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Instant Dress Tracker: A Real-Time Location-Based Inventory Management System

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Abstract: ***The development of local fashion markets has in-creased the demand for efficient dress inventory visibility and intelligent product search. The traditional shopping system based on boutiques does not provide real-time visibility, and customers have to visit multiple boutiques physically to know the status of the products. This paper presents the Instant Dress Tracker, which is a web-based system designed to provide real-time dress inventory visibility in local boutiques. Customers can search and filter dresses based on parameters such as size, color, type, and location, and also enable boutique owners to update the inventory dynamically. The proposed system is designed using the latest web technologies such as React with TypeScript for the frontend and Supabase with PostgreSQL for backend services and real-time data synchronization. The latest fuzzy search algorithms and real-time database subscriptions enable accurate and updated inventory data. In addition, geographic integration with map services enables users to locate nearby boutiques and optimize shopping routes. The system enhances customer experience by minimizing time and effort in dress discovery and also provides an opportunity for sales to boutique owners. The experimental setup in a tier-2 city scenario proves the feasibility, scalability, and efficacy of the proposed solution. The Instant Dress Tracker fills the gap between the conventional fashion environment and the online world, providing a scalable solution for the modernization of the fashion environment.***

Index Terms: Real-time inventory, location-based services, boutique management, fashion retail

I. INTRODUCTION

The fashion retail industry, especially the local boutique market, is still relying on conventional shopping behavior where customers physically visit different stores to look for the desired products. This is inefficient as customers often ex-perience out-of-stock products or inadequate sizes and colors.

On the other hand, boutique owners manually manage their inventory, causing them to miss sales opportunities as they are unable to accurately inform customers about the availability of products [3].

With the development of digital technology, customers are instantaneous information delivery and personalization of the shopping experience [15]. However, existing e-commerce infrastructures are mainly designed for supporting large retailers, and there is a lack of effective support for small, local, location-based retailers, especially in tier-2 cities [14].

To overcome the challenge identified above, the current paper proposes a web-based system referred to as Instant Dress Tracker that offers real-time views of dress stock in nearby boutique outlets. The proposed system enables users of the system to search and filter the dresses based on various fields such as dress size, dress color, dress category, and dress location, among others. On the other hand, the proposed system offers the boutique owners the benefits of real-time dynamic updates of the available stock of dresses [7]. Therefore, the proposed system combines the real-time update functionality with the search functionality to ensure the proposed system bridges the gap in local boutique commerce [13].

II. LITERATURE REVIEW

Recent trends in the technology infrastructure for digital retailing include the need for real-time inventory visibility and intelligent product search [11]. The current offline shopping experience for clothing has several issues, including the lack of a centralized inventory management system, poor product visibility, and inefficient customer search support. The current offline shopping experience for clothing has several issues, including the lack of a centralized inventory management system, poor product visibility, and inefficient customer search support. As stated in the project document for Instant Dress Tracker, customers are compelled to waste time searching for specific types, sizes, and colors of dresses in different stores, while the retailer lacks a digital platform to efficiently showcase their inventory [15].

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In the research article "Substitution Policy in Online Dress Retailing" conducted in the year 2022, a mixed methodology was adopted for conducting research [1]. In this methodology, quantitative and qualitative research are conducted simultane-ously. Under this methodology, statistical tests were conducted to understand and analyze the distinction between customers who are given substitutes and those customers who are not. The findings of the research were quite satisfactory because it revealed that information availability does play a crucial role in building customer trust. However, the research also faces certain limitations where it is not visible whether this research can be applied universally or not, considering the availabil- ity of exact details or data regarding customers. Secondly, qualitative research findings are based on a limited sample population group, where there are chances of biases. However, highly relevant observations regarding the importance of real-time inventory visibility or product representation carried out by the proposed system of Instant Dress Tracker are clearly identified [1].

In a study on the clustering approach using K-Means clus-tering in investigating retail business optimizations in 2023, the concept of using K-Means clustering in analyzing demand concerns, location or proximity, and inventory capacity to im-prove retail business optimizations was introduced [9]. Though the approach presented an instance of K-Means clustering in the analysis of demand concerns in the retail industry, the limitations of the approach are that it is based on clusters that are considered fixed in nature. The approach is also very sensitive to outliers. However, in the fashion industry, there are changing trends on a regular basis. Moreover, in considering factors, this approach has paid little attention to qualitative factors. This supports the need for using an approach like the Instant Dress Tracker [9].

