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BIKE E-CATALOUGE

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Abstract— **An augmented reality mobile app that suggests features for a bike where customers can view details about the characteristics and technologies of the bike in front by scanning the QR code from a mobile app. The app ought to be able to display the most crucial elements on the screen. such as a strong engine Electronically Chic Front lights Diamond-Style Suspension Frame Prolonged, etc. This application focuses on addressing the inconvenience of customer to visit the physical store, providing users with a seamless and immersive platform where they can virtually inspect, customize, and experience bikes in detail, facilitating informed purchase decisions without the need for in-person visits to brick-and-mortar stores.**

Keywords— **E-Catalogue, QR Scan, Augmented Reality, 3D Visualization, User Experience (UX)**

I. INTRODUCTION

In the ever-evolving field of new technological innovation, the integration of augmented reality (AR) with everyday experiences has reached new heights. The advent of augmented reality (AR) applications has completely changed industries by providing immersive and interactive experiences that have completely changed how we view and use products. Among these advancements lies a groundbreaking project: the "Augmented Reality-based Bike E-Catalogue."

This pioneering project aims to redefine the conventional approach to exploring and understanding bikes. This project introduces a smartphone application with augmented reality integrated features, providing users with a unique and incomparable experience. By simply scanning a QR code or the bike itself through the mobile app, users gain access to a comprehensive insight into the bike's features, technology, and functionalities in real time.

The core objective of this innovative mobile app is to deliver an immersive encounter, showcasing intricate details and pivotal aspects of the bike's design, technology, and performance. Through the lens of augmented reality, users are empowered to visualize and explore the bike's key features directly on their mobile screens. From the powerful engine and stylish headlamps to the intricacies of the diamond-type frame, suspension dynamics, and ABS instrument panel, the app vividly portrays these elements, providing a comprehensive understanding of the bike's essence.

Moreover, this cutting-edge application doesn't merely stop at showcasing the bike's fundamental attributes; it introduces an array of additional features that elevate the user experience. Enabling colour customization, offering a platform for users to share feedback, and integrating access to YouTube videos for a dynamic visual portrayal further enrich the interaction between the consumer and the product.

The incorporation of augmented reality in the bike e-catalogue goes beyond conventional limits for the display of the products and product understanding. It represents a change in approach to interacting with potential clients in a way that is more interesting, dynamic, and educational. This project is a testimony of innovation because it bridges the gap between traditional product presentations and immersive, future experiences.

With a seamless blend of technology and user-centric design, the Augmented Reality-based Bike E-Catalogue redefines the paradigm of consumer engagement, offering an unparalleled and futuristic approach to exploring and understanding bikes. This

report encapsulates the journey, methodology, and transformative impact of this revolutionary project, poised to reshape the landscape of consumer engagement in the automotive industry.

II. BACKGROUND INFORMATION

The "Augmented Reality-based Bike E-Catalogue" project began as a result of a shared understanding of how consumers are changing and the untapped potential in the automobile sector. The conventional approaches to product presentation and consumer engagement, especially in the cycling industry, have been stagnant for a while due to the limits of printed brochures and showroom displays.

The rapid pace of growth in technology, particularly with regard to augmented reality, offered an unusual opportunity to fundamentally change how customers interacted with and felt about bikes. The creators of the project recognized a crucial disconnect between the complex engineering and cutting-edge technology and the client's comprehension and appreciation of these components.

Recognizing the need to bridge this gap and create a more immersive, informative, and engaging experience for potential buyers, the concept of an augmented reality-based bicycle electronic catalogue was developed. The basic goal was very clear, to go beyond traditional presentations and provide customers with a tool that would allow them to understand the bike's features and technology in a dynamic, interactive, and comprehensive way.

The integration of augmented reality into the mobile app was deemed pivotal. This groundbreaking technology, capable of overlaying digital information onto the physical world, would catalase for transforming the bike exploration journey. Through a simple QR code scan or direct interaction with the bike through the mobile app, users could unlock a world of detailed insights right in front of their eyes.

The envisioned features—highlighting the powerful engine, electrical components, stylish headlamps, unique frame designs, suspension dynamics, seating ergons mics, grab bars, ABS instrument panels, and beyond—were meticulously chosen to offer a holistic understanding of the bike's essence.

