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Less Balances More: A Study on Dynamic Habitable Micro-Living in Urban Chennai

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Abstract: ***The Micro house movement also known as the small house movement or tiny house movement is a architectural and social movement that advocates living simply in small homes. It is a social movement where people choose to downsize the space they live in. The micro house movement has gained prevalence due to the scarcity of land and high land values. This study aims to analyze, the smaller living spaces in the context of urban Chennai by understanding the user preferences to give recommendation to adopt the concept of micro-living in Chennai city.***
Keywords: Micro units, habitable space, lighting, ventilation,

I. INTRODUCTION

Micro units are a concept in sustainable development to preserve the natural environment and enable a quality living in metropolitan cities where land is scarce. These units designed are affordable without compromising on the comforts and efficiency of the habitable spaces. The housing size is decided by each family and depend on a family's income, purchasing capability, family size, life style, needs, land and construction costs and local regulations are also considered. Micro houses are space and energy efficient, low-cost and low-maintenance, and environmentally and ecologically friendly. Harvey S. Moskowitz in his book "A complete illustrated book of development definition" said that "A dwelling unit between 250 and 400 square feet" is considered as a micro unit.

ULI research says that "Although micro unit has no standard definition, a working definition is a small studio apartment, typically less than 350 square feet, with a fully functioning and accessibility compliant kitchen and bathroom." Dueep Jyot Singh on his book Disaster management: The tiny house movement says that, "Micro houses are housed in miniature, which are made in limited spaces and the maximum area in 500sq.ft."

A. CHENNAI-AN Overview

Chennai is the capital city of Tamilnadu and it has a population of 1.1 million based on the census of 2011. Chennai's migrant population amounts to 76.3 per cent, the overwhelming reason for migration are the diverse employment opportunities the city offers. Chennai has excellent infrastructure, transport system, educational institutions, health care and other social and institutional amenities.

But due to demand, the cost of land and high rents acts as deterrent depriving people from varied income groups from an affordable quality habitable space.

People make a conscious choice on compromising the quality of their living space and move the central city to be closer to their work, school or any other institution that is a priority in their day today activity. Chennai with its scarcity of land, high rents, and high demand for affordable housing is a prime candidate which can adopt the micro house movement. This can be done only by understanding user preferences and by applying the concept to the local cultural context.

B. Case Study And Discussion

1) To identify the dwelling units in urban Chennai within 400 sq.ft of area.
2) To understand the living space - comfort level and its usability
3) To explore the Qualitative questionnaire survey to the user preference to satisfy to address the aim of the research.
4) To explore the recommendations for micro living concept by study and discussion of the samples taken.

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The following case studies are taken forward by questionnaire prepared based on the user preference .

1 House type

2 How much is the size of your dwelling

13.4-23.3 sq.m	23.31-32.5 sq.m	32.6-37.16 sq.m

FAMILY PARTICULARS

3

Sl.No	Name	Age	Relationship	Occupation

PART-1: LIVING / MULTIPURPOSE HALL

4 Do you have adequate light and ventilation in this room?

Very good	Good	Bad	Very bad

5 When will be the windows opened and closed during a day?

Day	Opened	Closed	Day	Opened	Closed
Morning			Evening		
Afternoon			Night		

6 When will be the windows opened and closed during a season?

Season	Often	Sometimes	Never
Summer			
Winter			

What is the size of the window place?

Is the window open is sufficient to this living space?

Actual carpet area of Living area

7

FURNITURE	PERMANENT	TEMPORARY	SIZE

Carpet area excluding the Furniture areas

Is the living space area is comfortable? Yes | No

PART-2: OUTDOOR SPACE

8 Do you have Outdoor space in your dwelling? Yes | No

9 Location of outdoor space in your dwelling? Front | Rear side | Adjacent

10 The outdoor space is used for?

Washing	Cooking	Playing	Parking	Garden	Utility

PART-3: KITCHEN

10 How often do you use the utility space? Always | Rare | Never

11 Is the storage area is attached or separated from kitchen? Attached | Separated

12 How do you prefer to place your kitchen? Part of | Separate

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		living	room
13	Do you use artificial light during day time?	Yes	No

14 Do you have adequate light and ventilation in this room?

Very good	Good	Bad	Very bad

15 When will be the windows opened and closed during a day?

Day	Opened	Closed	Day	Opened	Closed
Morning			Evening		
Afternoon			Night		

What is the size of the window place?		
Is the window open is sufficient to this kitchen space?		
16 Do you use your Kitchen during Special occasion?	Yes	No
Actual carpet area of Kitchen		

