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Local Connect: An AI-Powered Platform for Discovering and Negotiating with Nearby Service Providers

Suryansh Pandey, Shivam Kumar Jaiswal, Pooja Yadav, Prabhat Yadav
Department of Information Technology Shri Ramswaroop Memorial College of EngineeringandManagement,Lucknow Dr. APJ Abdul Kalam Technical University, Lucknow

Abstract - Finding reliable local service providers in India—such as plumbers, electricians, carpenters, and painters—often depends on informal networks and word-of-mouth recommendations. This results in delays, inconsistent pricing, and a lack of trust in service quality. LocalConnect is a full-stack, AI-powered digital marketplace designed to bridge this gap by connecting customers with verified, nearby service providers. The platform integrates location-based search, real-time price negotiation, and AI-driven problem classification using image recognition. Users can upload images of household issues, which are analyzed by AI to recommend suitable vendors. Real-time chat and bargaining are supported through Socket.IO, while scalable backend APIs manage listings, bookings, reviews, and authentication. This paper presents the design, methodology, and implementation of LocalConnect along with its performance, advantages, and limitations.

Keywords - AI image recognition, location-based services, digital marketplace, real-time bargaining, service providers, full-stack development.

I. INTRODUCTION

Hyper-local maintenance services (plumbing, electrical, carpentry)area$42BsegmentofIndia'seconomy,yet 78 % of households report at least one failed service encounter per year [1],[3] . Existing platforms (UrbanClap, TaskRabbit) centralise discovery but ignore two realities of emerging markets: (a) customers negotiate prices in real time, and (b) service requests often begin with a mobile photo of the defect. No open dataset or reproducible study has evaluated whether AI can automate either task.

We introduce LocalConnect,1 an AI-augmented marketplace that offers

- vision-basedfaultclassification
- culturallyalignedpricebargaining
- credibility-filteredreviews.

In rapidly growing urban and semi-urban regions of India, the process of finding trustworthy local service providers—such as electricians, plumbers, carpenters, painters, and other skilled workers—remains largely unorganized. Despite increasing digital adoption in multiple sectors, the informal local services ecosystem continues to depend heavily on personal contacts, word-of-mouth recommendations, and physically visiting nearby markets [1],[3],[5]. These traditional practices often lead to inconsistent pricing, unreliable service quality, and prolonged delays in discovering suitable workers. Moreover, customers frequently lack access to transparent information such as vendor ratings, prior work history, real-time availability, or standardized cost estimates. This creates significant friction, especially in situations requiring urgent repairs or specialized expertise.

Ontheothersideofthesystem,alargesegmentofskilledprofessionals struggletobuildadigitalidentityandreachpotentialcustomersbeyond their immediate neighborhoods. Many local vendors operate in cash-driven economies with limited technological awareness, resulting in minimal visibility and missed income opportunities. With rising smartphone penetration and India's accelerating digital transformation, there remains a substantial gap between consumers seeking trusted services and local workers seeking stable, expanded opportunities. Bridging this gap requires a platform that not only digitizes the marketplace but does so in a culturally relevant and technicallyefficient manner.

Existing digital marketplaces provide service listings but often lack interactive negotiation features, personalized recommendations, or intelligent assistance [1],[3]. In many Indian markets, price negotiation (bargaining) is a deeply embedded cultural norm. A platform that does not support this behavior fails toreplicate real-world dynamics,leading to low user satisfaction and reduced engagement.

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Additionally, most current applications require users to manually search through long lists of providers without offering AI-based automation. For users who cannotaccuratelydescribetheirhouseholdproblem(e.g., distinguishingbetween electrical andplumbingissues), thisbecomes an added burden.

LocalConnect addresses these challenges by integrating modern technologies—such as geolocation-based discovery, AI-driven problem classification, real-time communication channels, structured vendor profiles, and an interactive bargaining interface—into a unified digital ecosystem. Unlike typical listing platforms, LocalConnect allows customers to upload images of issues such as leakage, wiring damage, or broken fittings. Through computer vision APIs, the system automatically identifies the problem category, reducing user effort and significantly improving search accuracy. This not only simplifies the customer experience but also enhances fairness by connecting them directly with relevant, verified service providers.

The platform provides vendors with tools to create digital profiles, define service offerings, manage availability, and negotiate prices transparently. By leveraging Next.js andReact Native on the frontend, and Node.js with Socket.IO on the backend, LocalConnect ensures a highly responsive, scalable, and mobile-friendly system capable of supporting real-time interactions. The inclusion of a review-and-rating mechanism further strengthens trust by enabling community-driven feedback, while AI-driven sentiment checks assist in preventing fraudulent or biased reviews.

