

ExActHealth: A Mobile App for Food and Activity Data Collection in Type 1 Diabetes Management

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Abstract—We present ExActHealth, a mobile application designed for comprehensive food and activity data collection in individuals with Type 1 Diabetes (T1D). Integrated with smartwatch sensors and real-time server sync, the app enables researchers to gather detailed lifestyle metrics. A 30-day feasibility study with 8 participants demonstrated strong usability and potential for real-world diabetes management support.

Clinical Relevance— Enables collection of structured behavioral data to support personalized Type 1 Diabetes management.

I. INTRODUCTION

Effective management of Type 1 Diabetes (T1D) requires comprehensive understanding of patient behavior, including food intake, physical activity, and physiological signals. While CGM devices log glucose levels and insulin delivery, they often omit key lifestyle metrics critical for interpreting glycemic fluctuations. Collecting such real-world data is challenging due to technical, financial, and privacy barriers when relying on third-party tools [1].

To address this gap, we developed *ExActHealth*, a mobile application designed for comprehensive and structured data collection. The app allows manual logging of detailed meals (name, macronutrients, time, image), tracks heart rate, steps, exercise, and sleep through smartwatch integration, and synchronizes data in real time with a secure private server. Its dual functionality—as a research tool and a lightweight food tracker—promotes better engagement and glycemic awareness in patients.

II. METHODOLOGY

The ExActHealth system comprises a smartphone interface, server API, and cloud database. Development was done natively for Android and iOS, ensuring platform-specific optimizations. The architecture follows a modular design, allowing scalable integration of new features such as real-time notifications or analytics modules. The app automatically collects smartwatch data—including heart rate, step count, and exercise sessions—and syncs it continuously with a secure server, where data is organized per user for researcher access. As shown in Fig. 1, the app provides an intuitive interface for logging meals. Users can favorite frequently eaten foods for quick access, edit or delete previous entries, and upload images

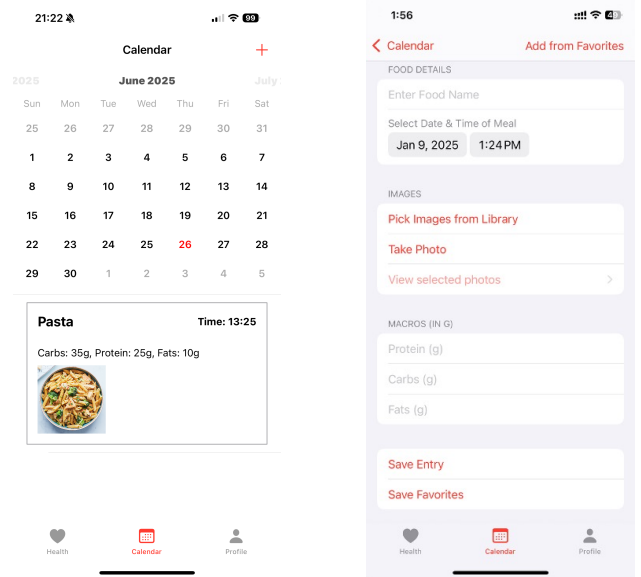


Fig. 1. Screenshots of the ExActHealth mobile app.

to improve tracking accuracy. Key implementation challenges included permission handling across devices, secure authentication, and cross-platform sensor data normalization.

III. RESULTS

We conducted a 30-day feasibility study with 8 participants in collaboration with Mayo Clinic Arizona. Using the ExActHealth app and a smartwatch, participants recorded daily meals with macronutrient details, timestamps, and photos, while the smartwatch passively collected physiological data such as heart rate, step count, and exercise sessions. All data were synchronized to a secure server in real time. Post-study surveys indicated high satisfaction: 100% of participants agreed that most people would learn to use both the app and smartwatch quickly, 87.5% found the app easy to use, and 100% rated the smartwatch as easy to use. These results highlight the system's usability and its potential to support behavior tracking and T1D self-management in real-world settings.

REFERENCES

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