17 FURNITURE					
Permanent					
Temporary					

Carpet area excluding the Furniture areas		
Is the kitchen space area is comfortable?	Yes	No

PART-4: TOILET

18 How the toilet space is accessed?

from inside	from outside

19 Does Bath area and water closet are separated?

Yes	No

20 What type of Water closet is used in your dwelling?		Indian closet	Western closet
21 Where do you wash the cloths?	Washing mach.	Bathroom	Outdoor
22 Do you prefer to have wash basin in your toilet?		Yes	No
23 Do you prefer to have bath space in your toilet?		Yes	No

24 Do you have adequate light and ventilation in this room?

Very good	Good	Bad	Very bad

Actual carpet area of Toilet		
Is the toilet space area is comfortable?	Yes	No

PART-5: BEDROOM

25 In listed below which one you will sleep?	Bed with cot	Mat / Blanket	Bed

26 How the storage space is used in your dwelling?

Loft	Wardrobe	On the floor	On the boxes

27 Do you have adequate ventilation in this room?

Very good	Good	Bad	Very bad

28 When will be the windows opened and closed during a day?

Day	Opened	Closed	Day	Opened	Closed
Morning			Evening		
Afternoon			Night		

29 When will be the windows opened and closed during a season?

Season	Often	Sometimes	Never
Summer			

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	Winter					
	What is the size of the window place?					
	Is the window open is sufficient to this bedroom space?					
	Actual carpet area of Bedroom					
30	FURNITURE					
	Permanent					
	Temporary					
	Size					
	Carpet area excluding the Furniture areas					
31	Is the bedroom space area is comfortable?				Yes	No

Table 1.1 Questionnaire based on user preference

For this Study, Four urban areas are identified in chennai city have choosen to study the dwelling units ranges from 150 sq.ft to 400 sq.ft. The four study places selected from four direction of the chennai city namely Manali from North, Ambattur from West, Srinivasapuram from East and Thiruvanmaiyur from South. From each place Five typologies of dwelling units are taken as example to analysis the space. Here the dwelling unit can be an individual house or a row house or a Flat in apartment. This combo gives a variety of layouts and difference between the people comfortness.

With the help of the questionairre, survey is taken in 15 dwelling units such that 5 units from per area selected in chennai city.

This study discuss about the spatial comfortness of the users space and the options they prefer for their comfortness in their dwelling space.

II. MODEL FORMAT OF SURVEY

A. Survey : 01

Total number of occupants : 4 members per family
Typology : 1 BHK
Built up area : 28 sq.m

