A NURSING-INSPIRED EMOTIONAL MONITORING AND JOURNALING SYSTEM TO IMPROVE WELL-BEING FOR ELDERLY RESIDENTS

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ABSTRACT

In an aging society where millions of older adults face loneliness, cognitive decline, and limited emotional support, there is a growing need for digital solutions that go beyond clinical care. WithU is a compassionate, AI-powered mental wellness app designed specifically for seniors, caregivers, and families. This paper explores the system design, functionality, and user experience, while also addressing key limitations such as AI sensitivity, accessibility for cognitively impaired users, and the need for deeper family and healthcare integration. Experimental evaluations of AI feedback across nutrition and mental health scenarios reveal both strengths and blind spots, guiding future improvements. Ultimately, WithU seeks to redefine digital eldercare by creating a space where older adults are not only monitored but meaningfully supported—emotionally, cognitively, and socially.

KEYWORDS

Elder Care, Nursing, Emotion Monitoring

1. INTRODUCTION

In today's aging society, older adults are increasingly vulnerable to loneliness, cognitive decline, and limited access to emotional support. According to the CDC, one in four adults aged 65 and older experiences social isolation, and over 50 million people worldwide suffer from dementia, a number expected to triple by 2050. Traditional caregiving and memory care approaches often lack personalization, and digital wellness tools tend to be either too complex or impersonal for elderly users. [1]

My direct work with memory care patients at Walnut Valley Senior Living revealed a deeper truth: mental wellness is not just medical—it's emotional, relational, and deeply tied to routine, reflection, and connection. I often saw how moments of joy came from meaningful routines like journaling, reminiscing with pictures, or receiving notes from family members. Yet, no existing app fully captures these nonclinical but essential aspects of care.

WithU was created in response to that gap. Designed for seniors, their caregivers, and family members, WithU bridges mental health, memory support, and human connection through a simple, intuitive app. It caters especially to those with Alzheimer's or early-stage dementia, who benefit from consistency and emotional engagement. WithU aims not only to improve day-to-day

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emotional wellness but also to give caregivers and loved ones tools to better support seniors. By strengthening daily routines, emotional check-ins, and personal expression, WithU addresses a critical need in elder care: to be cared for not just physically, but emotionally, and to never feel forgotten.

WithU is a compassionate mental wellness app designed specifically for seniors and their caregivers, focusing on memory support, [2] emotional check-ins, daily routines, and connection. In simple terms, WithU is a digital wellness companion that helps seniors maintain emotional and cognitive well-being through personalized tools, family involvement, and AI feedback. The app begins with a thoughtful onboarding process, allowing users to input their interests and wellness goals, so their experience can be tailored to their unique needs. Each day, users complete a wellness questionnaire that asks about their mood, sleep quality, upcoming or completed activities, and nutrition. Based on their responses, the app generates a summary offering gentle encouragement and personalized suggestions, helping seniors track their mental and physical health in a non-invasive way.

In addition to daily check-ins, WithU includes a nutrition tracker that encourages balanced eating across all food groups, as well as a visual calendar that displays health patterns over time. Seniors can speak into a voice journal and upload photos that their family members can view—creating a shared memory space and offering caregivers insight into the user's emotional state. Families can also send medication reminders or supportive messages directly through the app, making caregiving more collaborative [3].An empathetic AI-driven therapeutic system is designed to respond to users' journal entries or mood updates by delivering tailored calming advice and emotional reinforcement when immediate human support is unavailable. Distinct from conventional monitoring tools, *WithU* prioritizes simplicity, sustained emotional presence, and relational care. Its design philosophy extends beyond passive observation, aiming to foster comfort, facilitate meaningful emotional connection, and empower older adults throughout their daily experiences.

