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International Journal For Research in Applied Science and Engineering Technology

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 8 **Issue:** IV **Month of publication:** April 2020

**DOI:**

www.ijraset.com

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429*
*Volume 8 Issue IV Apr 2020- Available at www.ijraset.com*

# Review on Man Portable Cotton Picking Machine

K. Varun[1], Vishal N Singi[2], N Vinay Raj[3], Rajendra Hiremath[4], Shekar. K[5]
[1, 2, 3, 4] *Students,* [5]*Assistant Professor, Department of Mechanical Engineering , Ballery Institute Of Technology & Management , Bellary, Visvesvaraya Technology University, Belagavi, Karnataka.*

***Abstract:*** ***India is second largest producer of cotton in the world. Cotton is one of the major crop grown. The cotton production over the years have increased owing to the suitable soil and climatic condition prevailing. Inconsistent climatic conditions play a major role during cotton harvesting. Cotton picking is done manually in India. Cotton picking manually is time consuming, requiring 1560 man-hours per hectare.***
***We are making an attempt to mechanize cotton picking. Current labor wages which constitute about 35% of the total cost of cultivation can be reduced to about 10% with the use of cotton picker over a period of time .This machine could be used by medium and small-scale farmers for cotton picking as large harvesters available in the market are generally very costly and are used in large farms which uses the spindle mechanism for the harvesting of cotton reducing the cotton fiber strength and quality.***
***Pneumatic picker can be used as a picking mechanism which would reduce the cost of picking and maintain the quality of cotton fiber compared to the spindle harvesters. And will reduce the wastage of money for harvesting machine. In this machine only the cotton is picked, which will not affect the cotton.***
***Keywords: Knapsack cotton picking machine/ Rotary cotton picking machine/ cotton fiber strength/ Traditional method of harvesting/ Trash content in harvested cotton.***

## I. INTRODUCTION

From centuries cotton is known as soft white fibrous substance which surrounds seed of cotton plant, and it is one of the commercial crops of India. The way of cultivating might have been changed, we started using pesticides for the better yield, and even brought highbred seen in to the market to get more yield or to with stand the weather and some drawbacks of original bread. The quality of our nation cotton has a huge demand, due to this reason the British's use to export is to Britain as a row material for their textile industries during the time of East India company ruling period in India.

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As per 2012-13 we Indians are contributing around 21 per cent of global cotton production and about 27 per cent of world cotton cultivated area that is about 11.70 million hectares, this makes us the to stand in first in the world in cultivation of cotton area wise.

Even though we Indians are using the present technology in making threads from cotton and separating seed from it .But maximum of us still follow the old process of harvesting the crop i.e.

Manually plucking it from the plants. Although we have a harvesting machines in developed nation like USA, or even prototypes of automatic harvesters. This machines doesn't work for Indian former.

That might be due to their high capital price or because of the main important reason that the entire croup won't be ready to harvest at a time or at a stretch it has to be collected in several steps. This is why the huge harvesters won't work out economically for the Indian formers.

But in Indian market this are manual operated machines, where the entire setup can be carried by one human or man portable. This are of two types of picker spindle machine and the other is suction machine or knapsack they work on different principle.

In the spindle operated model when the operator brings the spindle near the cotton bolls it sucks the cotton in to the collector, because this are manual the operator ones the operator has to remove it manually.

The knapsack works on pneumatic pressure principle, in this model the working is like when the operator brings the suction pipe near the cotton bolls it sucks the cotton in to the collector, because this are manual the operator ones the operator has to remove it manually.

