InsightPulse: An IoT-based System for User Experience Interview Analysis

Team:

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My Roles:

- **UX Researcher and Designer:** Designed and developed functional prototypes, conducted A/B testing, and optimized user journeys for real-time UX analytics.
- **CFO:** Managed the project's finances, ensuring budget alignment with strategic goals while conducting thorough market research and competitor analysis.

10th IEEE International Conference on Collaboration and Internet Computing

Problem Statement

84% relied on **interviews for data collection**

45% of these articles had **incomplete, vague, or missing information** about data collection and analysis

Why focus on user interview scenario?

- How to Ask Follow-Up Questions?
- How to Encourage Users to Share More Details?
- How to Take Notes More Quickly?
- Analyzing Insights is Time-Consuming...
- Data Management is Challenging
- Data Visualization and Sharing with the Team is Difficult...

Challenges

High cognitive load in managing interviews and tracking insights, with added challenges of time management and data volume.

Objective

Reduce interviewer load, allowing focus on conversations while ensuring high-quality, in-depth data through automated capture and analysis.

Impact

Lowered interview quality and potential bias, with high time and labor costs for analysis.

Contribution

Developing a real-time, AI-driven interview support tool that unobtrusively enhances data quality and consistency, addressing cognitive load and bias challenges in qualitative research.

Motivation

Enhancing Interview Efficiency and Quality Through Real-Time, AI-Driven Support.

Related works

Enhancing Interview Efficiency and Quality Through Real-Time, AI-Driven Support

1 Influence of Question Wording on Responses

Interviewer question phrasing can introduce bias, shaping participants' responses and affecting data reliability.

Key Reference

Heather Cairns-Lee et al. (2021) highlights how suggestive or leading questions can compromise data integrity in qualitative research.

2 Real-Time Suggestions in Conversations

Keeping conversations relevant and engaging, especially in dynamic or exploratory settings.

Key Reference

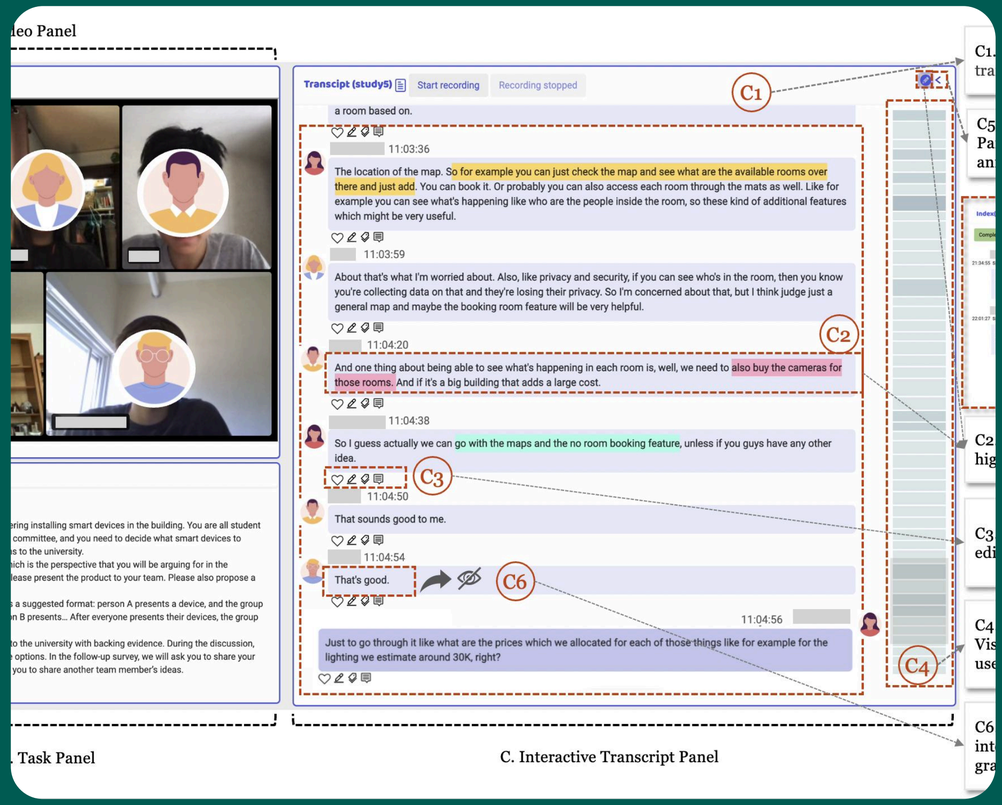
Nguyen et al. (2015) demonstrated that real-time recommendation systems improve engagement by offering dynamic topic suggestions.

3 Unobtrusive Support for Continuous Engagement

Providing support without interrupting the natural flow of interaction, especially important in interviews.

Key Reference

Chen et al. (2023) showed that non-intrusive, transcript-based support can enhance engagement without distracting the user.



Key Insights from Related Works

Using AI-driven, neutral prompts, InsightPulse minimizes bias from leading questions, ensuring responses remain authentic.

Neutral Prompts Enhance Data Integrity

InsightPulse provides tailored follow-up questions, helping UX researchers maintain focus and interview flow.

Real-Time Suggestions Maintain Focus

Unobtrusive interface provides seamless, in-the-moment guidance, ensuring interview continuity and reducing cognitive load.

