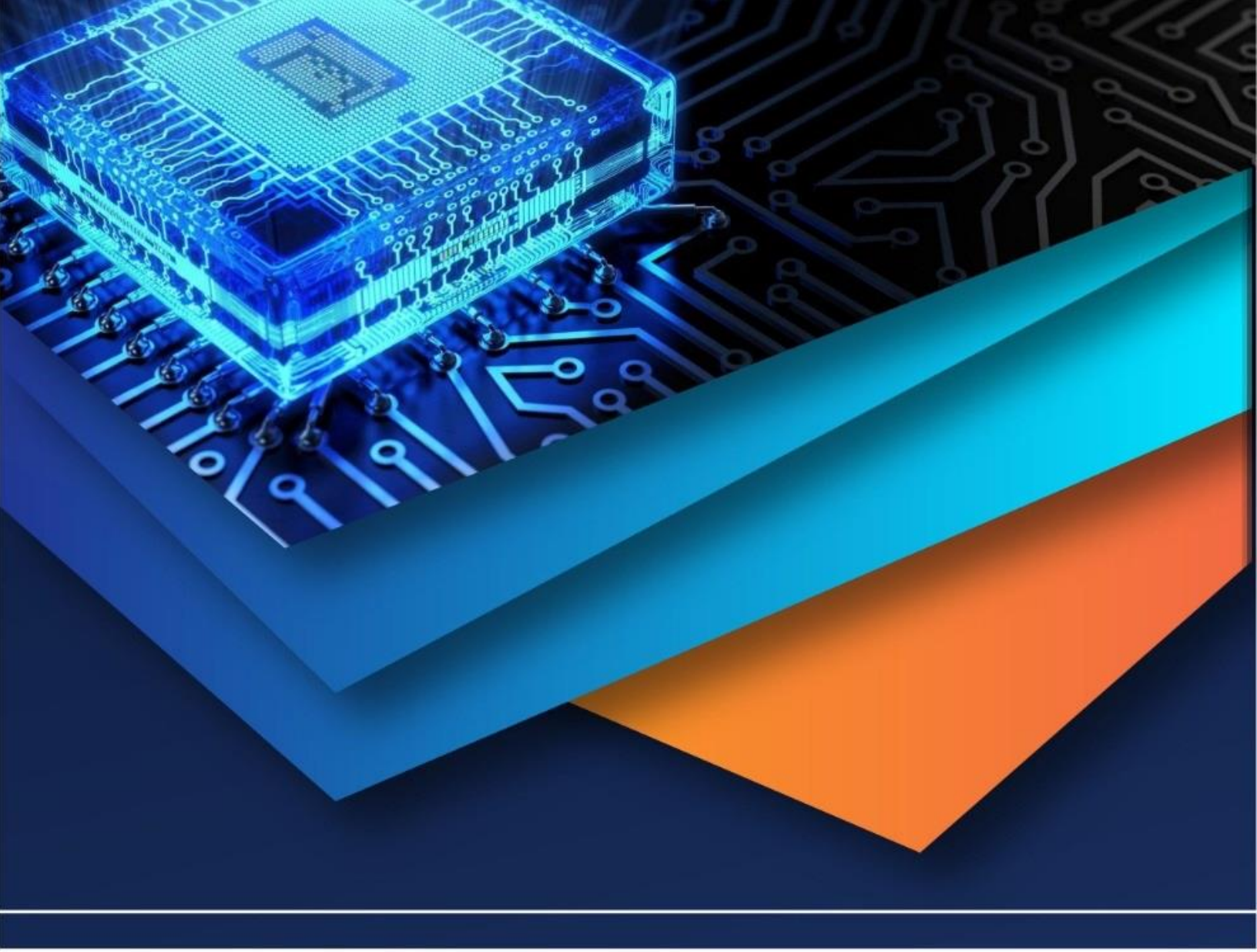

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