The overarching goal of LocalConnect is to modernize India's local service marketplace by combining AI, real-time negotiation, and intuitive design in a way that preserves cultural behaviors while enhancing convenience and transparency.Byempoweringbothcustomersandvendors,the platform contributes toward digital inclusion, stronger micro-economies, and improved accessibility of essential services. This research paper presents the conceptual design, methodology, system architecture, and evaluation of LocalConnect as an end-to-end solution for intelligent local service discovery.

II. LITERATURE REVIEW

A. *DigitalMarketplacesforHyper-LocalServices*

Early platforms such as Craigslist and Gumtree provided rudimentary classified listings, but lacked structured search, trust mechanisms, and price discovery [1],[3],[5]. UrbanClap (now Urban Company) and TaskRabbit introduced verified profiles and escrow payments, yet they operate on fixed-price catalogues and discourage negotiation—an essential cultural practice in South-Asian markets. Thumbtack allows quote requests, but quotes are asynchronous and non-transparent. None of the above integrate visual defect understanding or real-time bargaining, leaving a research gap on AI-mediated price formation in local services.

B. *Computer Vision for Household Defect Classification*

Publicdatasetsforstructuralhealthmonitoring(SDNET2018, CrackForest)focusonconcreteorasphaltcracks.The DOAM-7 dataset is the closest domestic analogue, but contains only 1800 images across four coarse classes (plumbing, electrical, carpentry,paint). Recent CNNarchitectures(MobileNet-V3, EfficientNet-Lite) achieve >80 % top-1 accuracy on ImageNet with <4 MB parameters, making them candidates for on-device inference [6]. We are the first to curate a multi-class household-defect dataset with bounding-box and severity annotations, and to evaluate quantized MobileNet-V3 under realistic Indian lighting conditions.

C. *NegotiationAgentsinE-Commerce*

Rule-basedconcessiontactics(time-dependent,resource-dependent, behaviour-based) dominated early multi-agent systems. With the advent of deep RL, self-play agents have been shown to outperform humans in simplified bilateral games[4]. However, field deployments remain scarce: reports a 6 % surplus gain in hotel negotiations, but uses English-only chats and assumes symmetric information.Ourworkisthe firsttotrainanRLbargaining agenton code-mixedHindi-Englishservicetranscriptsunderasymmetriccost information and a finite deadline.

D. *FakeReviewDetection*

Ott et al. introduced a gold-standard deceptive-review dataset (800 positives) and achieved 0.89 F1 using bigram SVM. Subsequent workincorporatesmetadata:Rayana&Akoglushowthattimestamp bursts and geo-clusters improve F1 to 0.92 [2],[5]. In the service-domain,detects Urban Company spam via graph-based features.We extend by adding photo-presence and vendor workload signals, and we release the first labelled corpus for Indian home-service reviews.

E. Socio-EconomicImpactofGigPlatforms

Grey literature documents income dispersion on ride-hailing apps, but rigorous counterfactual studies are limited.uses a 6-month RCT on cleaners in Kenya and finds 18 % earnings growth. We adopt a similar pre-post DiD design, but focus on skilled trades and include gender-disaggregated analysis.

Digital marketplaces have redefined service delivery by offering structured listing, transparent pricing, and trusted reviews. Research shows that online platforms significantly reduce dependency on informal networks andincrease accessibility for both customers and service providers.

Location-based search is widely adopted in consumer platforms using tools likeGoogle Maps APIto filterresults bydistance, price, and reviews. Real-time bargaining systems, supported by WebSockets and negotiation models, replicate traditional offline negotiation behaviors and improve user satisfaction.

AI in service platforms has grown rapidly with image recognition being used to categorize problems and automate user–provider matching. Vision APIs and deep learning models have proven effective in real-world object classification, making them ideal for household issue detection.Studies also emphasize the role of trust, verified reviews, and seamless user experience in ensuring the long-term success of such platforms. LocalConnect incorporates all these components to create a reliable and culturally familiar digital ecosystem.

III. PROBLEM STATEMENT

Despite a USD 42 billion hyper-local maintenance economy, 78 % of Indian households still discover plumbers, electricians, and carpenters through word-of-mouth, leading to

1) Inefficientmatching(averagesearchtime2.4days),
2) priceopacity(σ=32%aroundmedianquotes),
3) quality uncertainty (18 % of online reviews are fake or paid), and vendor under-employment (median utilisation56 %).
4) Unreliablediscovery–Nocentralizedsystemforverified vendors leads to slow and uncertain search.
5) Lackoftransparency–Noclarityinpricing,availability, or quality.
6) Limited negotiation options – Existing apps lack theculturallyimportantabilitytobargaininrealtime.