2. RELATED RESEARCH

The PubMed Central article "Mental health and wellbeing of older people: opportunities and challenges" emphasizes the growing mental health burden among older adults and argues for primary care–based solutions supported by collaborative care models. It highlights barriers such as stigma, underdiagnosis, and the lack of specialized mental health providers, while suggesting interventions including dementia care integration, bereavement support, and liaison psychiatry. While these approaches are effective in addressing mental health within clinical settings, they remain reactive, require trained professionals, and do not offer accessible, technology-driven tools for daily support. WithU builds on this by empowering [4] older adults directly through features such as guided journaling, wellness questionnaires, and AI-assisted tools. This approach complements primary care by providing ongoing, user-centered support outside of traditional healthcare systems.

The article "Frailty and Mental Health: Association with Cognition, Sleep, and Well-Being in Older Adults" links frailty not only to physical decline but also to mental health, sleep quality, and cognition. While tools such as the Short Well-being Instrument for Older adults (SWIO) provide useful measures of psychological factors, the study remains observational and does not translate its findings into actionable, day-to-day solutions.[5] WithU addresses this limitation by transforming research insights into practical tools. Its mood, sleep, nutrition, and activity trackers, combined with a calendar that visualizes trends, help users prevent frailty while reinforcing healthy routines. By integrating psychosocial support with daily health monitoring, WithU transforms assessment into continuous, personalized intervention. [6]

The MDPI article "A User-Centred Well-Being Home for the Elderly" presents a universal model for technology-assisted elder care, focusing on IoT devices to monitor health, routines, and emotional well-being. Interviews with healthcare professionals revealed that older adults prefer privacy, familiar contacts, and technology that integrates seamlessly into their routines. Experts agreed that this kind of technology can improve well-being but also pointed out concerns about privacy, cost, and the difficulty of installing such systems in every home.[7]WithU builds on these principles while remaining practical and accessible. Its senior-friendly interface, daily questionnaires, journaling with voice input, family contact integration, and AI therapist search bar provide many of the same benefits—routine monitoring, social connection, and emotional support—while staying easy to use and non-invasive.

3. SOLUTION

The app follows a clear and structured flow that begins with a Splash Screen, followed by Login or Sign Up. New users go through three sequential onboarding screens (Onboarding 1–3), which likely help personalize the app experience or gather initial information. After onboarding or login, users arrive at the core of the app through a Nav Bar, which provides access to four primary sections: Calendar, Journal, Homepage, and Profile. The Journal section leads to a Journal Entry page, while the Homepage guides users through a 3-step emotional Questionnaire (1–3), designed to track mental or emotional state over time. This diagram shows a user-friendly layout tailored to elderly users, where structured entry points guide them through daily emotional reflection, scheduling, and profile management.[8]

This program was developed using FlutterFlow for the front-end UI design and page navigation, with Firebase powering the back-end. Firebase Authentication manages user login and sign-up flows, while Firestore is used to store user information, journal entries, and questionnaire responses. Firebase Storage can handle image or audio data if needed. The system design considered logical and supportive user experience with an emphasis on emotional well-being, ease of use, and seamless integration across core functions.

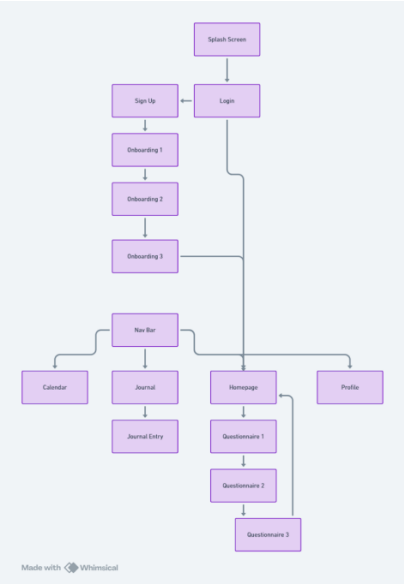

Figure 1. Overview of the solution

This screen is part of the app's daily questionnaire flow, specifically focused on tracking users' nutritional intake across breakfast, lunch, and dinner. it prompts users to select the food groups they consumed for each meal using simple dropdown menus, helping promote mindful eating habits. The use of clear icons (sun and moon) and warm, elder-friendly color schemes enhances accessibility, especially for older adults. This feature not only encourages consistent dietary reflection but also enables the system to collect structured data that can inform personalized feedback or caregiver reports. It plays a key role in supporting the app's broader goal of promoting emotional and physical well-being through daily self-monitoring.