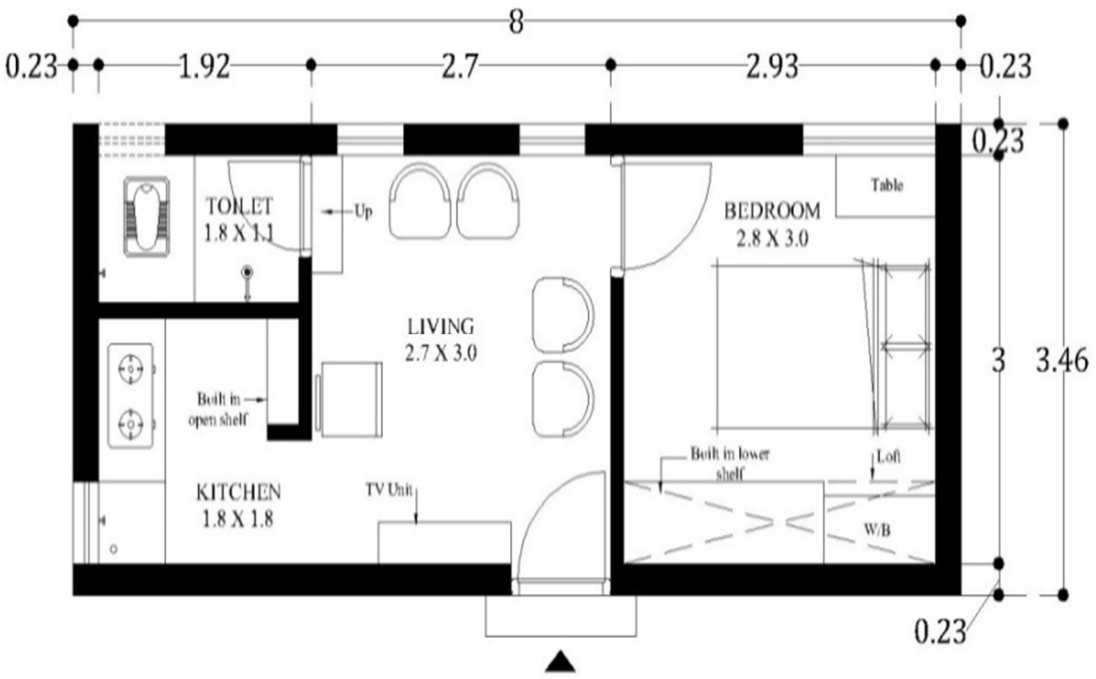

Fig 1.1: Individual house

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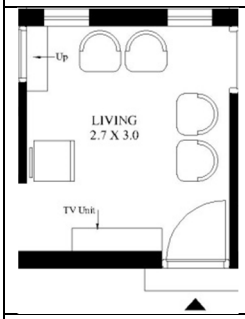
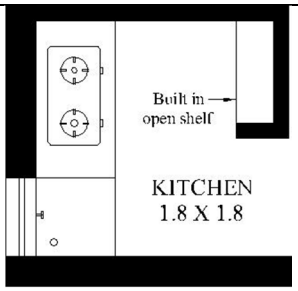
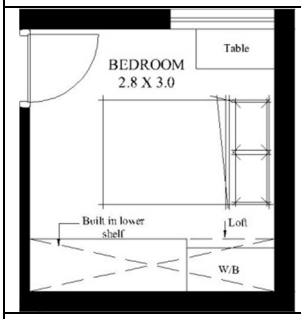
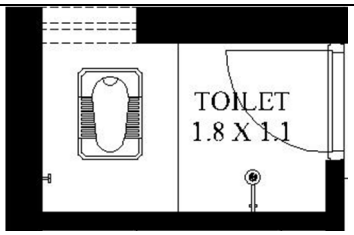
LIVING	KITCHEN
 Carpet area : 8.1 sq.m Size of the window opening : 0.9 x 1.2 m	 Carpet area : 3.24 sq.m Size of the window opening : 1.2 x 1.2 m
Lighting and Ventilation: Area of the window opening : 1.08 sq.m 1/10th of the Carpet floor area : 0.81 sq.m Both the windows placed in living area measure the same size. So put together area of both windows are 2.16 sq.m. Here the value of the area is higher than the 1/8th of the carpet area proves that lighting and ventilation is sufficient in living area. The survey also says that the user feels more comfortable and satisfactory. Spatial analysis: Carpet area that covers furniture's : 1.7 sq.m Carpet area excluding furniture's : 6.4 sq.m Living area occupies both the permanent and temporary furniture's. When comparing to the permanent, temporary furniture's are more and this will be more flexibility in usage. According to the survey with the users in this residence, the living space is far more comfortable for 4 occupants. If there is increase in occupant, at night the living area temporary furniture's are moved to a corner and used as a sleeping area.	Lighting and Ventilation: Area of the window opening : 1.44 sq.m 1/10th of the Carpet floor area : 0.324 sq.m The kitchen window opening area is more than 1/10th value of the carpet area. According to NBC standard, the higher value in window opening is sufficient for a habitable room. The users also expressed a positive comfort to kitchen space. Spatial analysis: Carpet area that covers furniture's : 1.9 sq.m Carpet area excluding furniture's : 1.34 sq.m Most of the space is occupied by the permanent open shelf and the counter top. Due to insufficient of the space, the appliance such as refrigerator is placed in the living area. According to the survey taken, the occupant states that it is only sufficient for one to two people stand at that time to work.

BEDROOM	TOILET
 Carpet area : 8.4 sq.m Size of window opening : 1.2 x 1.2 m	 Carpet area : 2.0 sq.m
Lighting and Ventilation: Area of the window opening : 1.44 sq.m 1/10th of the Carpet floor area : 0.84 sq.m The bedroom window opening is provided to get light and ventilation sufficiently to the users. As per the users opinion light and ventilation in bedroom is better and comfortable.	According to the survey, this dwelling users prefer to use Indian closet attached. And bath area and water closet should be separate to use it comfortable to wash the cloths in bath area in spite of space constrain. They preferred to have a large space comfort them to wash. Lighting and Ventilation:

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Spatial analysis: Carpet area that covers furniture's : 4.3 sq.m Carpet area excluding furniture's : 4.1 sq.m Here in this bedroom space the furniture's and the inclusive carpet area is more or less equal in its value. Because this room is occupied by mostly permanent furniture's which has no chance to move and make the space bigger for other use.	Size of the Ventilator measures 0.6 x 0.6m and this is sufficient to give light and ventilation to the required space as the users wish. Spatial analysis: This toilet space consists of one Indian water closet and one shower with tap. Due to the insufficient of the space and less space to run the activities in the bath area, the users feel it is not convenient in this less space.