A study published in 2024, titled "Designing User-Centric E-Commerce Platforms for Fashion Retail using a Database-Driven Approach," stresses the need to have responsive in-terfaces and user layouts while developing effective business systems [10]. However, it has its own limitations, as it assumes that all users will behave in the same manner. This system might have limitations in terms of speed, as there would be an increased number of users. Implementing these systems requires a lot of technical knowledge. Although the study proves the viability of database-driven e-commerce solutions, it focuses exclusively on large-scale online business systems. This system, however, fails to address these requirements, which are being taken care of by the proposed Instant Dress Tracker system [10].

Based on the studies and project reports presented above, one can clearly observe that current practices mainly focus on customer behavior analysis, supply chain optimization, or central e-commerce business platforms [12]. Very few studies or projects attempt to cover real-time inventory synchroniza-tion, search capability, and boutique-style control in one single unified solution [2]. Instant Dress Tracker helps to fill this gap by providing real-time synchronization, search techniques, and geographic find capability [6]. Therefore, it is an appropriate solution to navigate tier-2 fashion cities and help traditional retail ecosystems evolve [13].

III. PROPOSED SYSTEM

The Instant Dress Tracker is a website that does two things at a time. It helps people find Instant Dress Tracker dresses that're available in stores and it helps store owners keep track of the Instant Dress Tracker dresses they have in stock [7]. This is different from shopping websites because it connects the internet to the stores [13]. The Instant Dress Tracker has two parts. One part is for people who are looking for Instant Dress Tracker dresses. They can search for Instant Dress Tracker dresses by typing in what they want. They can look at categories of Instant Dress Tracker dresses. They can also pick what size and color they want and what price they are willing to pay. They can see if the Instant Dress Tracker dress is in stock before they go to the store [5]. The other part is for store owners. They can use this part to add their store to the Instant Dress Tracker website and to add pictures and prices of the Instant Dress Tracker dresses they have. They can also update the stock of Instant Dress Tracker dresses whenever it changes. The Instant Dress Tracker uses something called Supabase to make sure that when a store owner updates something it shows up away on the part of the Instant Dress Tracker website that people use to search for Instant Dress Tracker dresses [8].

The Instant Dress Tracker also has a feature that helps people find stores that're near them. It uses a map to show where the stores are so people can plan their trip to the store [6]. The Instant Dress Tracker also has a way to keep track of who's using the Instant Dress Tracker website so store owners and people looking for Instant Dress Tracker dresses have their own separate accounts. This is done using something called Supabase Auth, which makes sure that only the right people can get into their accounts, on the Instant Dress Tracker [4].

A. System Architecture

The system is built around a client-server model that lets everything happen in time [8]. The frontend is made using Re-act 18 and TypeScript. It looks nice because of Tailwind CSS and shadcn-ui. This frontend talks directly to the Supabase backend using a special client SDK over a connection [4].

There is no server Supabase just gives us access to the PostgreSQL database, file storage and other important services like authentication and real-time updates [8].

The database has four tables: Shops, Dresses, Customers and Shop Owners. The Dresses table has a lot of details like dress ID, name, color and price. Each dress is linked to a shop. Each shop has an owner. This way the system can show us dresses that fit what we want count how dresses each shop has and make sure everything is up to date [4].

We use React Query on the frontend to manage what is happening on the server get data and store responses so we do not have to ask for the thing over and over. The Supabase Realtime channels watch for changes, to the Dresses and Shops tables so when a retailer makes a change the customer interface updates automatically [7].

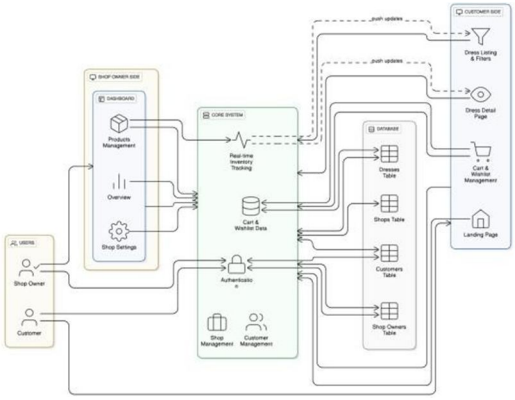


Fig. 1. System Architecture

B. Modules and Functionality

The system has eight modules that work together. Each module was developed separately. Added to the system one by one [4].