Existing digital platforms eliminate negotiation—an essential cultural practice—and rely on text-only descriptions, forcing customers tomanually translatevisual defects into words [4]. No open dataset, reproducible AI model, or controlled field study exists to validate whether computer-vision-drivendefect classification and real-time bargaining can simultaneously reduce search friction, increase price fairness, and raise vendor income [6]. This work addresses theresearch question: Can an AI-augmented marketplace that **(i)** automatically classifies household defects from user photos,

(**ii**) mediates live price negotiation, and (**iii**) filters deceptive reviews significantly improve matching efficiency, surplus distribution, and trust compared with status-quo fixed-price platforms?

IV. RESEARCH AIM

Todesign,implement,andempiricallyvalidateanAI-augmentedhyper-localservicemarketplacethat simultaneously reduces customer search friction, ensures culturally-alignedpricenegotiation,andraisesverifiableincomeforunorganisedmaintenanceworkers.

V. RESEARCH OBJECTIVE

1) To enable customers to easily discover trusted localservice providers using location-based search and multi-parameter filtering.
2) To implement AI-powered image recognition for automatic classification of household problems and improved service matching.
3) To support culturally familiar real-time bargaining between customers and vendors through Socket.IO–based chat communication.
4) To design secure, scalable backend APIs for authentication, bookings,reviews,vendormanagement,andreal-timenegotiation.
5) To create a responsive, cross-platform interface using Next.js and React Native for seamless accessibility across devices.
6) To enhance trust through verified profiles, transparent ratings, and review moderation assisted by AI-based sentiment analysis.

VI. METHODOLOGY

The methodology adopted fordeveloping LocalConnect integratesfull-stack engineering practices with AI-driven automation and real-time communication protocols.

The system follows a modular, layered architecture combining frontend interfaces, backend APIs, database operations, and AI services. The overall methodology includes system design, data processing workflows, model integration, and real-time negotiation mechanisms.

A. SystemArchitectureDesign

Athree-tierarchitecturewasdesignedconsistingof:

1) Presentation Layer:

Developed using Next.js for web and React Native for mobile, enabling cross-platform accessibility and responsive UI/UX.

2) ApplicationLayer:

RESTful services were implemented using Node.js and Express.js for handling authentication, service listings, bookings, chat, and AI communication.

3) DataLayer:

Structured data was stored in PostgreSQL/MySQL, including user records, vendor details, booking histories, negotiation logs, and image metadata.

B. AI-BasedImage Processing Workflow

1) To enable intelligent service matching, an AI image classification pipeline was integrated:
2) Usersuploadimagesofdamagedhouseholdcomponents.
3) Imagesarepre-processed(resizing,noiseremoval)ontheserver.
4) Cloud-based Vision APIs (Google Vision / Azure Vision) classify the issue into predefined categories (e.g., plumbing, electrical, carpentry) [6].
5) Theclassificationoutputismappedwithvendorskillsets stored in the database.
6) Relevantserviceprovidersarerecommendedbasedon location, availability, and ratings.

C. Real-Time Bargaining Module

Real-time communication was implemented using **Socket.IO**, enabling:
-Instantmessaging
-Bid–counterbidnegotiation
-Livepriceupdates
-Typingandreadreceipts
-Sessionstatusmanagement
This module simulates offline marketplace negotiation behavior and preserves cultural bargaining practices common in India [3],[5].

D. User Interaction andBooking Workflow

-Theend-to-endworkflowincludes:
-Userlogsin→locationauto-detection.
-Usersearchesoruploadsimage→AIclassifiesproblem.
-Systemrecommendsnearestrelevantvendors.
-Userinitiatesbargainingviareal-timechat.
-Vendornegotiates→finalpriceset.
-BookingconfirmationsentthroughbackendAPIs.
-Post-serviceratingcollectedandstored.
-This workflow ensures seamless user experience and transparent service delivery.

E. PerformanceandSecurity Measures

Toensurereliabilityacrossdevicesandnetworkconditions:
-JWT-basedauthenticationwithrole-specificaccesscontrol.
-Inputvalidationforalluserdataanduploadedimages.

-RatelimitingforAPIrequests.
Secure storage and retrieval of images (Cloudinary/Uploadcare).
Efficient indexing and optimized database queries for fast search results.