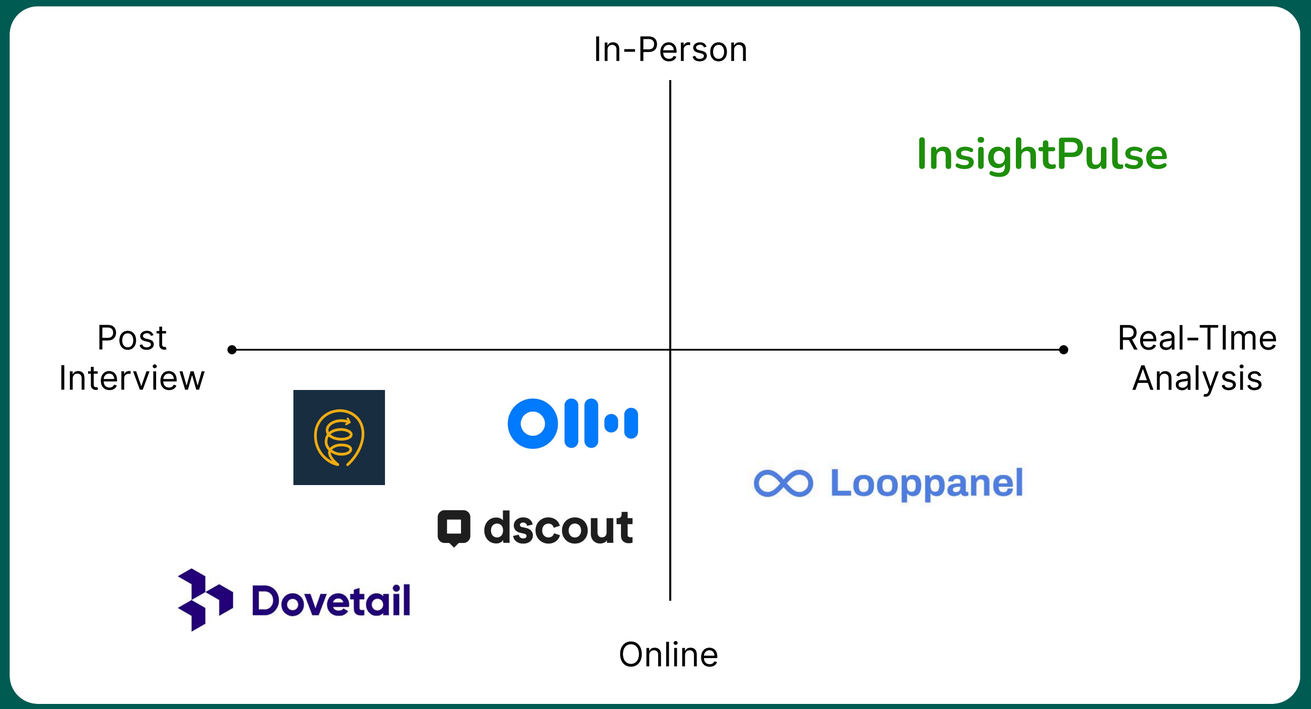
Unobtrusive Support Reduces Cognitive Load

Current Solutions and Gaps

Enhancing Interview Efficiency and Quality Through Real-Time, AI-Driven Support

Landscape Overview

AI tools in user research mostly focus on virtual environments and often aim to replace human roles, leaving a gap in supporting in-person interviews with real-time assistance.



Current Market Gap

Existing tools lack of real-time, in-person support—InsightPulse fills this gap with live AI-driven prompts.

	InsightPulse	Dovetail	Otter.ai	
Auto Tag	√	√	✗	✗
Customization Summary	√	√	✗	✗
Time Management	√	✗	✗	✗
Real-Time Analysis	√	✗	✗	✗

This is a very Promising Market

Product managers, researchers, and management professionals, they all have a strong demand for this type of product.

Key Points:

- Valued at **USD 235.19 Million** in 2024
- Expected to expand at a **CAGR of 17.97%**