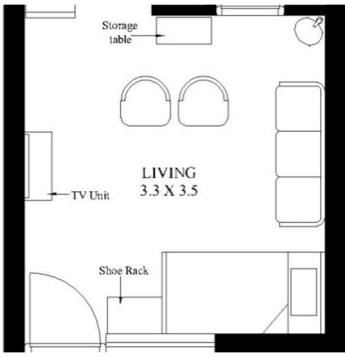
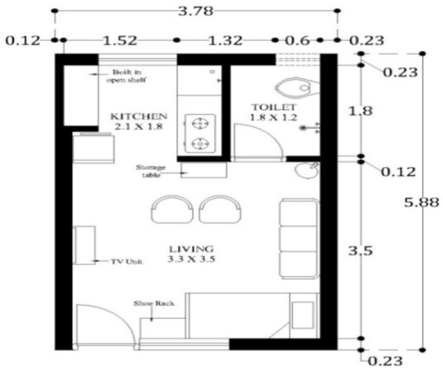
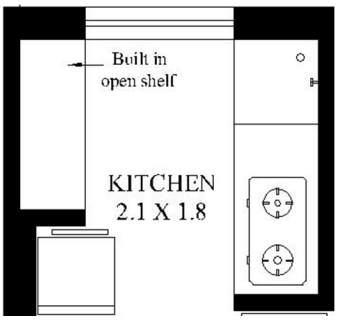
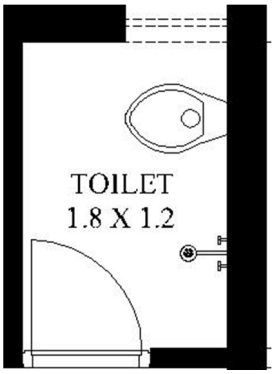
Table 1.2: Survey 01

B. Survey: 02

This dwelling unit typology is example of Row house units.

Total number of Occupants : 4 members per family
Typology : 1 room, kitchen and toilet
Built up area : 22.2 sq.m

Fig 1.2: Row house

MULTIPURPOSE HALL	KITCHEN	TOILET
 Carpet area : 11.6 sq.m Size of the window opening : 1.2 x 1.2 m 	 Carpet area : 3.8 sq.m Size of the window opening : 1.1 x 1.2 m	 Carpet area : 2.16 sq.m
Lighting and Ventilation: Area of the window opening : 1.44 sq.m 1/10th of the Carpet floor area : 1.16 sq.m Living area window opening is sufficient as per NBC standard India and also satisfied the users to reside in comfort.	Lighting and Ventilation: Area of the window opening : 1.32 sq.m 1/10th of the Carpet floor area : 0.38 sq.m Kitchen space window is bigger in its size to achieve the light and	According to the survey, these dwelling users prefer to use Western closet accessed from inside the unit. For their convenient they prefer bath area and water closet separately to wash the cloth at bath area.