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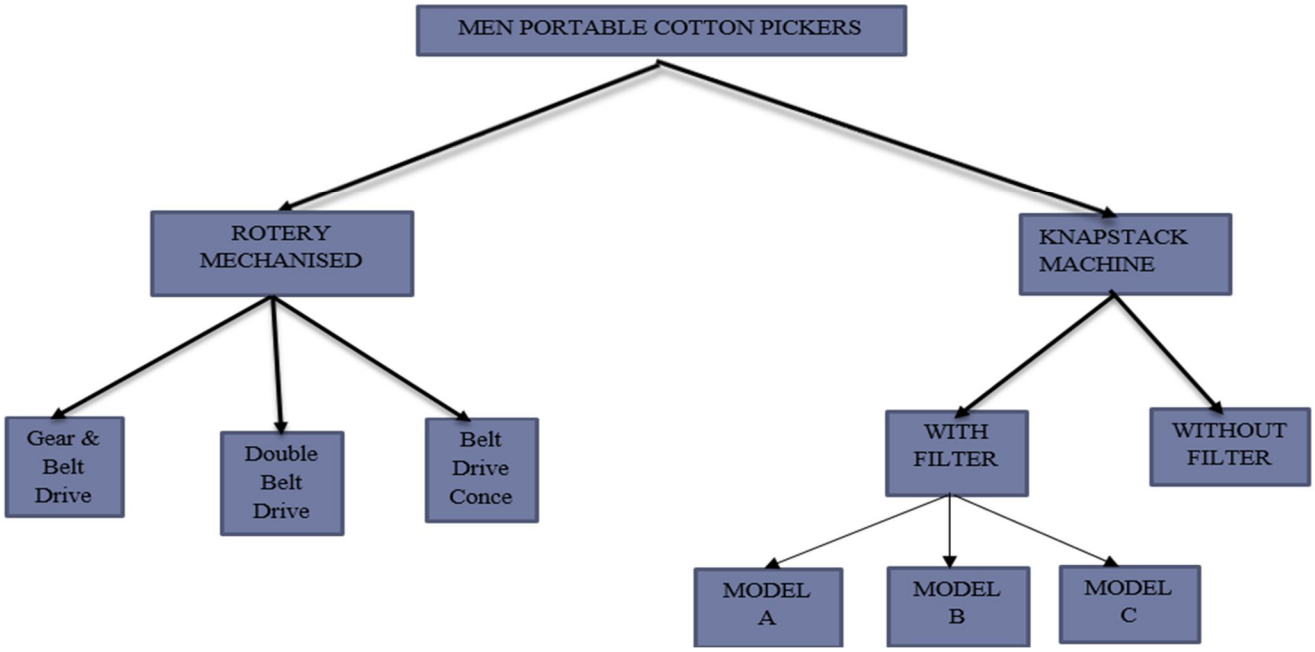
## II. CLASSIFICATION OF COTTON PICKERS




## III. EXPLANATION FOR THE CLASSIFICATION

### *A. Rotery Mechanism*

In this type there are of three prototypes which work on the same principle or mechanism that is Cam mechanism for teeth but arranged in different order. About the three models briefly description is below.

1) *Gear & Belt Drive*: In this Power is transmission by gear and belt drives to the rotor and the motor is assembled in body perpendicular to picking shaft, the cotton bolls after being cut from the Plant it travels through the handle in to the collecting bag.

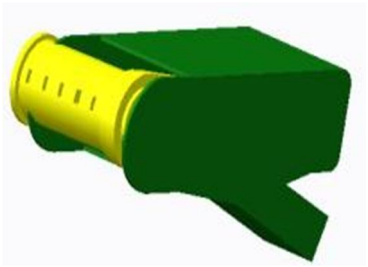


Figure.1. Gear & Belt Drive Concept.

2) *Double Belt Drive Concept:* In this Power is transmission by belt drive to the rotor and the motor is assembled in its handle perpendicular to the picking spindle, and the cotton bolls after being cut from the plant it passes through body in the collecting bag.

Figure.2. Double Belt Drive Concept.

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3) *Double Belt Drive Concept:* In this power is transmuted as same as Concept A that is by belt drive and the motor is assembled offset with the rotor which is also known as picking spindle, and the cotton ball after being cut from the plant it passes through the handle in to the collecting bag.