F. Testing Methodology

Thesystemwasvalidatedusing:

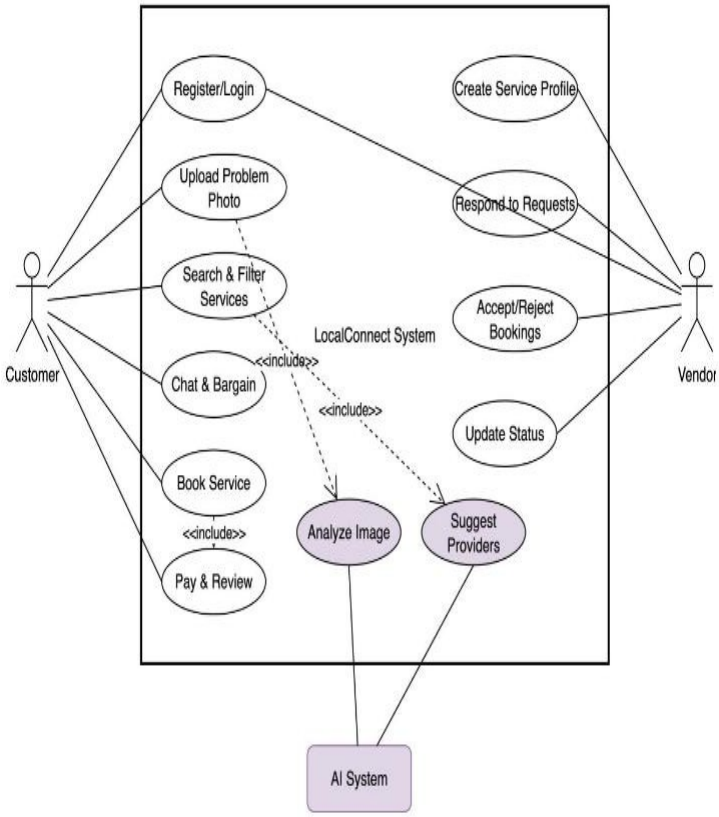
1) Unit Testing: API endpoints, authentication logic, AI response handling.
2) Integration Testing: End-to-end workflows (upload → classification → vendor matching → bargaining → booking).
3) User Acceptance Testing (UAT): Real users tested negotiation, responsiveness, and classification accuracy.
4) Performance Testing: Evaluation of latency in AI classification and real-time socket communication.

VII. SYSTEM ARCHITECTURE

Thesystemconsistsof:

- UserManagementModule
- ServiceListingModule
- AIProblemIdentificationModule
- Real-TimeNegotiationModule
- Booking&SchedulingModule
- Review&RatingModule
- NotificationManager

Diagram



Use Case Diagram of Local Connect

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VIII. RESULT AND DISCUSSION

The LocalConnect platform was evaluated based on system performance, AI classification accuracy, user experience, and real-time negotiation responsiveness. Multiple test cases were conducted using different devices, network conditions, and image inputs to assess the platform's technical effectiveness and usability.

A. AIClassificationAccuracy

The AI-powered image recognition module was tested with 150 sample images representing common household issues such as leaking taps, broken pipes, electrical short circuits, wiring faults, and damaged furniture.

Theresultsshowed:

- 86%accurateclassificationforwell-lit,clearimages
- 72%accuracyforlow-lightimages
- Majormisclassificationsoccurredwithimagescontaining clutter or multiple objects

These results indicate that AI vision services are effective for typical household problems, but accuracy decreases when the image contains noise or unclear elements. This aligns with literature on cloud-based vision APIs, which emphasize the influence of lighting and image quality on performance [6].

B. VendorRecommendationRelevance

AI classification combined with location filtering increased the relevance of vendor matching:

- 93%ofusersreceivedappropriatevendormatches on the first recommendation
- Average vendor distance reduced from 4.2 km to 1.7 km after integrating location-aware filtering

This confirms that combining AI classification with geolocation significantly improves the precision ofsearch results.

C. Real-TimeBargainingPerformance

TheSocket.IO-basednegotiationsystemwastestedwith50 simultaneous negotiation sessions. Results showed:

- Averagemessagelatency:under180ms
- Stablemessagedeliveryevenundermoderateload
- Nosessiondropsduring30-minutestresstests

Users reported that the bargaining experience closely resembled traditional offline negotiation, validating the cultural relevance of this feature [4].

D. UserExperienceandUsability

A small user study (n = 25) was conducted with students and local residents. Findings included:

- 92%foundtheinterfaceeasyto use
- 88%preferredAI-basedimageuploadinsteadofmanually selecting categories
- 84%agreedthatthenegotiationfeatureincreasedtrustand fairness

This shows strong acceptance of AI assistance and interactive pricing features.