However, the project's ambition extended beyond mere demonstration. The integration of colour customization, a feedback mechanism, and seamless access to YouTube videos aimed not only to inform but to engage and empower users. It was about creating an ecosystem where potential buyers could not only understand but also personalize, contribute, and immerse themselves in the bike's world.

III. SCOPE

The intention of the Augmented Reality (AR) based bike E-Catalogue project is to transform the way consumers interact with and comprehend bikes by developing a cutting-edge smartphone application. With the help of AR technology, this cutting-edge app will provide a smooth and engaging experience by letting users use their mobile devices to quickly scan QR codes or the actual bike. After scanning, the app will show a comprehensive depiction of the bike's important elements right on the screen, giving users deep insights into its features and technological innovations.

The application will have augmented reality integrated seamlessly, enabling users to interact and explore important features like the Electrical Stylish Headlights, Powerful Engine, Diamond Type Frame, Suspension, Extra Long Seat, Raised Grab Bar, ABS, Instrument Panel, and many more notable features. The app interface will cleverly display and depict these features, giving users an interactive and educational platform to comprehend the bike's functionality, design, and technological advancements.

The main goal of the app is to provide a user-friendly interface that visually engages users and highlights these essential bike elements, enabling them to fully comprehend the features and special selling factors of the bike. The program uses augmented reality to provide comprehensive details, interactive descriptions, and eye-catching visuals of the bike's main features in an effort to improve the user experience.

IV. OBJECTIVES

Mainly the aim of this project is to:

1. To develop an application that provides the user with a comprehensive and detailed preview of the bike that he/she desires to eventually buy.

2. To develop QR codes that will be used to provide easy access to the 360° view of the specific bike with information about the features and specifications of the selected model through the camera on a smartphone or tablet.

3. Implement augmented reality technology to enhance the customer's experience by superimposing key features and specifications of the bike directly onto the screen, offering an interactive and immersive view of the product.

V. SYSTEM ARCHITECTURE

The system design of this application (Fig. 1) revolves around a dynamic home page featuring two distinct entry points: the "Bike E Catalogue" and "Scan QR" options. Upon selecting "Scan QR," the application seamlessly integrates with Unity, activating the device camera for QR scanning capabilities. This functionality empowers users to scan QR codes associated with bikes, instantly unlocking an immersive Augmented Reality (AR) view of the scanned bike. Conversely, opting for the "Bike E Catalogue" redirects users to a separate page showcasing a comprehensive list of available bikes. Once a bike is chosen from this catalogue, users are directed to an AR view of the selected bike, providing a realistic visualization of their surroundings. Additionally, an info icon conveniently positioned atop the AR view page grants user access to detailed features and information about the chosen bike, ensuring a rich and informative experience for customers exploring various bike options.

A. Implementation

Implemented in Kotlin using Android Studio, the AR-based bike e-catalogue comprises four activities:

1. MainActivity.kt:
   a. Orchestrates UI components initialization.
   b. Functions trigger transitions to CatalogView, WebView, and Unity-based AR app.
   c. Ensures seamless navigation using Kotlin-based Intents.