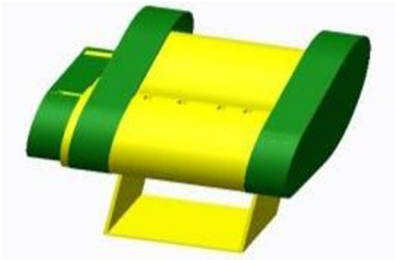
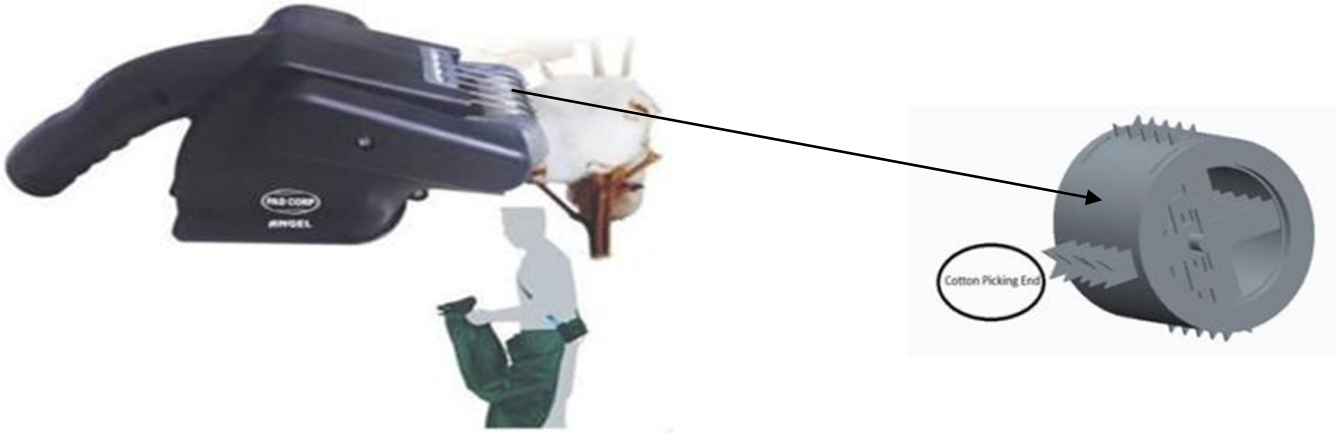


Figure.3. Belt Drive Concept

The time consumed to collect cotton by old or traditional process that is manually consumes but by using this machine we may reduce the time and even the former can manage with less agriculture labors by which he can even save money. But this device has a huge drawback. While cutting the cotton bolls from cotton plant the spindle or the rotator cuts or tares the cotton bolls.
On making a test on the cotton fiber strength it was found that the quality of the cotton is less than the quality the quality of cotton which was handpicked. Image of cotton collected by using cotton spindle or rotary mechanized device




Rotary machine with blade and a human catching it

This figure shows two images above one is spindle collecting cotton from cotton bolls and the other figure is a man wearing the entire setup of the picker and the right side a enlarged image of the cutting blade roter.

The table provides information about traditional harvesting of cotton

| Property | Length | Uniformity | Strength/tex | Elongation | s.f.i | Micronaire |
|---|---|---|---|---|---|---|
| S1 | 30.1 | 54.20 | 29.20 | 5.6 | 9.2 | 4.5 |
| S2 | 29.9 | 53.21 | 28.9 | 5.8 | 97 | 4.5 |
| S3 | 29.87 | 53.9 | 29.1 | 5.0 | 9.2 | 4.4 |
| S4 | 30.5 | 50.9 | 29.5 | 5.4 | 9.4 | 4.5 |
| S5 | 30.2 | 52.9 | 27.65 | 5.3 | 9.0 | 4.4 |

This table shows the result obtained from the hvi-900 test it contain the information like length, uniformity, Strength, elongation, s.f.i, and micronaire factors of cotton which is machine or spindle harvested