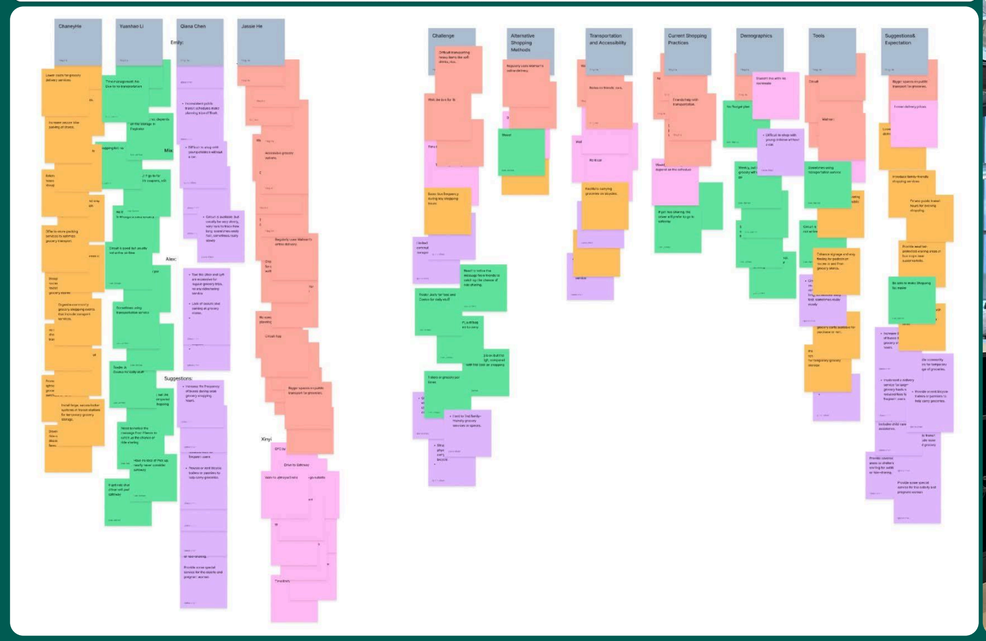
Primary Research

Exploring the Latest Innovations Visuals

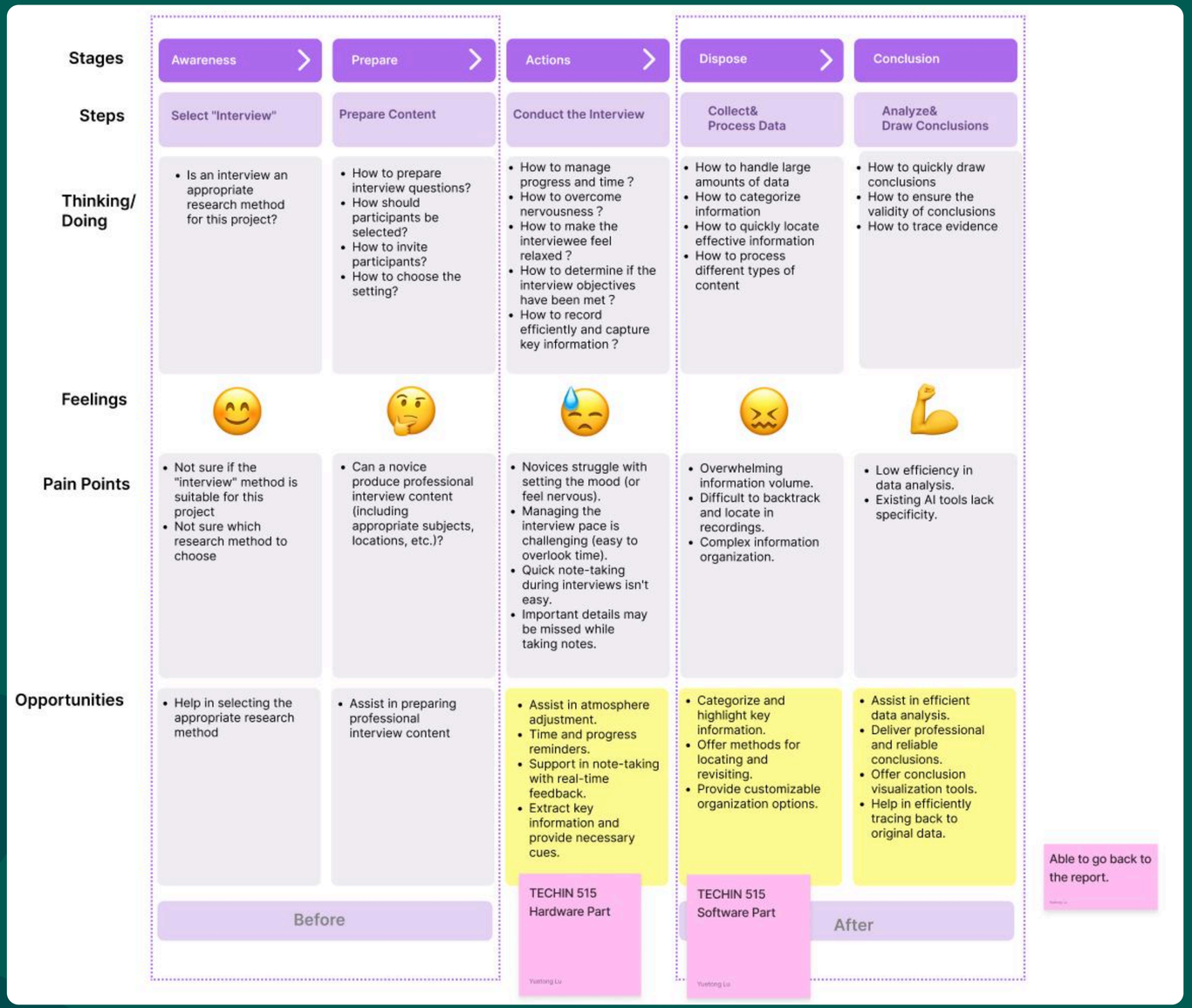
User Interview

We conducted two rounds of research, including 8 interviews and over 80 surveys targeting **product managers**, **students**, and **non-professionals**, to understand daily challenges, assess solution satisfaction, and identify innovation opportunities in UX design.

Goal	Questions
Understand the daily challenges and needs	1.1 Can you describe a typical day at work/home? What challenges do you frequently encounter?
	1.2 Are there specific tasks or activities that are more troublesome than others? Why?
	1.3 How do these challenges affect your productivity or personal life?
Assess satisfaction with current solutions	2.1 What specific tools, apps, or services are you currently using to address these challenges?
	2.2 On a scale of 1 to 10, how would you rate your satisfaction with these solutions? Why?
	2.3 What are the main reasons for your dissatisfaction with current solutions, if any?
Identify opportunities for product improvement or innovation	3.1 What features do you feel are missing from the current tools or services?
	3.2 Have you encountered any innovative solutions in other areas that you wish were applied to the tools you use?
	3.3 What would an ideal solution look like for your needs? Describe any specific functionalities or characteristics.
Gather expectations and requirements for future solutions	4.1 What specific problems do you hope new solutions will solve for you?
	4.2 What are your top priorities when considering new tools or services (e.g., cost, efficiency, ease of use)?
	4.3 Are there any deal-breakers that would prevent you from adopting a new solution?
Learn about user habits and preferences	5.1 Describe how you typically find and start using a new tool or service. What influences your choice?
	5.2 What factors are most important to you in continuing to use a tool or service?
	5.3 How do you prefer to learn about and be trained in new tools or services?
Determine key factors in decision-making processes	6.1 When deciding to use a certain tool or service, what sources of information do you rely on?
	6.2 Who else, if anyone, influences your decisions regarding the tools or services you use?
Collect specific user feedback to validate preliminary product concepts or prototypes	7.1 If you were shown a prototype of a new product designed to address your needs, what would be your initial reaction?
	7.2 Can you provide detailed, constructive feedback on what you like and dislike about the prototype?
	7.3 How could this product be improved to better meet your needs and expectations?