The Authentication Module is used for login and registration for users. This module makes sure that shop owners can only change their inventory [8]. The Shop Registration and Man-agement Module helps boutique owners create and manage their shop information. This includes the shop name, address, phone number, hours of operation and location [6].

The Dress Management Module is used for managing in-ventory. Retailers can add dresses change existing information and remove old items. All changes are updated away across the system [11].

The Search and Filter Module helps customers find what they are looking for. It processes search words and categories and returns results that're relevant and available [5].

The Availability Tracking Module keeps the retailer dash-board and customer view up to date. It makes sure that sold-out items are marked and new items are added away [7].

The Shop Locator and Mapping Module uses maps to show where boutiques are located. This helps customers plan their visit [2].

The Cart Management Module lets customers pick dresses they like before they visit the store. This helps them decide what they want before they go [12].

The User Interface Module makes sure the system looks good, on all devices, including desktops, tablets and mobile phones [10].

IV. IMPLEMENTATION

The system was built using a web technology stack because it is good for developers can handle a lot of users and supports real-time data [4].

For the frontend we used React 18 with TypeScript to make sure the components can be reused and the code is safe.

We chose Vite as the build tool because it can replace modules fast.

React Router helped with navigation between the page, dress listings, shop details, cart and the retailer dashboard.

React Query handled all the server data and caching.

We used Tailwind CSS to style the website and added shadcn-ui for components.

Framer Motion was used to add animations to some parts of the interface making the user experience better.

On the backend Supabase was the provider [8].

The PostgreSQL database was set up to support querying of large dress datasets [8].

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Supabase Storage hosted the dress images and the public URLs were added to the database records [8].
We used Supabases real-time channel system to update the inventory in time [7].
The search function was implemented using PostgreSQLs full-text search so customers can find results even if the search terms do not match exactly [5].
Each shops location was stored as latitude and longitude coordinates allowing for distance-based sorting and map ren-dering [6].
The entire application was deployed on Vercel at instant-dress-tracker.vercel.app. Tested on multiple browsers, includ-ing Google Chrome, Mozilla Firefox and Microsoft Edge as well as, on Android mobile browsers to ensure it works well on all platforms [4].

V. RESULTS

The system we put in place was checked in ways. We looked at how it searched how well it updated in real time how accurate the inventory was and how easy it was to use [11]. We tested it using 42 dress entries from five boutiques in Ballari, Karnataka. These boutiques had kinds of clothes like Traditional Wear, Western Wear, Casual Wear and formal clothes.

A. What We Found From Functional Testing

All 21 tests we did for customers and shop owners worked fine. When we tested the customer part the system did a job with searches even when the keywords were not correct. It also did well with filters for categories and sizes checked if people were who they said they were managed the shopping cart and helped find shops based on where you were [5]. For shop owners the system made sure all required information was given when products were added, updated and deleted inventory correctly and showed the shops location on the map [6].
We also checked how well the different parts of the system worked together. We found that information put into the retailer dashboard was saved in the Supabase PostgreSQL database and shown to customers in than 300 milliseconds [7]. This is as fast as Supabase says it can be. We tested the system and found that it worked well gave correct results from the database and showed pictures without any errors thanks, to Supabase Storage [8]. The system we put in place the system worked well and did what it was supposed to do the system was good.

B. Performance Comparison

We compared the Instant Dress Tracker system to the way of finding dresses to see how much better it really is [13]. Normally people have to go to a lot of stores to see what dresses are available. This takes a lot of time. Often does not work out. The Instant Dress Tracker system makes this easier by letting people search for dresses online with filters for category and size. This means people can find dresses in seconds instead of spending hours looking [15].
The Instant Dress Tracker system also keeps track of what dressesre in stock in real time [7]. This means customers always get the information about what dresses are available. Before stores had to check what dresses they had by asking employees, which was not very reliable. Now people can find stores they never knew about because the system shows them where all the local boutiques are on a map [6]. Stores can also update what dresses they have instantly on the Instant Dress Tracker system. This means customers can see what dresses are available away [11]. The Instant Dress Tracker system is also better at finding what people are looking for. It uses a database to find dresses so people get the results even if they make a small mistake when typing [5]. The Instant Dress Tracker system is available all the time so people can use it whenever they want from any device with internet [14]. This makes it a lot easier for people to find dresses because they do not have to go to stores in person. The Instant Dress Tracker system is an improvement, over the old way of finding dresses [3].