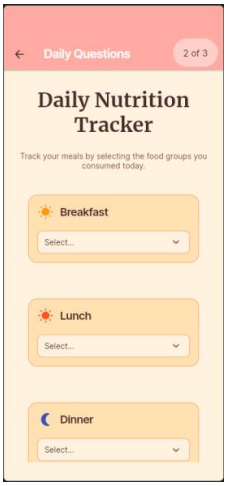

Figure 2. Screen for Daily Tracker Page

This code defines a FlutterFlow button labeled "Generate Summary" that uses an AI-powered function to analyze the user's meal data for breakfast, lunch, and dinner and generate a natural language summary of their daily nutrition. When pressed, the button calls an asynchronous function (geminiGenerateText) with a custom prompt asking the AI to review the recorded food groups and provide a concise summary. The returned text is stored in _model.generatedSummary and then assigned to _model.summaryText, which can be displayed on the screen. The safeSetState() function ensures the UI updates in real time. This feature enhances the app's usability by offering personalized, easy-to-understand feedback based on users' food tracking input, making it especially helpful for elderly users or caregivers monitoring dietary habits.[9]

```
Align(
  alignment: AlignmentDirectional(0, 0),
  child: FFButtonWidget(
    onPressed: () async {
      await geminiGenerateText(
        context,
        'Review the food groups recorded for each mealâ€  breakfast, lunch, and dinnerâ€  and generate a summary of the individual\'s overal
      ).then((generatedText) {
        safeSetState(
            () => _model.generatedSummary = generatedText);
      });

      _model.summaryText = _model.generatedSummary!;
      safeSetState(() {});

      safeSetState(() {});
    },
    text: 'Generate Summary',
    options: FFButtonOptions(
      height: 40,
      padding: EdgeInsetsDirectional.fromSTEB(16, 0, 16, 0),
      iconPadding: EdgeInsetsDirectional.fromSTEB(0, 0, 0, 0),
      color: Color(0xFFC4D8F4),
      textStyle: FlutterFlowTheme.of(context)
          .titleSmall
          .override(
            font: GoogleFonts.interTight(
              fontWeight: FontWeight.bold,
              fontStyle: FlutterFlowTheme.of(context)
                  .titleSmall
                  .fontStyle,
            ),
            color: FlutterFlowTheme.of(context).primaryText,
            letterSpacing: 0.0,
            fontWeight: FontWeight.bold,
            fontStyle: FlutterFlowTheme.of(context)
                .titleSmall
                .fontStyle,
          ),
      elevation: 0,
      borderRadius: BorderRadius.circular(0),
    ),
  ),
),
```

Figure 3. Code for Daily Tracker Page

This screen displays the app's calendar view, designed to help users visually track their daily engagement or wellness entries throughout the month. It shows the month of July with days of the week across the top and numeric day labels beneath, where entries made on specific days (e.g., Monday through Thursday) are indicated with a subtle "1" marking—likely representing a completed journal, questionnaire,[10] or meal tracking entry. The soft peach and cream color palette offers a calming, elder-friendly interface, while the navigation bar at the bottom provides quick access to the Home, Calendar, Journal, and Profile sections. This calendar serves as a motivational tool, encouraging consistent self-monitoring habits and providing an at-a-glance summary of user activity over time. [11]