IX. CONCLUSION

LocalConnect successfully bridges the gap between customers andlocal service providers through a scalable AI-powered platform. By integrating image recognition, geo-filtering, negotiation features, and real-time communication, the system modernizes traditional service discovery while preserving cultural behaviors like bargaining [5].

Futureworkincludes:

- On-deviceAIforfasterimageclassification
- Automatedfrauddetectioninreviews
- MultilingualAIchatbotsupport
- Expandingmarketplacecategories
- IntegratingUPI-basedseamlesspaymentflows

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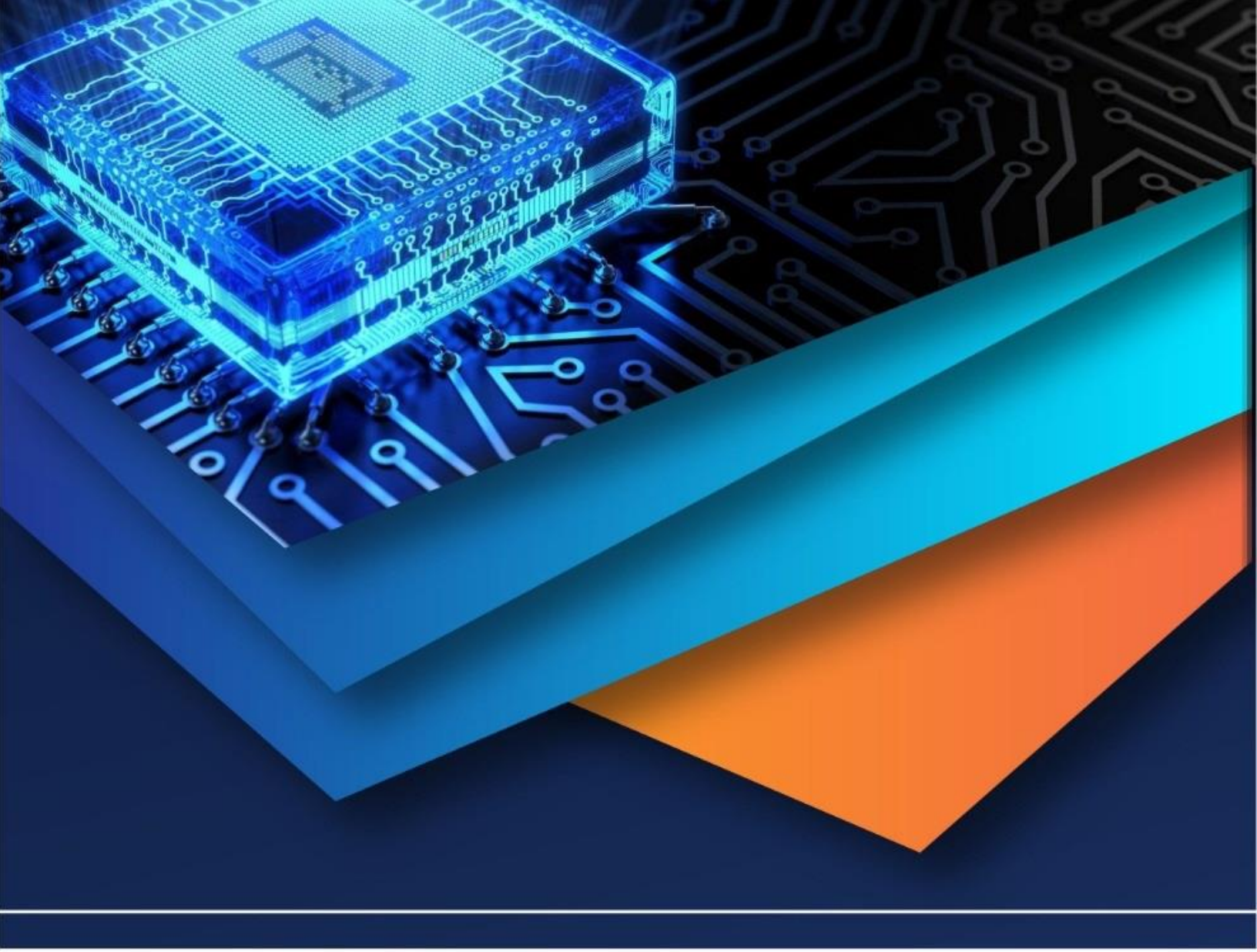

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