User Journey Map



What We Learn from Primary Research

Poorly framed questions due to insufficient user research.

Insufficient User Research Skill

Incomplete questioning due to poor time management

Poor Timing Management

Difficulty in handling unanticipated answers and follow-up questions.

Unanticipated Responses

Limited time for analysis, leading to underutilized research materials.

Limited Analysis Time

Poor internal integration, resulting in low utilization and continuity of research materials.

Resource Integration Issues

Ideation

Exploring the Latest Innovations Visuals

Ideation Research

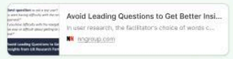
Source:

- Literature review: gathers and analyzes relevant data from academic and research publications, government agencies, educational institutions, books, articles, and online resources (i.e., Google Scholar, social media, etc.). It helps designers gain a deeper understanding of existing knowledge, theories, and perspectives on the subject matter.
- Market research: studying and analyzing market reports, industry trends, consumer behavior, and demographic data. It provides valuable insights into the target market, user preferences, emerging trends, and potential opportunities for design solutions.
- Competitor analysis: examines and evaluates the products, services, and strategies of competitors in the market. By studying competitors' strengths, weaknesses, and unique selling points, designers can identify gaps, potential areas for improvement, and opportunities to differentiate their designs.
- User research analysis: User research analysis involves reviewing and analyzing data collected from various user research methods, such as surveys, interviews, and usability testing. It helps designers gain insights into user needs, preferences, pain points, and behaviors, which inform the design decisions and enhance the user-centeredness of the final product.
- Data analysis: processing and interpreting quantitative and qualitative data from various sources, such as surveys, analytics, and user feedback. It helps designers identify patterns, trends, and correlations in the data, which can guide decision-making and inform design choices.

Tools:

- Several Market Resarch AI
- Figma/Google Doc/Miro
-

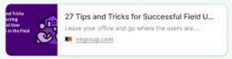
Methods:



- 不要用我们自己的话改写。
  - 参与者：“我注意到这里有这张照片……”
  - 研究员：“你提到这张图片里有那款，那你喜欢什么？”
  - 改进：“你提到了那张照片……？”
- 不要建议答案。
  - “这能为您节省工作日的时间吗？”
  - 改进：“如果有的话，这会如何影响你的效率？”
- 不要命名界面元素。
  - “页面一侧的相关链接——这些链接会指向哪里？”
  - 改进：“页面一侧的该区域……[指向区域]。那是什么？”
- 不要假设你知道用户的感受。
  - “当你努力完成这项任务时，发生了什么？”
  - 改进：“完成这项任务容易或困难的地方是什么？”

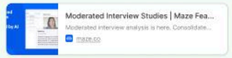
Field Study

Methods:



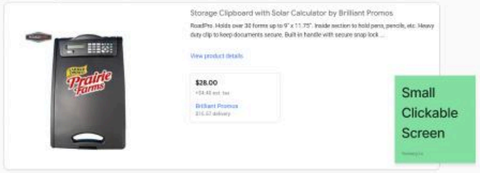
Type of Field Study	Goal	Observational vs. Attitudinal?
Direct observation	Observing uninterrupted natural behavior	Purely observational
Contextual inquiry (including usability testing in the field)	Understanding the reasoning or context that drives an observed behavior	Observational and attitudinal
Customer-site visits	Learning about specific domains or industries, with the participant acting as a guide	Slightly more attitudinal
Ethnography	Total immersion in a setting to learn about relationships, interactions, and cultural norms within a group	Slightly more observational

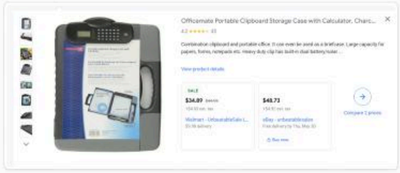
Tools:

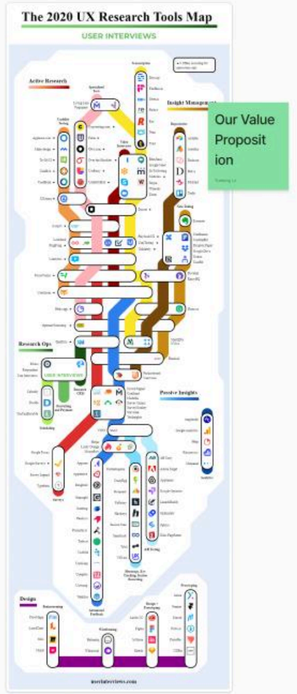


Several AI tools and User Research Tools are still in the market, but many of them are B2B.

- They are more focus on Zoom Interview summary.
- Surveys tools like 问卷星
- Tools for user and usability testing: These tools help UX researchers evaluate how easy to use their products and features are
- Tools for user interviews: These tools help conduct live interviews to get direct feedback from users
- Tools for recruiting research participants: These tools help find participants for user research interviews
- Tools for testing information architecture: These tools help evaluate the layout of your website and how users expect your navigation to work
- Tools for product analytics: These tools provide data on how users interact with your website
- Tools for user surveys and feedback: These tools enable you to create surveys that collect feedback and insights from users

