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Giv: From Campus to Community- Mobile Application for Sustainable Sharing

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***Abstract*— In reaction to the increasing sustainability issues brought about by waste and resource underuse, my capstone project introduces "Giv", a mobile application designed to promote sustainability using the circular economy concepts, for the Al Akhawayn University (AUI) community in Ifrane, Morocco. Giv promotes the interchange of commodities by enabling students to purchase, sell, or give things for free in a secure university setting. This minimizes waste and promotes a circular economy culture. This paper addresses Giv's development process, key features, and methodology in addition to its anticipated impact, results, and potential expansion for growth beyond AUI.**

Keywords— circular economy; development process; mobile application; sustainability

I. INTRODUCTION

Premature disposal of reusable goods has grown to be a major problem and a major factor in the expanding waste management dilemma. This tendency is a lost chance for resource optimization and community support, in addition to making the issue of landfill misuse worse resulting in the buildup of needless waste. Such actions not only squander important resources but also fail to consider the ways in which these products may help other members of the local population. Acknowledging the pressing necessity for sustainable substitutes, the notion of promoting the exchange and repurposing of products surfaces as an essential measure. By using the Giv mobile application, which makes it easier for people to share and trade goods and food, Al Akhawayn University (AUI) in Ifrane, Morocco serves as both the app's pilot project and a cutting-edge environment for the testing and development of concepts that could significantly reduce waste and advance the circular economy [1].

II. LITERATURE REVIEW

The rise of platforms like Avito are devoted to making it easier to buy and sell products [2]. It has significantly transformed Moroccan shoppers' purchasing behaviors. However, even with its wide appeal and widespread use, such marketplace platforms may have limitations when it comes to encouraging a sustainable culture and advancing the circular economy—especially when it is related to item donations and food sharing. Additionally, this platform broadens its scope in terms of the products it takes on, including substantial categories like vehicles and real estate. Although thorough, this large-scale approach frequently ignores the subtleties of smaller, more routine operations that are more pertinent to people trying to trade or donate common products.

The Giv app stands apart in that it places a high priority on fostering a culture of giving, encourages users to donate products at no cost, and then adds the buying and selling notion as an extra benefit with the possibility of profit. The Giv app, which precisely customizes its offers to the particular demands and dynamics of the AUI student society fills a need in Morocco's digital world by fusing sustainable practices with a dynamic marketplace environment.

In the sharing economy app market, Geev stands out as a prominent example as a zero-waste solution. It is well-known for its extensive reach and nationwide presence in France, where it enables users to freely swap products and food items [3]. Its efficacy stems from a paradigm that emphasizes reducing waste via the allocation of goods that are still useful and is closely aligned with the circular economy.
Giv, on the other hand, is designed to support this sharing economy first at the Al Akhawayn University microcosm and then strategically throughout Morocco. It presents an innovative approach to resource sharing and sustainability that is specifically designed to fit the distinct dynamics of Moroccan academic communities. Giv's specific goal seeks to establish a foundation that may be repeated across

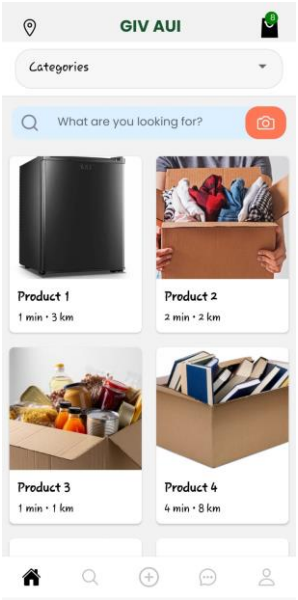
the country by utilizing the close-knit college environment to promote trust and regular use.
There is potential for creativity in Morocco's use of smart city principles, especially when it comes to university communities. The Giv app, which offers a customized solution for Al Akhawayn University and may serve as a model for smart city apps across the nation, is a trailblazing move in this regard.