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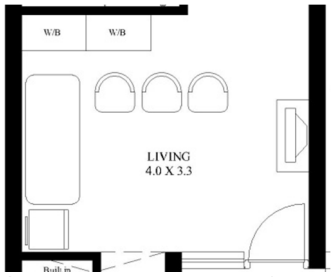
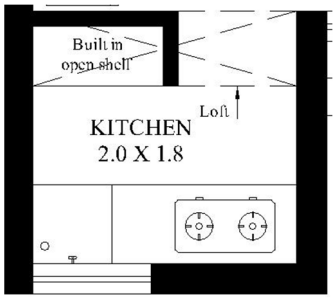
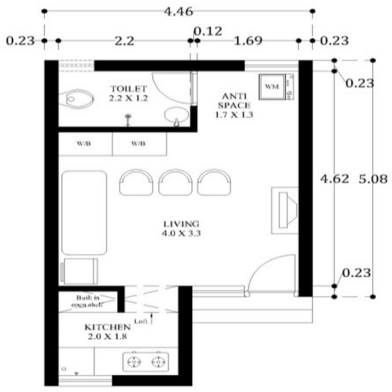
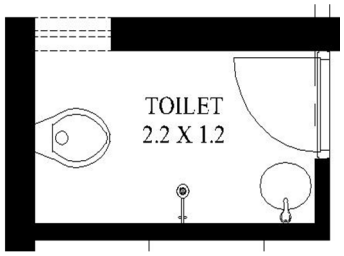
Spatial analysis: Carpet area that covers furniture's : 3.25 sq.m Carpet area excluding furniture's : 8.35 sq.m Living area occupies both the permanent and temporary furniture's. Most of the carpet area is filled with permanent stuff, which cannot be altered. As an impact, sleeping place for the 4 occupants seems more difficult and this answer also reflected in the survey with the user of this dwelling unit. The sleeping activity takes over by using mats in addition to cot.	ventilation effectively. Spatial analysis: Carpet area that covers furniture's : 2.0 sq.m Carpet area excluding furniture's : 1.8 sq.m Open Shelf and counter top are the permanent in built facilities in kitchen. Small space is allotted to the refrigerator to access is easy. The area given to the carpet and for built-in, facilitates the user requirements.	Lighting and Ventilation: Size of the Ventilator measures 0.6 x 0.6m and this is sufficient to give light and ventilation to the required space as the users wish. Spatial analysis: This toilet space consists of one western water closet and one shower with tap. The area of the toilet satisfies the activities requirement including washing. And they prefer to have wash basin in the toilet.

Table 1.3: Survey 02

C. Survey: 03

Total number of occupants : 3 members / family
Typology : Multipurpose hall, kitchen and toilet
Built up area : 28.1 sq.m

Fig 1.3: Individual flat

MULTIPURPOSE HALL	KITCHEN	TOILET
 Carpet area : 15.4 sq.m Size of the window opening : 0.9 x 1.2 m	  Carpet area : 3.6 sq.m Size of the window opening : 0.9 x 1.2 m	 Carpet area : 2.6 sq.m
Lighting and Ventilation: Area of the window opening : 1.08 sq.m	Lighting and Ventilation: Area of the window opening : 1.08 sq.m 1/10th of the Carpet floor area : 0.36	According to the survey, these dwelling users prefer to use Western closet accessed from

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$1/10^{th}$ of the Carpet floor area : 1.54 sq.m Living area window opening is not sufficient enough too lit and breeze the room. Though the size of the opening is very small and also not coincides with the $1/10^{th}$ of the floor area value. Spatial analysis: Carpet area that covers furniture's : 3.7 sq.m Carpet area excluding furniture's : 11.7 sq.m Living area occupies only five-permanent furniture's which would not impact much in the carpet area. The rest of the space in the living area fills the requirement of the users. Later at night the temporary furniture's are remove and used as the sleeping area with bed and mat. Wardrobes are used for the store the cloths and other stuffs	sq.m The window opening placed in kitchen lit and breeze sufficiently to the room. As per the survey, the users felt more comfortable to cook as wish. Spatial analysis: Carpet area that covers furniture's : 1.7 sq.m Carpet area excluding furniture's : 1.9 sq.m Kitchen space only has the permanent built-in for counter top and for storage. Rest of the carpet area is fulfilling the function of the users. The user prefer to have storage are attached to the kitchen as a shelf or wardrobe.	outside the unit. For washing they prefer only Washing machine. And the wash basin and bath space is required to be with in the toilet to get big space for comfort as per the survey conducted. Lighting and Ventilation: Size of the Ventilator measures 0.6 x 0.6m and this is sufficient to give light and ventilation to the required space as the users wish. Spatial analysis: This toilet space consists of one western water closet and one shower with tap with wash basin. The area of the toilet satisfies the activities requirement.

Table no: 5.3 Survey 03

III. CONCLUSION

A. For 13.4-23.3 Sq.M Size Dwelling

In these types mostly comprises of a multipurpose hall with kitchen and toilet.

B. Living

Most of the dwelling user prefer for temporary furniture's in their usable space because they can able to change the layout according to their activity during day and night.

C. Recommendation

For this small space Temporary furniture should be used for flexibility in space.
Avg. size of living – 2.8x3.0m
Avg. size of multipurpose hall – 3.0x3.3

D. Out Door

Most of the users prefer the outdoor space in their dwelling. Even it is a small area they want an outdoor space likely to be used for washing, cooking, playing, parking, and garden, utility.
The majority outdoor space placed at rear side is preferred. Becauseextension of the kitchen activity is happens. And some of the front outdoor space is used for parking and playing purpose.