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Table shows Machine harvested cotton tested by hvi-900

| Property | Length | Uniformity | Strength | Elongation | S.f.i | Micronaire |
|---|---|---|---|---|---|---|
| S1 | 26.9 | 51 | 26.2 | 5.4 | 13.0 | 4.1 |
| S2 | 26.4 | 50.3 | 26.8 | 5.6 | 12.9 | 4.1 |
| S3 | 27.2 | 51.2 | 26.9 | 4.7 | 12.60 | 4.0 |
| S4 | 27 | 51.30 | 27.10 | 5.1 | 12.90 | 4.2 |
| S5 | 26.63 | 50.15 | 26.44 | 5.0 | 12.55 | 4.0 |

This table shows the result obtained from the hvi-900 test it contain the information like length, uniformity, Strength, elongation, s.f.i, Manual cotton harvesting Micronaire factors of cotton which is machine or spindle Hand-picked cotton is having good quality then spindle cut ones.

The above image shows the traditional way of cotton harvesting

4) *Knapsack Pressure Machine***:** This type of cotton picking machine work on pneumatic pressure, when the operator brings the suction pipe near the cotton bolls then cotton gets sucked and enters in to the aspirator and gets in to the collecting bag.

a) *Without Filter Knapsack Machine:* This machine are also known as knapsack machine and they mead fuel to run the engine and then the engine rotates the aspirator which is the region behind pneumatic pressure which sucks the cotton ball. The cotton collected by this machine has less trash then the manual harvested cotton. As the speed or rpm of motor increase the efficiency of the machine, but the fuel consumption also increases, the amount of cotton eft on the cotton flower is less than handpicked for sum variety of cotton.

Knapsack cotton picking machine

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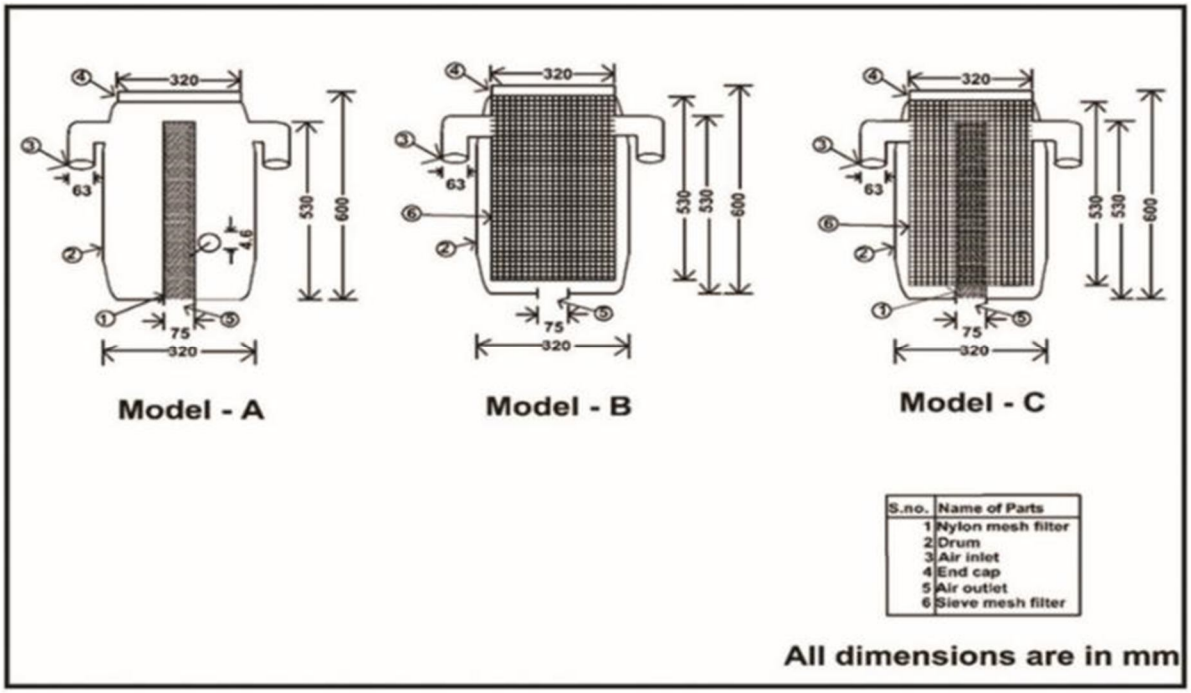
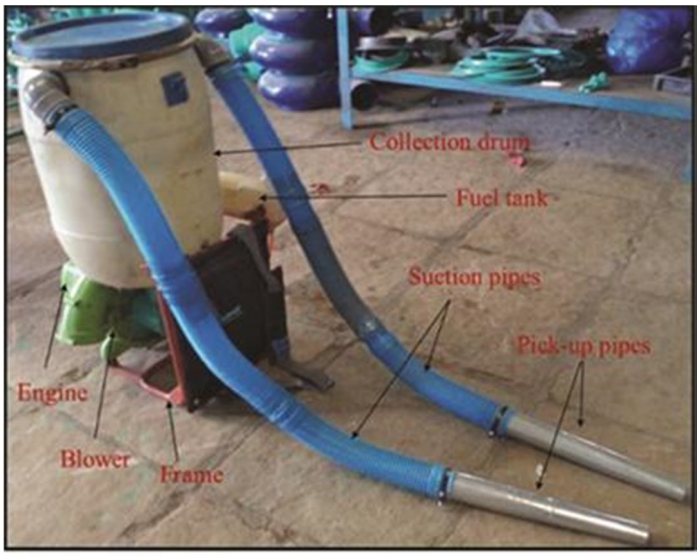
b) *With Filter Pneumatic Pressure Machine (Knapsack Machine):* This also works on the same principle that is pneumatic pressure machine but the only difference is that they have filter and a collector tank. Ant are three prototypes of this machine which are named as model A, model B and model C. the major difference in this prototypes is the filter and there arrangement.