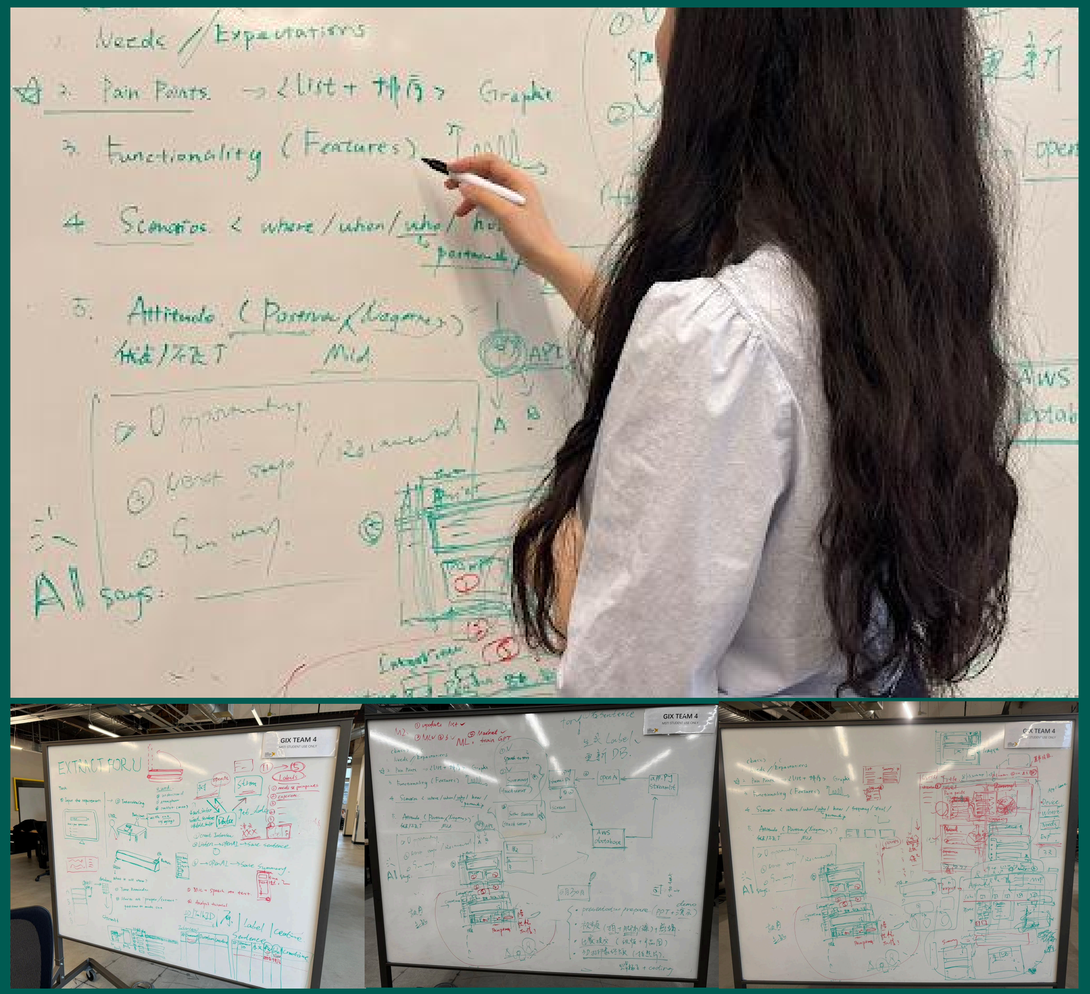






Ideation

We brainstormed to define the software and hardware architecture, user interfaces, and key functionalities, successfully establishing clear design directions.



Data Processing

Voice Recognition:

Utilizes OpenAI API for transcription and analysis.

Data Storage:

Managed with AWS for security and accessibility.

Software Design

User Interface:

Dashboard for live data interaction and monitoring.

Functionality:

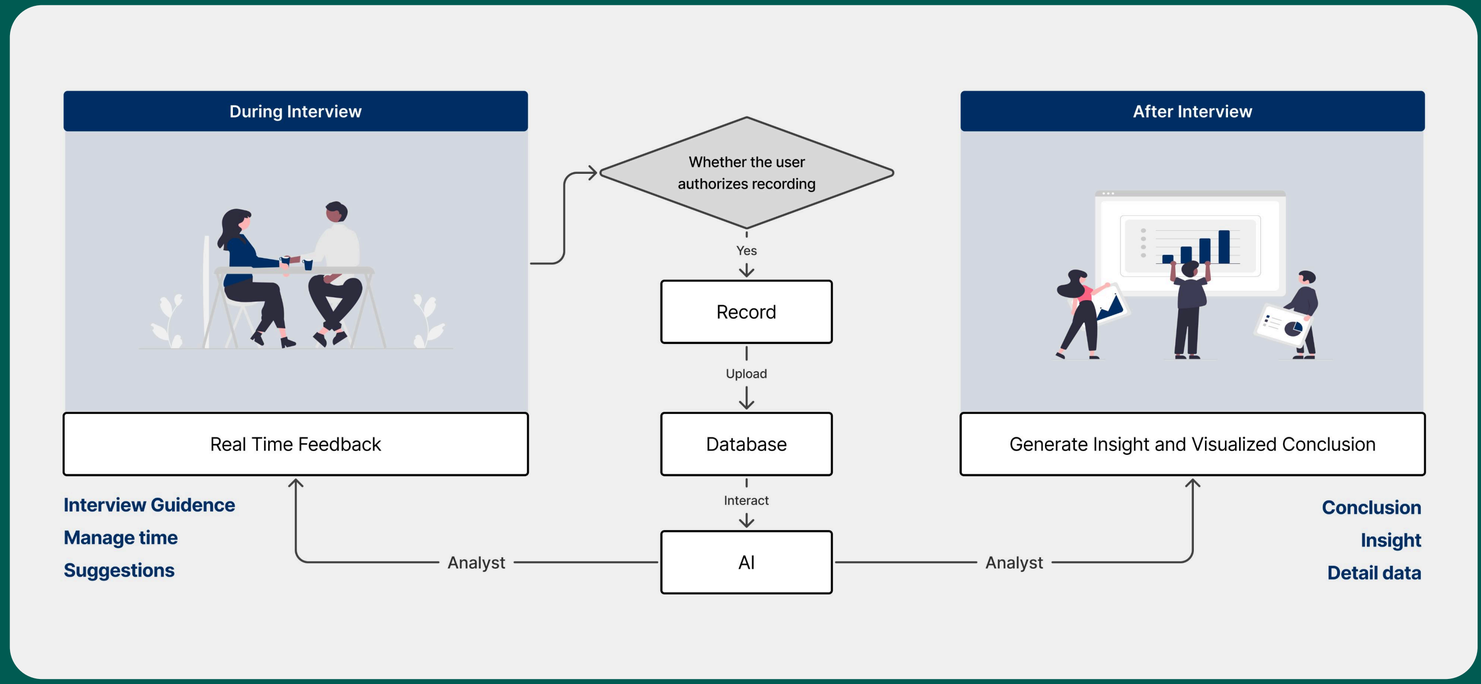
AI-driven prompts and analysis for researcher support.