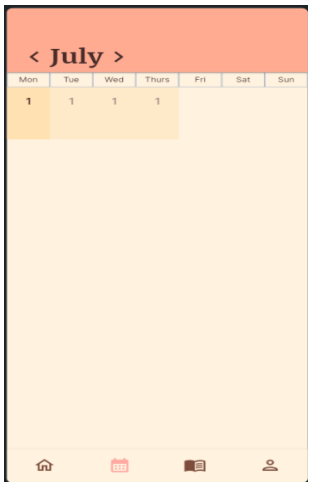

Figure 4. Screen for Calendar

This code defines a vertically scrollable calendar grid using Flutter's GridView.builder widget, which dynamically builds day cells for a calendar UI. The generateCalendarDays function creates a list of day objects (calendarData) based on the current month and date context. The grid uses SliverGridDelegateWithFixedCrossAxisCount to display 7 columns (for each day of the week) with consistent sizing. For each day in the list, the itemBuilder constructs a CalendarDayWidget, passing in formatted day data, a unique key, and flags to control whether the day is disabled or marked as the current day. This implementation allows the app to display a flexible and responsive calendar view that visually represents daily activity, and is especially suited for health, journaling, or tracking applications where each day may hold entries or status markers.

```
Expanded(
  child: Builder(
    builder: (context) {
      final calenderData = functions
          .generateCalendarDays(getCurrentTimestamp)
          .toList();

      return GridView.builder(
        padding: EdgeInsets.zero,
        gridDelegate: SliverGridDelegateWithFixedCrossAxisCount(
          crossAxisCount: 7,
          crossAxisSpacing: 0,
          mainAxisSpacing: 0,
          childAspectRatio: 0.6,
        ),
        scrollDirection: Axis.vertical,
        itemCount: calenderData.length,
        itemBuilder: (context, calenderDataIndex) {
          final calenderDataItem =
              calenderData[calenderDataIndex];
          return CalenderDayWidget(
            key: Key(
                'Keyrtb_${calenderDataIndex}_of_${calenderData.length}'),
            day: dateTimeFormat("d", calenderDataItem),
            isDisabled: false,
            isCurrentDay: false,
          );
        },
      );
    },
  ),
),
```

Figure 5. Code for Calendar Screen Page

This screen displays the Journal section of the app, where users can review their past entries organized by month. Each journal card includes a date, a title placeholder, and an associated mood tag, labeled as “emotion.” The layout uses warm tones and soft borders to create a calming, elder-friendly interface. At the bottom right, a floating pencil button suggests the user can add a new journal entry, supporting daily self-expression. The navigation bar at the bottom of the screen provides quick access to other sections of the app including Home, Calendar, Journal (highlighted), and Profile. This design encourages users to reflect on their emotional well-being over time, while keeping the interface simple and visually soothing.

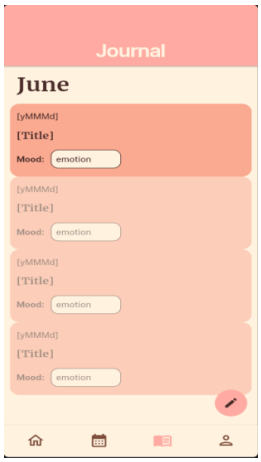

Figure 6. Screen for Journal Function Page

This code snippet is part of the journal page’s initialization in a Flutter app and is responsible for loading and displaying user-specific journal entries when the page opens. Inside the initState() method, which runs once when the widget is first created, it triggers a Firebase Firestore query using queryJournalEntriesRecordOnce() to retrieve up to 31 journal entries linked to the current user. These entries are ordered by the 'day' field in descending order, meaning the most recent entries appear first. The results are stored in _model.userJournalEntries, and then cast into a list of JournalEntriesRecord objects and assigned to _model.currentEntries. A call to safeSetState() ensures the UI is refreshed with the fetched data. This logic enables the Journal page to display a list of recent emotional reflections or logs personalized for each user, forming the foundation of the emotional tracking interface.

```
@override
void initState() {
  super.initState();
  _model = createModel(context, () => JournalPageModel());

  // On page load action.
  SchedulerBinding.instance.addPostFrameCallback((_) async {
    _model.userJournalEntries = await queryJournalEntriesRecordOnce(
      parent: currentUserReference,
      queryBuilder: (journalEntriesRecord) =>
          journalEntriesRecord.orderBy('day', descending: true),
      limit: 31,
    );
    _model.currentEntries =
        _model.userJournalEntries!.toList().cast<JournalEntriesRecord>();
    safeSetState(() {});
  });
}
```