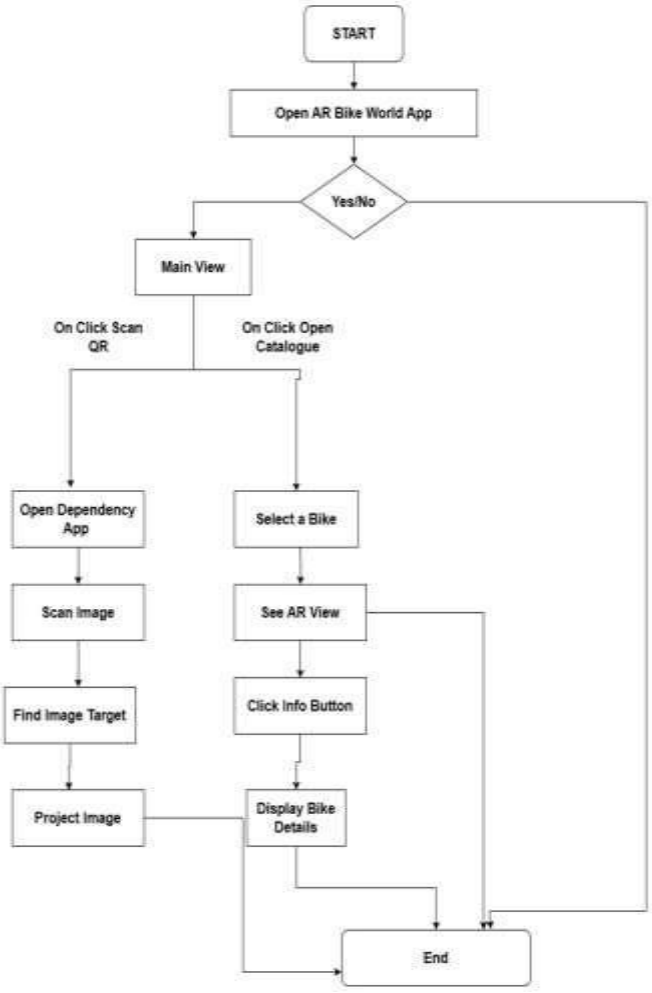

Fig. 1 System Flow Chart

2. CatalogViewActivity.kt:
   a. Defines behaviour for displaying bike images.
   b. Click listeners initiate ARViewActivity with unique product identifiers.
   c. Floating action buttons enable web page access and Unity-based AR interactions.

3. ARViewActivity.kt:
   a. Initializes UI components for AR view and 3D model rendering.

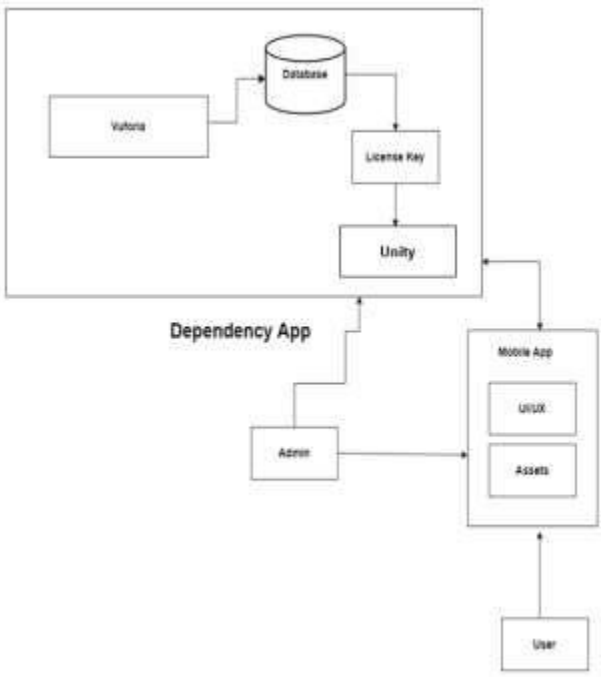

Fig. 2 System Architecture

b. Utilizes Kotlin functions to handle AR scene setup, model loading, and user interactions.

4. WebViewActivity.kt
   a. Manages WebView for displaying web content.
   b. Retrieves and loads URLs passed as extras.
   c. Provides feedback via Toast messages for URL availability.

Additionally, the AR integration involves the following steps:

1. Vuforia and Unity Setup:
   a. Create/activate Vuforia account, download Unity Hub, and integrate Vuforia SDK.
   b. Set up Unity project, import and configure Vuforia database, link
   c. image targets, and integrate 3D models.
2. Positioning and Building for Android:
   a. Position 3D models accurately over image targets within Unity.
   b. Build the AR application for Android, generating an installable .apk file.

This streamlined development process ensures a cohesive and engaging AR experience for users exploring the bike e-catalogue on Android devices.

VI. LITERATURE REVIEW

The report by MD. Abdullah Al-Mamun outlines the development of an AR/VR application for real estate visualization, utilizing Unity3D, Autodesk 3ds Max, and Adobe Photoshop. However, it lacks a thorough evaluation of software limitations, hindering insights into scalability and performance impact. Detailed information on encountered technical hurdles is absent, impeding a comprehensive understanding of potential obstacles and solutions. A more in-depth analysis of cost implications and resource requirements for integrating AR/VR into real estate businesses is essential for assessing feasibility.