III. Architecture and Implementation

This initiative tackles the growing demand for environmental stewardship and instantly helps to waste reduction and sustainability on campus by providing a platform for students to buy, sell, or give commodities such objects or food. Giv's primary goal is to make it simple and convenient for AUI students to reuse objects in order to promote sustainable living. The program's foundation is the understanding that little, individual actions paired with group efforts may significantly improve the environment.

A. Frontend Development

The Giv app's UI was created with React Native, an established framework for creating JavaScript-based native mobile applications. This decision was driven by a few significant elements. React Native allows for the usage of a single codebase for all of the major mobile platforms—iOS and Android— reducing development time and effort while preserving a consistent user experience across devices [4].



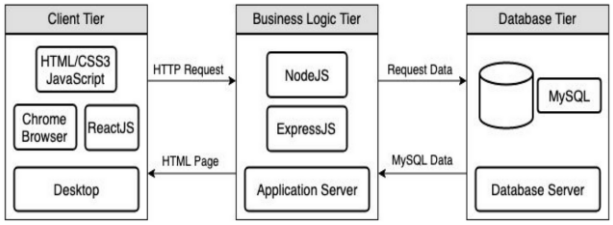
Frontend result 1: Admin view.

This sample displays the first stage of the product listing frontend interface of the GIV mobile application. The product visuals are arranged in a grid arrangement, each item with its name, and information on the delivery distance and time.

B. Backend Development

The Giv application uses Express.js which is a Node.js web application framework intended for creating APIs and online apps. It makes the already-available Node server creation procedure simpler.
Node.js, a potent and effective JavaScript runtime based on Chrome's V8 engine, on the backend [5]. The non-blocking, event-driven architecture of Node.js made it the ideal choice for managing concurrent requests and giving users real-time updates—a crucial component of the app's functionality.
A RESTful API is part of the server-side implementation to help with maintaining user data and item listings and integrating backend [6].

C. Mern Architecture



The architecture of our application uses the Model-View-Controller (MVC) framework. React Native was used to construct the View layer, which improves user engagement by having a responsive interface on mobile devices. The Controller layer manages HTTP requests and responses effectively by facilitating communication between the user-facing interface and the database through the usage of Node.js and Express.js. The Model layer's primary tool is MongoDB, a powerful database created to safely store and handle the app's key information [9].

D. Features

Some of the important features of the app includes user authentication system integrated with AUI system, item listings, and search functionality, an in-app chat feature for easy interactions, a rating system to assure dependability and trustworthiness, and the user profile settings. The item listings are shown according to the most recent updates. If a student is interested in an item, they may reserve it right away and communicate securely through the app with the owner to work out the specifics and complete the transaction, whether it's a donation or sale. Users may view the geographical location of objects by clicking the "Map" button making it easier to find products nearby and setting up handy locations for pickup.

1) User authentication

Ensure safe, smooth user authentication by integrating with AUI's current systems and giving the university

community an easy way to log in.
To evaluate performance and stability, I will implement security and integration tests in addition to load testing. JWT (JSON Web Tokens) is the algorithm used to securely send JSON objects as information between parties [7].

2) Using RESTful API to Test Features for Item Listing

Provide a user-friendly interface that makes it easy for users to list products on the Giv app, including data like category, description, and price status (free or for sale).
To ensure proper data collection for item categories, descriptions, and price, I will test the item listing process across a range of user scenarios using RESTful API endpoints.
Assess the backend's efficiency in processing and storing listings as well as the interface's usability, emphasizing areas that need improvement.

3) Functionality Testing of the Item Listing and Search

Evaluate the app's capacity to manage a high number of item listings and conduct efficient, precise searches. This can be done by putting a good number of item listings in the database and run searches with different parameters. Monitor and report on system performance under load, search result accuracy, and latency.