i) *Model A:* In this model the collecting drum has a hole at the bottom at outer side it is fitted with the aspirator and the inner side is fitted with a pipe which has n number of holes on it the top of the pipe is closed with a cop which has holes on it when the operator starts the machine and takes the suction pipe near to the cotton bolls it sucks the cotton and stores it in the collecting tank.

ii) *Model B:* In this model the collecting drum has a hole but which is open and a mesh filter is made in the shape of the collecting drum and is fitted in it and the drum is closed title, when the operator brings the suction pipe near the cotton bolls it sucks it and collects the sends the cotton in to the collecting drum. Later the drum top cat is opened in order to remove the cotton from collector.




With filter knapsack cotton collecting machine

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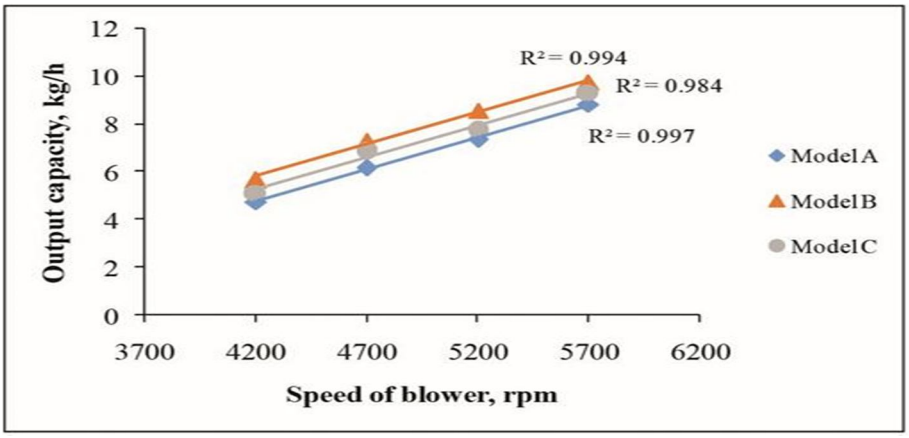
*iii)* *Model C:* This model also works on the same principle but the only difference is that in this model is that both type of filters of model a and model b are combined used in this model, when the collecting tank is full then the operator has to manually open the cat of the drum and remove the cotton.