The augmented reality Android app, detailed in the study, addresses traditional catalogue limitations by incorporating rich media. Developed with Unity 3D, future enhancements may involve adding interactive elements, expanding compatibility with iOS, enabling catalogue downloads, and facilitating product comparisons. Streamlining text display and reducing vertical scrolling should be considered for improved user experience. Additionally, extending the application's functionality is recommended.

The "AR Bike Showroom Experience (AR.S.E.)" project aims to enhance the bike purchasing process through an augmented reality platform. Future development may include collaboration with dealerships to integrate real-time inventory, providing users with current model information and dealership offers. Enhancements like direct communication for inquiries, test ride scheduling, and personalized assistance within the AR.S.E. app can further elevate the user experience.

TABLE I
EXISTING RESEARCH PAPERS

SL NO	TITLE OF THE PAPER	AUTHOR	METHODOLOGY	ADVANTAGES	LIMITATIONS
1.	Web AR: A Promising Future for Mobile Augmented Reality—State of the Art, Challenges, and Insights [7]	Xiuquan Qiao, Pei Ren, Schahram Dustdar, Huadong Ma and Junliang Chen	Segmentation method for categorizing users	To understand the valuable insights of mobile AR and the opportunities and obstacles associated with Web AR implementation	The absence of specific empirical data or case studies to support the identified challenges and insights in Web AR technology.
2.	E-commerce platform of online shopping consumers[8]	Yidan Wang	Conceptual Model of Online Shopping Information Platform's Security Customer Satisfaction.	Convenience and accessibility. Wide product selection Customer reviews and ratings. Personalization and recommendations	Lack of physical experience. Security concerns. Trust and credibility concerns
3.	An Augmented Reality (AR) Experience for Bike Showroom[5]	Lokesh Goyal, Hardik Mishra, Jai K. Pillai, Arush Bolia, Vishal Jain	Creating detailed 3D models integrating augmented reality for the development of the AR Bike Showroom experience (AR.S. E)	Convenience. Customization, AR interaction, Comprehensive Preview, Time and cost efficiency	Limited Physical interaction, Technical Requirements, Network Dependence
4.	Augmented Reality Application for Product Concepts Evaluation [12]	JuanC. Arbeláez-Estrada. a, Gilberto Osorio Gómez Juan C. Arbeláez Estrada,Gilberto Osorio-Gómez	Camera Mapping or Projection	Enhanced User-Centric Evaluation	Challenge of predicting user preferences
5.	An Analytical Study Evaluating the Applicability of a Developed Innovative E-Sourcing System for Automobile Based Firm.[10]	Bokolo Anthony, Mazlina Abdul Majid, Awanis Romli	Designed MVC e-sourcing system architecture.	Data reveals that the respondents accept the developed innovative e-sourcing system for automobile-based firms than existing manual sourcing approaches.	The limitations of this study are that empirically the developed innovative e-sourcing system was evaluated with data from only 50 respondents. Secondly, data was collected from respondents familiar with e-sourcing operations.
6.	Application of Augmented reality for furniture catalogues[4]	Hamzah Fachrurozi, Aditya Permana Wibowo	Augmented reality Integration using MDLC (Multimedia Development life cycle)	Wide Application User-defined targets Improved consumer engagement	Device and system Limitations, Light intensity dependency
7.	Mobile Augmented Reality for Interactive Catalogue[6]	Naser.F. Mohamed EL-fiejani,	Contributing to the overall development and evaluation of the	Innovative Approach, Practical Application, Usability Evaluation	Flexibility, Platform Limitation, Technology Dependency.

		Abdelsalam M. Maatuk	Interactive Catalogue application.		
8.	Augmented Reality Based online application for e-shopping[1]	Arshif Ali, Kishor Saikia, Biki Nayak, Manoj Kr. Muchahari*, Pranav Kumar	Developing AR-based Computer Vision Application.	The AR system is highly friendly in nature and easy to operate and it operates with real time environment. It provides a different view of our real world and virtual world.	It is very expensive to develop the AR technology project and to maintain it. It is costly. Privacy is a big concern for AR-based applications.
9.	Virtual and Augmented Reality Applications in Medicine: Analysis of the Scientific Literature [11]	Atanas G Atanasov	Bibliometric analyses using VOSviewer and Bibliometrix	Comprehensive approach to analyzing publications on virtual reality in medicine	The reliance on a single database (Web of Science) for the literature search.
10.	Augmented reality use for cycling quality improvement [2]	Egils Ginters	Integration of the visual recognition subsystem into AR glasses, allows cyclists to receive real-time information about their surroundings.	Integration of AR technology with cycling for real-time information. Detailed description of the Velo Router tool and its dual applicability.	The paper does not provide information on the specific outcomes or results of the Velo Router implementation.