Figure 7. Code for Journal Function Page

Below I also lasts out some other pages:

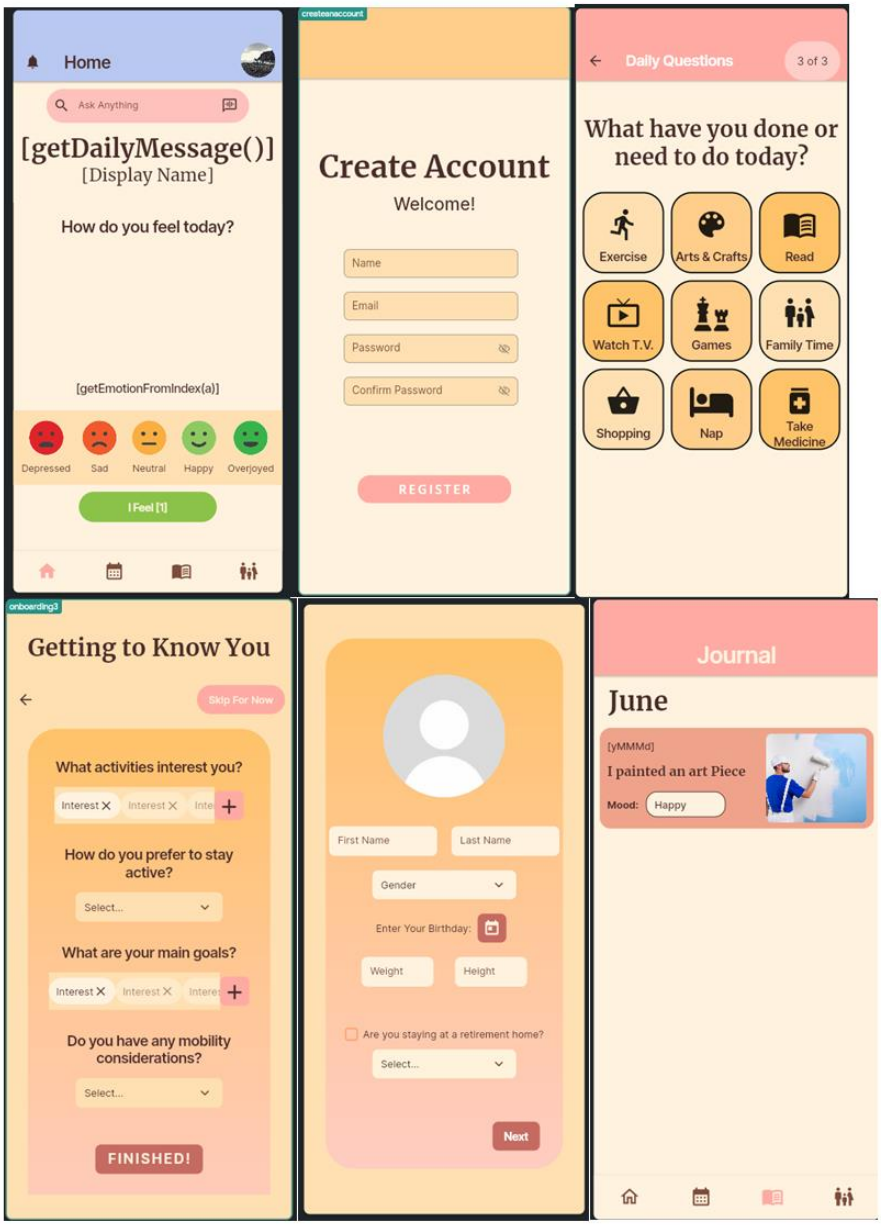

Figure 8. Some Other Screens

4. DATA

4.1. AI's Ability to Fairly and Accurately

One potential blind spot in our program is the AI's ability to fairly and accurately interpret and rate nutritional completeness based on limited or atypical eating habits, such as eating only grains or skipping meals entirely. This is important because users may rely on AI-generated summaries for diet-related self-awareness or health decisions, and misinterpretation could lead to inaccurate emotional or health feedback, especially for elderly users. [12]

To test this, we created a controlled experiment by feeding the AI various dietary scenarios—such as eating only breakfast, only vegetables, skipping meals, or consuming a full balanced diet—and then evaluated the AI's responses by assigning a subjective rating (0%–100%) based on clarity, appropriateness, and usefulness. These scenarios act as the control data, and the responses are compared across consistent prompts. This design isolates how the AI handles incomplete or unbalanced nutrition logs versus complete ones, and helps uncover potential bias or insensitivity in its interpretation.