Image of man collecting from plant

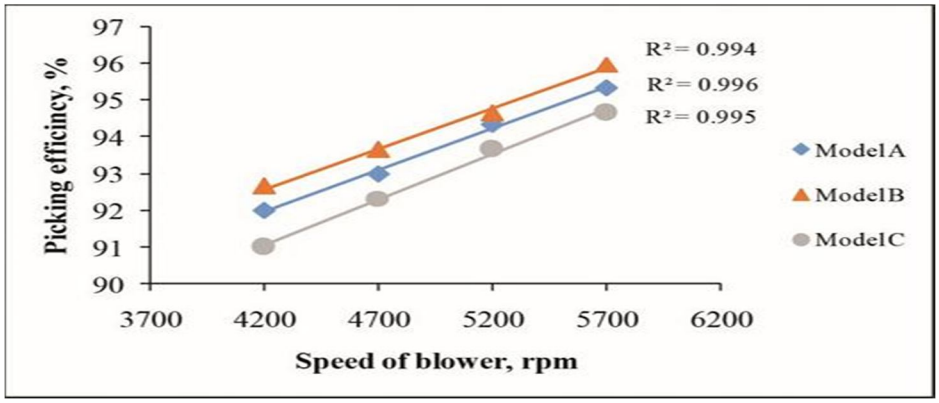
The above Picher shows man collecting cotton from plant .After several testes the results are plotted in the form of graph the bellow graph deals with the output capacity v/s speed of the blower in which it is found that model b is better than other two models when compared.




Graphical representation between output capacity & speed of blower

The most important hear is to note is that as the speed increases the output capacity also increases. But it is found that not only the output capacity increases it also increases the trash content, picking efficiency and the fuel consumption.

The bellow graph shows the relation between effect of drum on picking efficiency and speed it is clearly noticed that model b lies at top.




Graphical representation between picking efficiency & speed of blower

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Model B reading at 5200 rpm

| Machine operator | Fuel consumption (l/h) | Picking efficiency (per cent) | Trash content (per cent) | Output capacity (kg/h) |
|---|---|---|---|---|
| Operator I | 0.58 | 94.12 | 5.6 | 8.74 |
| Operator II | 0.63 | 94.23 | 5.5 | 8.83 |
| Operator III | 0.60 | 96.01 | 6.2 | 8.96 |
| Average | 0.603 | 94.79 | 5.77 | 8.84 |

The above table shows the readings noted while Model B was tested it consist of fuel consumption, picking efficiency, trash, Content, output capacity at a speed of 5200 rpm as the no of operation conducted the machine working better.

Table is about Quality assessment of cotton fiber

| Sr. | Variety | 2.5 % span length, mm | | Uniformity Ratio, % | | Strength, g/tex | | Trash content, % | |
|---|---|---|---|---|---|---|---|---|---|
| | | KCP | MP | KCP | MP | KCP | MP | KCP | MP |
| 1 | G.Cot.12 | 21.9 | 22.1 | 45.2 | 51.1 | 21.6 | 19.9 | 5.50 | 3.60 |
| 2 | G,Cot.18 | 28.8 | 29.1 | 49.5 | 51.0 | 21.8 | 20.3 | 6.00 | 4.20 |
| 3 | RCH-2(Bt) | 30.3 | 30.7 | 52.0 | 54.0 | 25.5 | 25.5 | 7.50 | 3.80 |
| | Aug. | 27.0 | 27.3 | 48.9 | 51.7 | 22.97 | 21,9 | 6.33 | 3.87 |

The above table is of knapsack cotton picker without filter hear we can notice that the strength of cotton collected by picker is more than the manual picking but the trash is bit more in knapsack cotton picker this drawback is overcut my using the filter .

## IV. CONCLUSION

By considering all the above points, graphs and tables about both the spindle cotton plucking machine and knapsack cotton picking machine, it is clear that spindle cotton picking machine collected cotton is not a good quality of cotton when compared to the old traditional method of handpicked cotton, but by using knapsack machine without filter with the same human picking pressure the quality of fiber is batter but the content of trash is bit more this has been over com by using filters to knapsack machine, even by comparing the three models of it in all manner the model B was found to be the best among the rest models in overall manor.