4) Performance of In-App Messaging in Real-Time
Use Firebase or SignalR to guarantee message delivery in real time with the least amount of delay. and then create a chat room where several people are chatting simultaneously. Analyze user experience in terms of interface responsiveness, system load, and delivery timeframes.

5) Geolocation and Proximity Matching Accuracy Test
Using Geographic Information Systems (GIS) to improve the precision of the Giv app's geolocation services, guaranteeing that users are efficiently paired with objects or other users according to their geographic vicinity.

E. Potential expansions

To maintain the Giv app's relevance and maximize its effect, it is imperative to consider future updates and extensions. To increase the app's usefulness and user base, the following features and potential improvements are being considered.

- The inclusion of gamification elements, such as badges, points, or awards for successful exchanges, active involvement, or environmental contributions, is intended to stimulate user engagement.
- Collaborations with local companies and NGOs: enhance the app's ecosystem by working with environmentally conscious companies and non-governmental organizations to give special incentives or ways to donate.
- Regular exchange events: Arrange periodic "Swap Days" on campus, when people may bring products, they no longer need near their buildings so that others can go through and take what they can use.
- Develop item rescue missions or calls to action to encourage users to save goods that are prone to being thrown away, including large furniture that is hard to move or perishable food items approaching expiration.
- Use geolocation to deliver alerts to users when they are in close proximity to an item that is being given away. This will promote impromptu swaps and raise the possibility that objects will find new homes.

IV. RESULTS

Within the first year of its release at Al Akhawayn University, it is expected that the Giv app would significantly accelerate the move towards sustainability and community participation. One of the main planned outcomes is a discernible decrease in waste as students actively purchase, sell, or donate things instead of throwing them away. It is plausible to expect the app to facilitate hundreds of transactions, with an initial target involving 20% or more of the student body. The next stage for Giv may entail reaching out to a larger portion of the local population in Morocco to promote the circular economy on a large scale.

V. IMPACT

The immediate impact of Giv is multifaceted, supporting the reuse and recycling of things in an effort to promote environmental sustainability by cutting waste and prolonging the lifespan of products. Its importance is most noticeable when students are going through significant life transitions, including moving days, graduation, or even just in daily life when they have stuff they don't need. Giv fills a vital need for a cost-effective and ecological substitute for throwing out usable products by giving students a simple tool to purchase, sell, or give these items. From an economic standpoint, it is expected to help students save money and maintain their finances by providing a platform for the exchange of low-cost or free items. Socially, it is anticipated that Giv would improve the sense of community and university connectedness by encouraging a sharing and helping mentality. By putting its ideas into practice, Giv may become a pioneering example of how to incorporate technology-driven sustainability solutions into educational settings.

VI. FUTURE WORK

Our plan for the Giv app's future goes beyond its existing functionality to include sophisticated capabilities and greater community involvement. The aim is to expand the

app's user base to include other educational institutions and urban neighborhoods throughout Morocco, building on the basis established at Al Akhawayn University and customizing the platform to accommodate a range of demands and peculiarities of culture.

In order to promote enhanced interactions, future improvements will include AI-driven suggestions for users based on their prior actions and preferences. Additionally, we intend to include blockchain technology to guarantee safe and transparent transactions, boosting consumer confidence. To solve the problem of unsold or returned items and promote the donation of outdated equipment, the Giv initiative also hopes to work with retailers. Giv intends to investigate alternatives for these dormant inventories, maybe even providing them at substantial discounts similarly when it comes to the reduction of food waste.

VII. Conclusion

As we get to the end of this paper, the Giv project stands out as not simply a mobile application but also as a driver of change within the community of Al Akhawayn University and a model for possible national adoption in Morocco. Based at the nexus of environmental stewardship and technology, it embodies the spirit of creativity, environmental consciousness, and social duty. The app's intended features, which aim to improve campus's circular economy, lay the groundwork for a repeatable model that may be used to other organizations and localities.

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