Solution: An IoT device

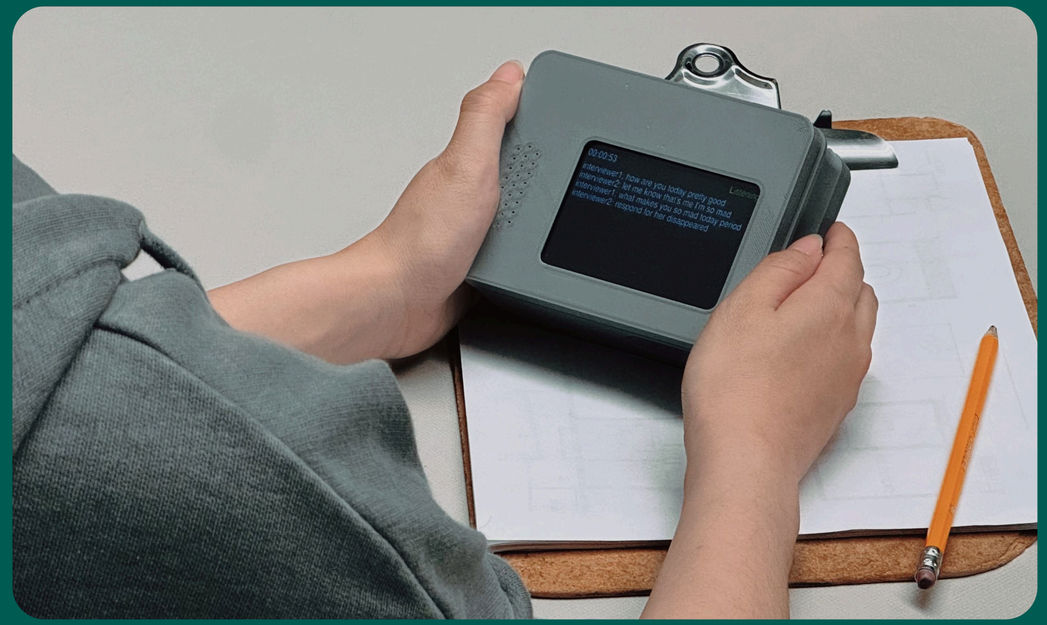
Enhancing Interview Efficiency and Quality Through Real-Time, AI-Driven Support

What’s InsightPulse?

- IoT-based hardware and software system
- Provides real-time support during UX interviews through AI-based speech analysis
- Facilitates post-interview analysis with automatic insights extraction

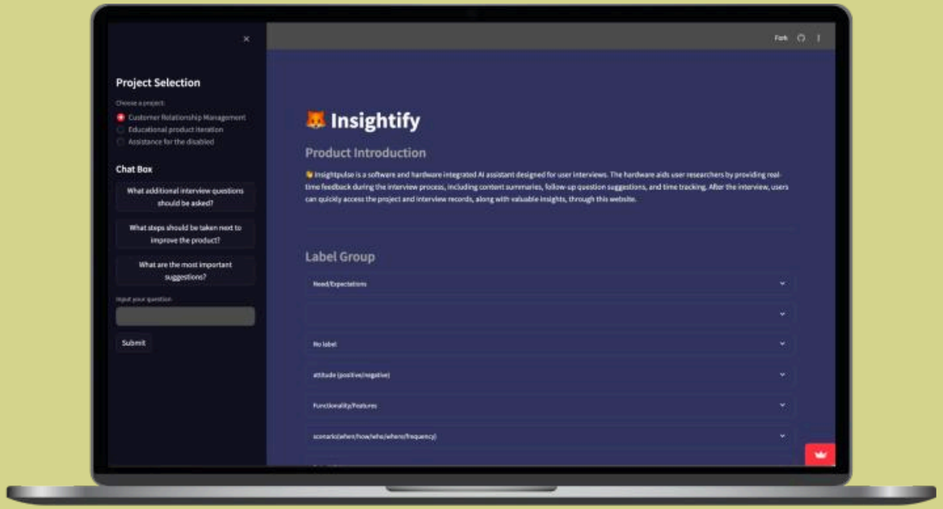


How this system works?