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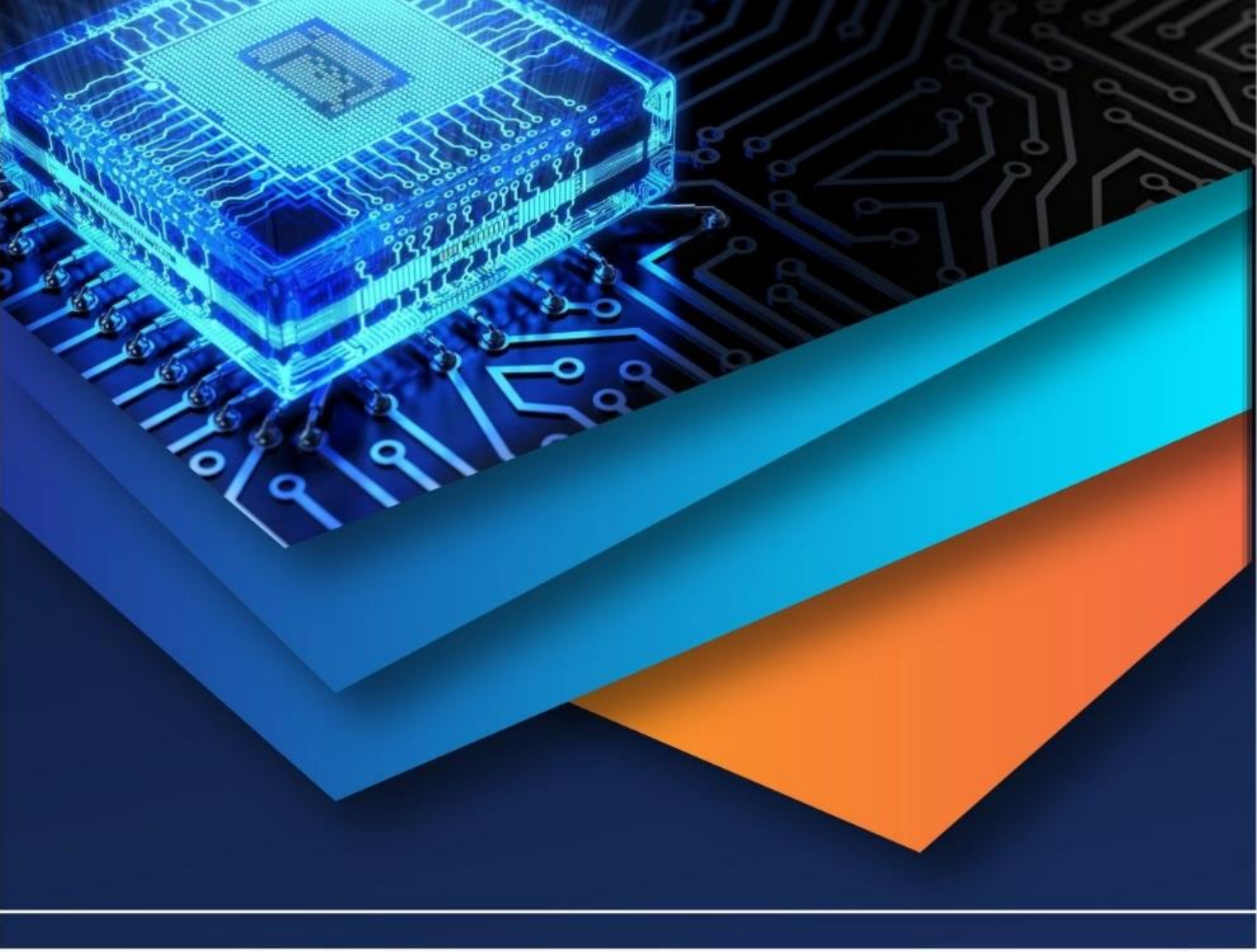

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