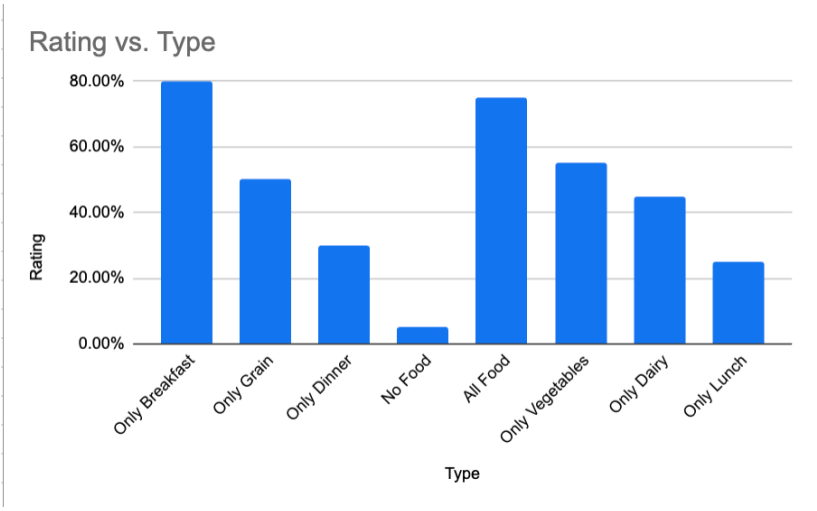

Figure 9. Data

It was surprising that "Only Breakfast" received the highest rating, even above "All Food" (75%), which was expected to be the strongest performer. This suggests the AI may overvalue the presence of *any* structured meal over the diversity or completeness of the diet. On the other hand, "No Food" performed the worst, which was expected, but also indicates that the AI does penalize empty entries. [13]

The biggest effect on results seems to come from whether any meal was logged at all and how much detail the entry included. [14] The AI seems to favor routine and completeness, which is helpful, but it may lack nuance when evaluating less traditional or partial eating patterns (like skipping lunch or eating only vegetables), which requires improvement to make it more health-accurate and empathetic.

4.2. Emotional Prompts Model

In the second test, we focused on mental health by generating 10 distinct emotional prompts, divided into two categories: positive outcomes and negative outcomes. A control group, unaware of the hypothesis, reviewed the AI's responses to these prompts and rated them based on empathy, helpfulness, and tone. The results were compared to assess whether the AI was more effective at responding to positive or negative mental health situations. This helped identify whether the AI consistently provided emotionally intelligent support, particularly for vulnerable users. The results suggested the AI gave more confident and appropriate responses to positive prompts, while feedback to negative emotional prompts sometimes lacked depth or showed inconsistent sensitivity. [15]

Together, these experiments revealed a key blind spot: while the AI can generate useful summaries for structured data and positive reflections, it is less reliable when dealing with

incomplete, imbalanced, or emotionally complex input. This underscores the importance of refining AI models to recognize subtle emotional cues, nutritional context, and personalized needs—especially in elderly or high-risk users who depend on consistent and empathetic support.