C. Sample Output

I love how the landing page looks. It has a hero section with a search bar and links to Shops and Dresses.
The home page has a New Arrivals section. It shows cards for products. Each card has a picture of a dress the dress name, the retailer name, where its from, the price and what sizes are available.
The Featured Shops section lists some boutiques. It has their store's pictures and links to their pages.
The Shop Detail page has all the info about a boutique. You can see a map. How many dresses they have right now.
The shopping cart comes out from the side. It helps cus-tomers look at and manage their chosen items before they go to the store.
A dashboard is given for the shop owner to manage their shop details and dresses. The shop owner can add, delete or change the details of the dresses.
The customer can locate the shop in the map. He can also navigate to the selected shop from his current location.

The user can log in as a customer or as the shop owner by entering the login credentials if they have an account. If they don't have the account, they can create one.
In the about section we can see the basic details of the website.
There is a section for dresses where the customer can search and check for the available dresses.

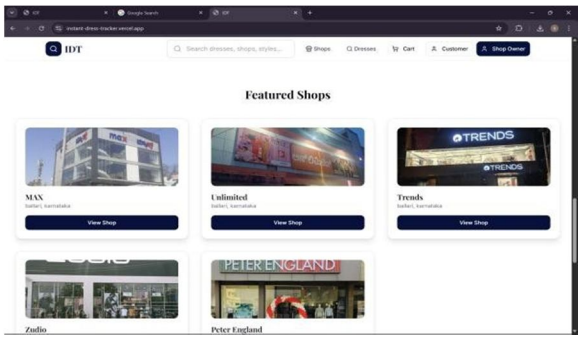


Fig. 2. Featured Shops

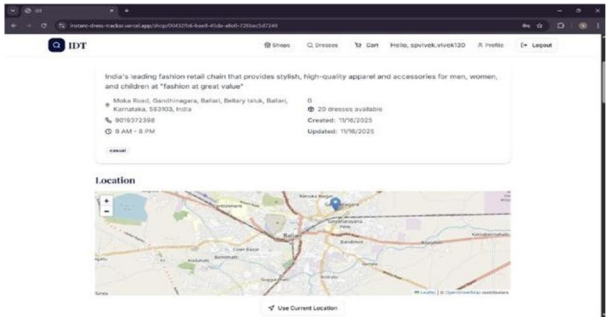


Fig. 3. Shop Location

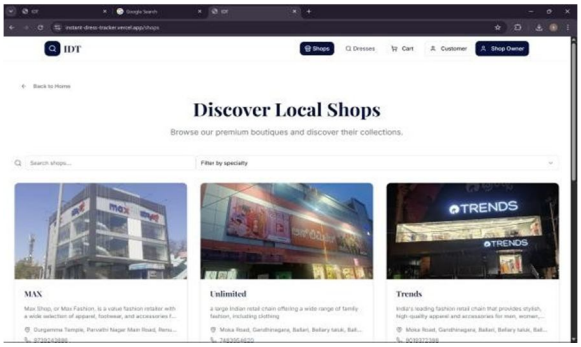


Fig. 4. Shop detail Page

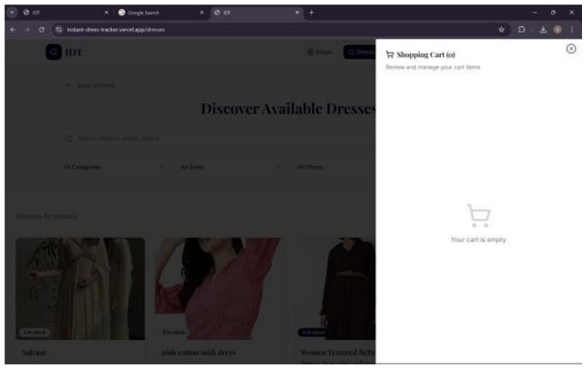


Fig. 5. Shopping Cart

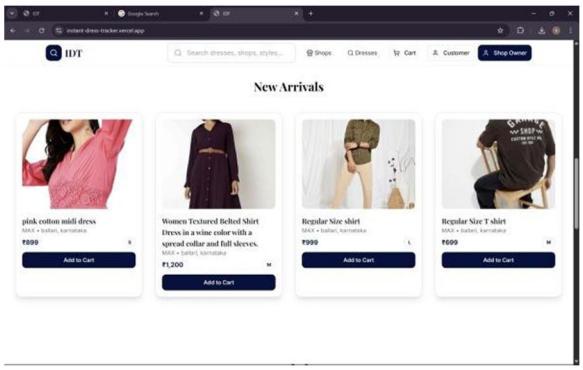


Fig. 6. New Arrivals

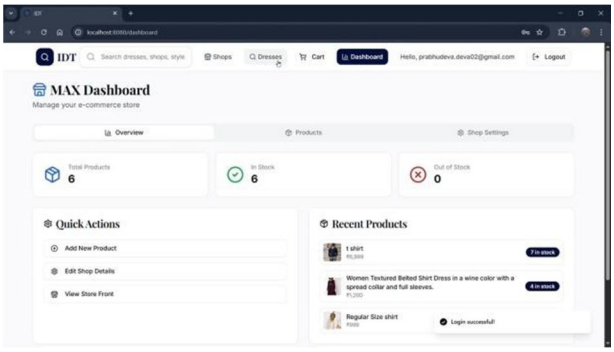


Fig. 7. Shop owner dashboard

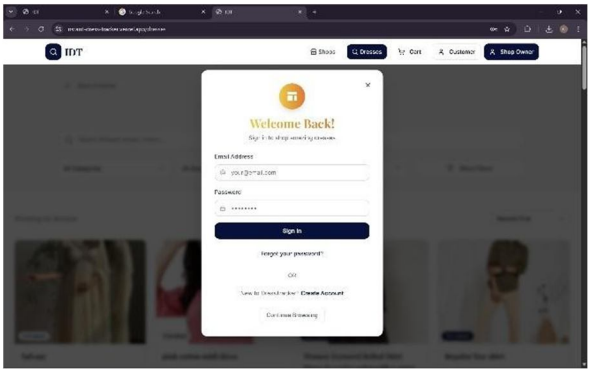


Fig. 8. customer login page

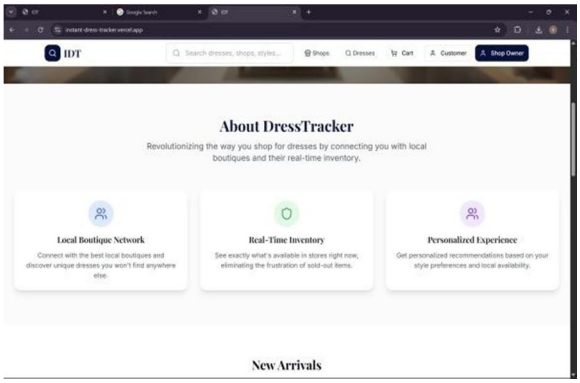


Fig. 9. About page

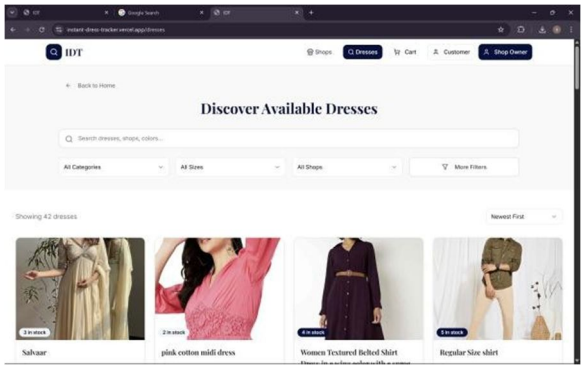


Fig. 10. Available Dresses

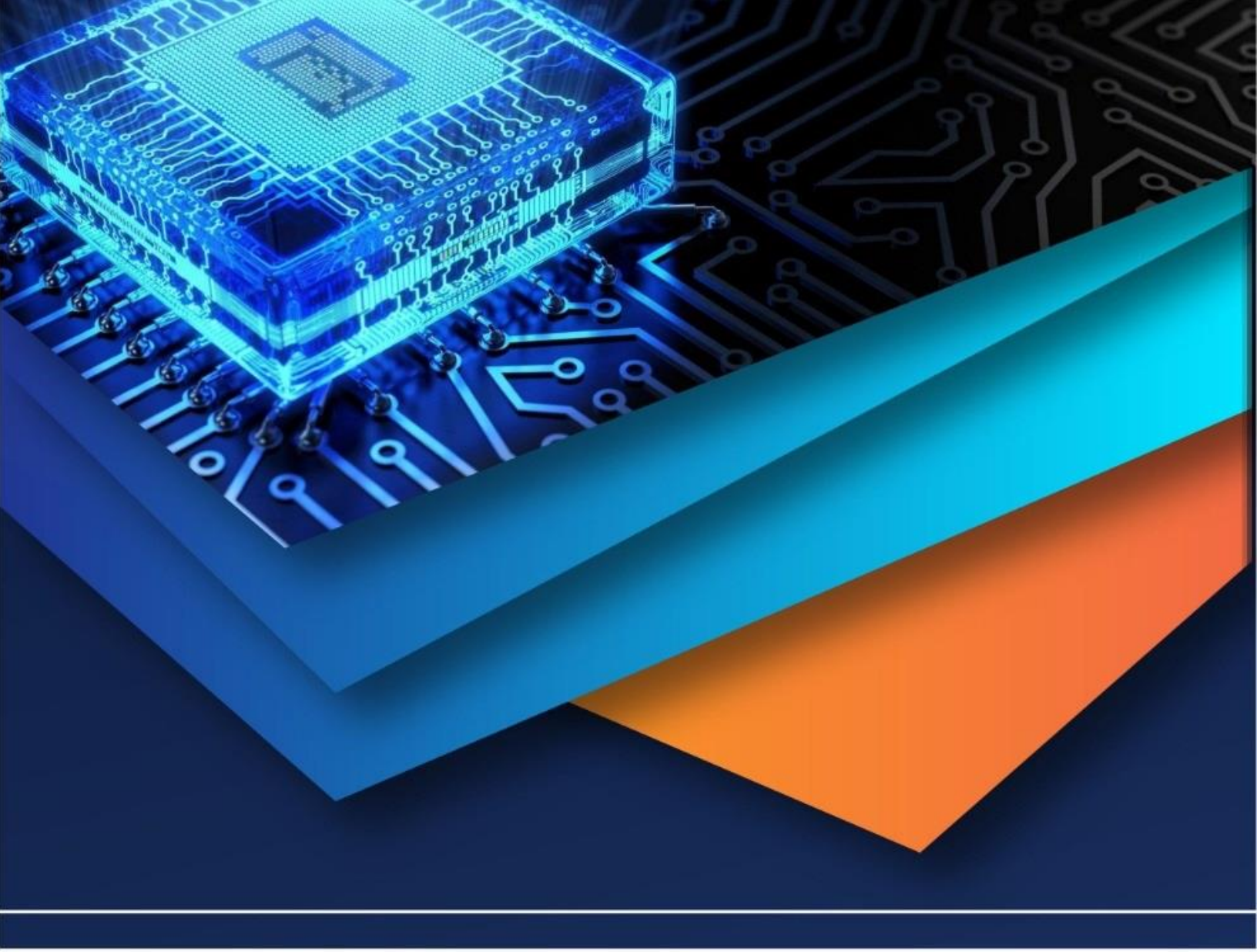
VI. CONCLUSION AND FUTURE WORK

The Instant Dress Tracker helps people find dresses in stores easily. It shows what dresses are available and when so people can see what they like and where to find it [7]. It helps people find stores that have the dress they want and how to get there [6]. This is really helpful for people who do not like to waste time going to stores that do not have the dress they want [15]. The Instant Dress Tracker is also helpful for store owners to get more customers [3]. They can keep track of what dresses they have in stock. See what people want to buy [11]. We tried the Instant Dress Tracker in a city. It worked well. The Instant Dress Tracker did everything it was supposed to do. It was fast and easy to use. People found the dresses they wanted quickly and easily [5].

To make the Instant Dress Tracker better we can add a feature that suggests dresses to people based on what they like [12]. We can also help store owners figure out what dresses will be popular and when [9]. The Instant Dress Tracker can let people buy dresses online or reserve them to pick up in the store [13]. An app for the Instant Dress Tracker on phones would make it easier to use [14]. We can send messages when new dresses arrive or when something they want is back in stock [11]. The Instant Dress Tracker would be with them all the time. The Instant Dress Tracker would be with them all the time. The Instant Dress Tracker can be used in cities and in types of stores not just dress stores [2]. People can leave reviews of stores and dresses they buy. This helps people trust the Instant Dress Tracker and helps store owners make their stores better [15]. The Instant Dress Tracker is a tool, for everyone. It makes buying dresses much easier.

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