E. Kitchen

1) *Recommendation:* Utility should place in the rear side to facilitate the users. Built-in furniture is preferred for sufficient use instead of modern kitchen. Placement of the kitchen can with living or multipurpose hall as the allied space.

Avg. size of the kitchen – 1.5x1.5m

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F. Toilet

1) Recommendation: Indian closet should be used. Bathroom and toilet should be designed separately. Avg. size of the bathroom-0.9x0.9m; size of the toilet-1x0.9m

2) For 23.31 – 32.5 Sq. M And 32.6 – 37.16 Sq. M size categorized under 1BHK dwelling.

G. Living

1) Recommendation: Dynamic furniture's are recommended to plan micro spaces. So that usable space will be more spacious and comfort to do activity in

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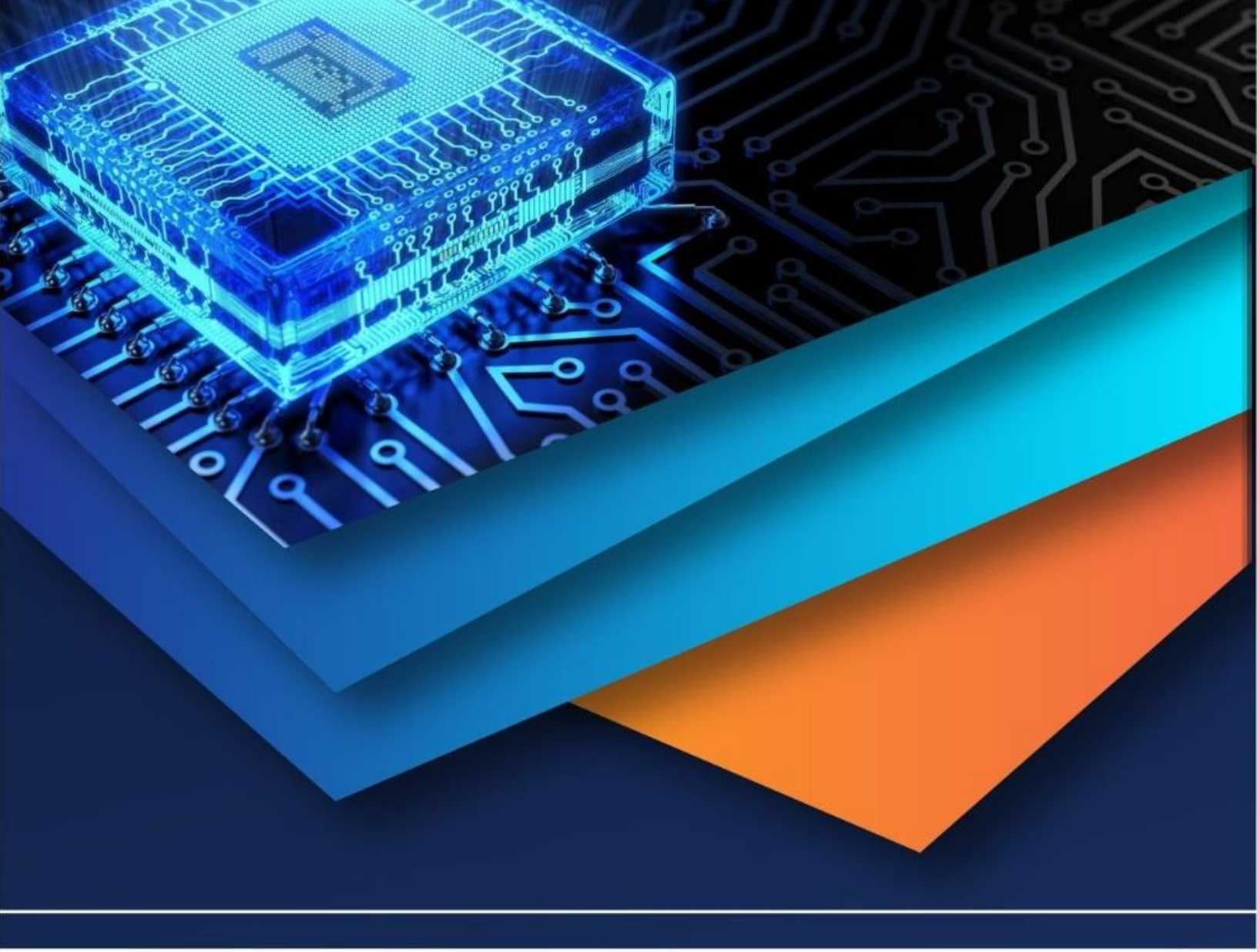

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