VII. OUTCOMES

This application brings to the users with an outcome of:

1. Enhanced Accessibility and Engagement: Customers can effortlessly access comprehensive bike insights by scanning QR codes or using the mobile app, offering an interactive platform to explore intricate details of bike features and cutting-edge technology.
2. Immersive AR Experience: The integration of a 360-degree AR view elevates the user experience by providing a complete visual tour around the bike model. Users can explore the bike from every angle, inspecting and interacting with its features in a captivating and detailed manner
3. Displaying key features: The AR component vividly illustrates essential bike features on the screen, displaying critical elements such as the engine, technological advancements, design intricacies, and other significant components.
4. Seamless and User-Friendly Interface: The app's interface is intuitively designed, allowing users to effortlessly navigate and

Fig. 3 3D View

Fig. 4 QR Code

place the specific model with the AR view, ensuring a smooth and engaging experience (Fig.3).

5. Technological Innovation: The inclusion of an AR view represents a leap in technological innovation within the e-catalog, setting a new standard for engaging, informative, and interactive experiences in the realm of bike browsing and selection.

In summary, the outcomes of this project promise to revolutionize the bike browsing experience by seamlessly integrating AR views, providing users with a captivating, detailed, and immersive exploration of bike features, and ultimately empowering them to make informed decisions.

Fig. 5 Mobile App Interface

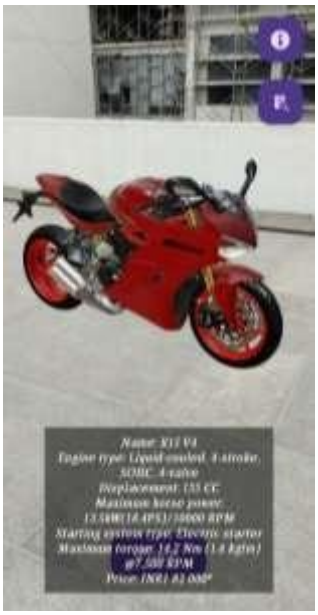

Fig. 6 Displaying key features

VIII. FUTURE WORK

1. User Feedback Loop: Create a dedicated user feedback section to continuously improve the AR application based on user experiences and preferences, ensuring it aligns with evolving client needs.

2. Social Media Integration: Enhance user interaction and online visibility by integrating advanced social media features, simplifying logins, and enabling seamless sharing of customized motorcycles across various platforms.

3. Virtual Test Rides: Introduce an innovative virtual test ride feature, allowing users to experience different biking scenarios to gain a comprehensive understanding of a motorcycle's performance, enhancing their decision-making process and overall app experience.

IX. CONCLUSION

In summary, the Bike E-Catalogue project is a revolutionary step forward for the bike retail industry, combining augmented reality (AR) and QR code technology into an easy-to-use mobile app. This digital, interactive platform replaces old paper-based catalogues, effectively adapting to the changing demands of the digital age. The initiative meets the increasing need for online transactions and a better in-store experience by promoting effective e-commerce and improving customer interaction.

The use of augmented reality and QR code technology is really innovative. It not only overcomes the constraints of traditional catalogues but also expedites the process of obtaining comprehensive bike specifications. Users may investigate, examine, and enjoy every aspect of a bike model thanks to the app's dynamic and immersive 360-degree view functionality and interactive features. This creative method fosters a closer bond between customers and the bikes they are interested in, surpassing the typical showroom experience.

In addition, the app's incorporation of augmented reality provides a glimpse into the future of bicycle adventure by fusing the real and virtual worlds together in a seamless manner. This combination offers manufacturers and dealers useful market insights in addition to improving user experience and enabling well-informed purchasing decisions. To put it simply, the Bike E-Catalogue with QR code and AR capabilities represents a new era for the bike industry—a seamless fusion of state-of-the-art technology with the eternal appeal of motorcycles.

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