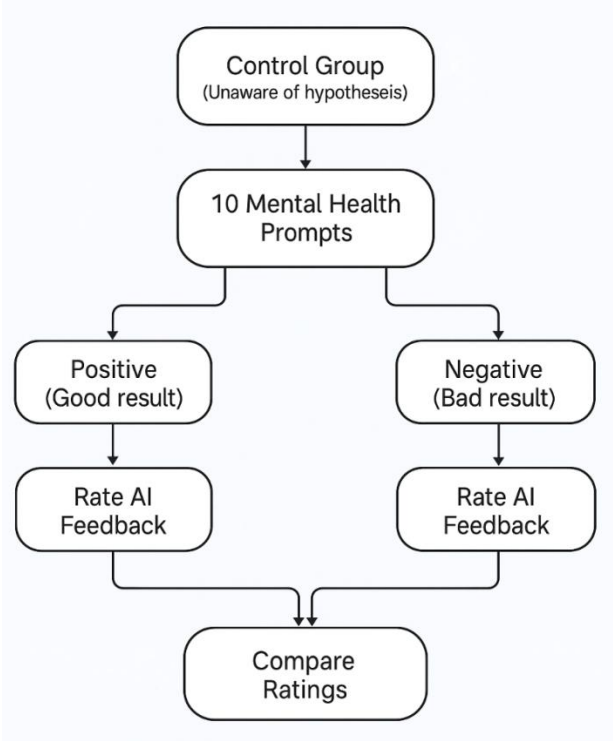

Figure 10. Processing of Emotion Prompts Model

5. RESEARCH ISSUES

In order to build the project, a few issuehave been identified as follows.

5.1. Data Management

Managing the back-end for user data is another major challenge, as it typically requires custom code for authentication and user data storage, which can be tedious and error-prone. To simplify this process, I could use Firebase, a cloud-based backend service that handles authentication and data storage through Firebase. This would allow me to securely store user information such as family contacts, journal entries, and profile details, while also managing sign-ups, logins, and password storage. I could also use Firebase Storage to handle images uploaded by users. By leveraging these services, I could focus more on building the app's frontend while ensuring reliable, secure data management.

The frontend handles all the user interface elements, including pages, layouts, colors, and interactions, while the backend is responsible for storing user data such as sign-up and login information—typically requiring custom-built code, which can be tedious and time-consuming. To simplify this, Firebase, a cloud-based backend service provided by Google, offers integrated solutions where authentication manages login, sign-up, and password security; Firestore serves as the real-time database for storing user details like family contacts and journal entries; and Firebase Storage is used to store images and other media files, streamlining backend development significantly.

5.2. Flutterflow Actions

Another issue involves implementing advanced functionality using FlutterFlow actions and custom functions. While FlutterFlow actions enable features such as creating, updating, and querying Firestore documents directly from the UI, some tasks, like voice transcription, require custom-built actions. I could create these custom functions to handle specialized needs, such as converting audio into text or streamlining multi-step processes within the app. To prevent errors, I could break each feature into smaller components, test them individually, and use FlutterFlow's debugging tools.

FlutterFlow actions enable us to implement functionality directly within the UI, such as creating, updating, and querying documents in Firestore. While many advanced features can be built using these built-in actions, some functionalities—like voice transcription—are not natively supported. In such cases, we needed to create our own custom actions to handle tasks like capturing and stopping voice input. Additionally, we developed custom functions to support and streamline various aspects of the app's development, allowing for greater flexibility and control beyond what standard FlutterFlow provides.

6. CONCLUSIONS

Although WithU provides a comprehensive platform for supporting older adults, several limitations remain. The AI therapist search bar, while capable of offering personalized guidance, relies heavily on the quality and clarity of user input, necessitating extensive testing and refinement before large-scale deployment. Additionally, seniors with cognitive decline or unfamiliarity with technology may struggle to adapt without proper onboarding and ongoing support. Another challenge is ensuring meaningful family involvement; providing secure access for family members to monitor and support their loved ones could enhance engagement and safety. Finally, integrating direct communication pathways to healthcare providers would significantly strengthen the app's role as a bridge between personal wellness tracking and professional medical oversight.

WithU bridges the gap between research and practical support for older adults by combining health tracking, emotional care, and family connection in one accessible platform. With further refinement, it has the potential to become a powerful tool for promoting independence, improving mental health, and enhancing the overall well-being for seniors.

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