Interview Process

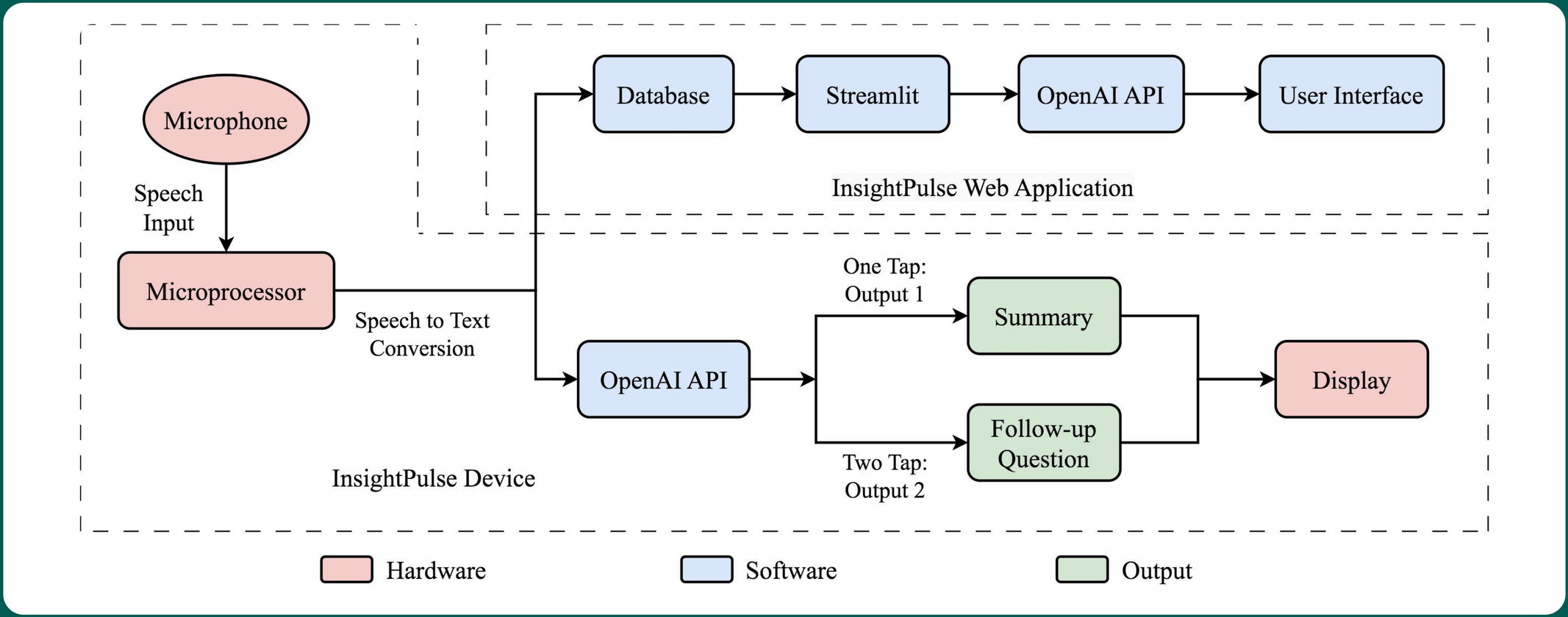
Transcribe and analyze the content, providing a simple, non-intrusive way to keep the interview on track.



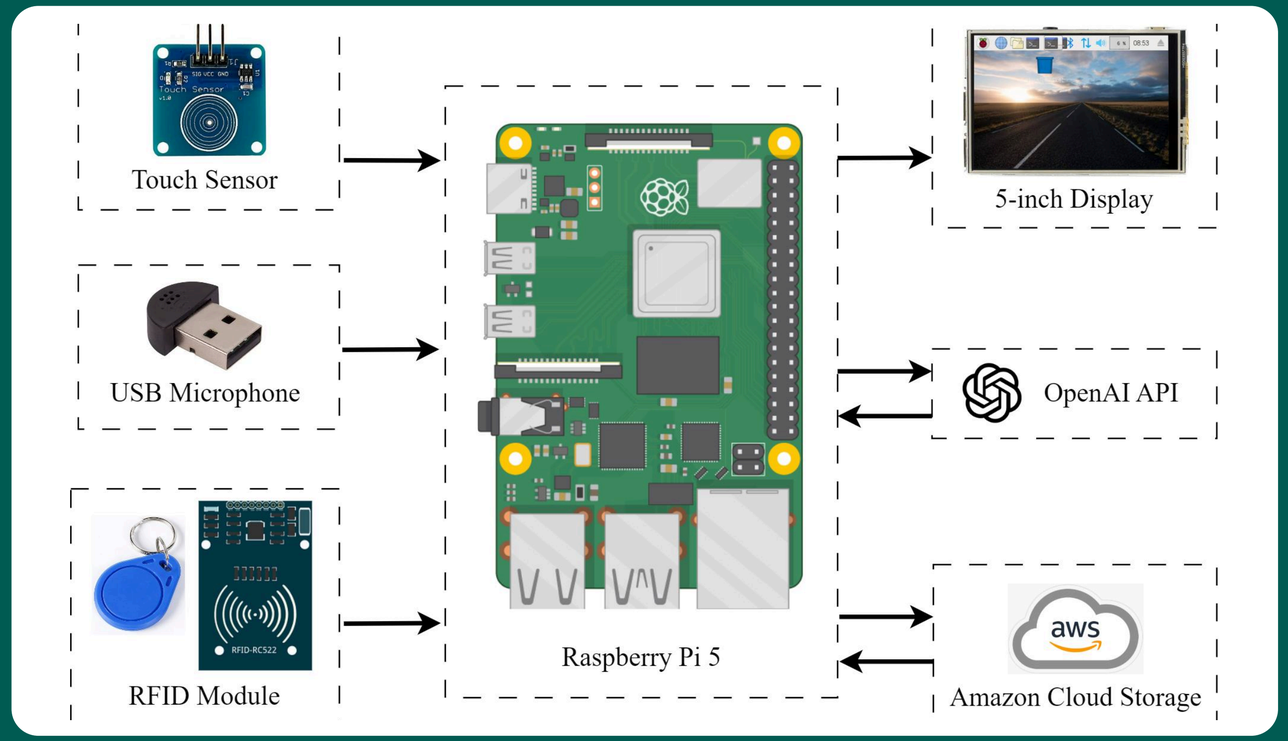
Post-Interview Analysis

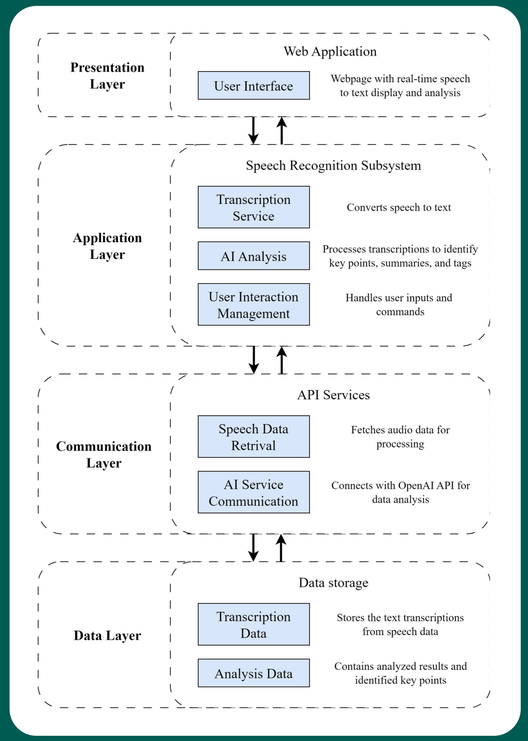
Store and automatically organize information to visualize key insights for team review, making it accessible for further analysis.

System Architecture



Hardware and Software Design





Token

Need/Expectations

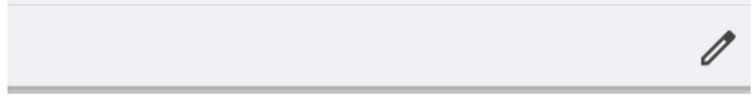
Pain point

Functionality/Features

scenario（when/how/who/where/frequency）

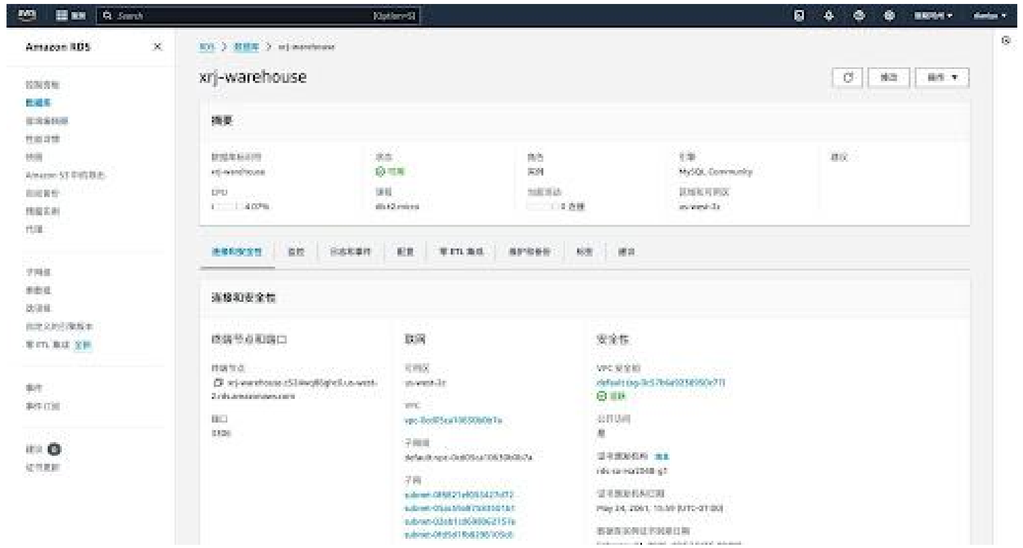
attitude（positive/negative）

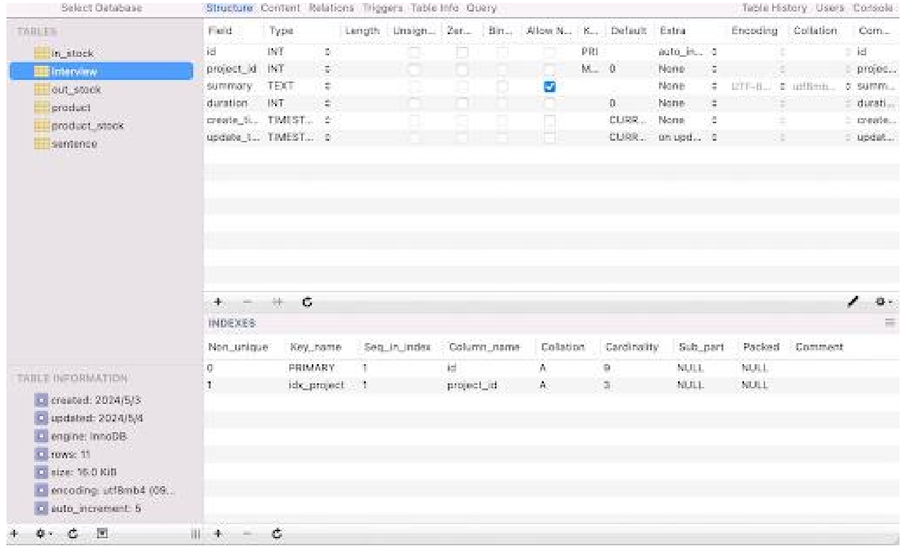
no label



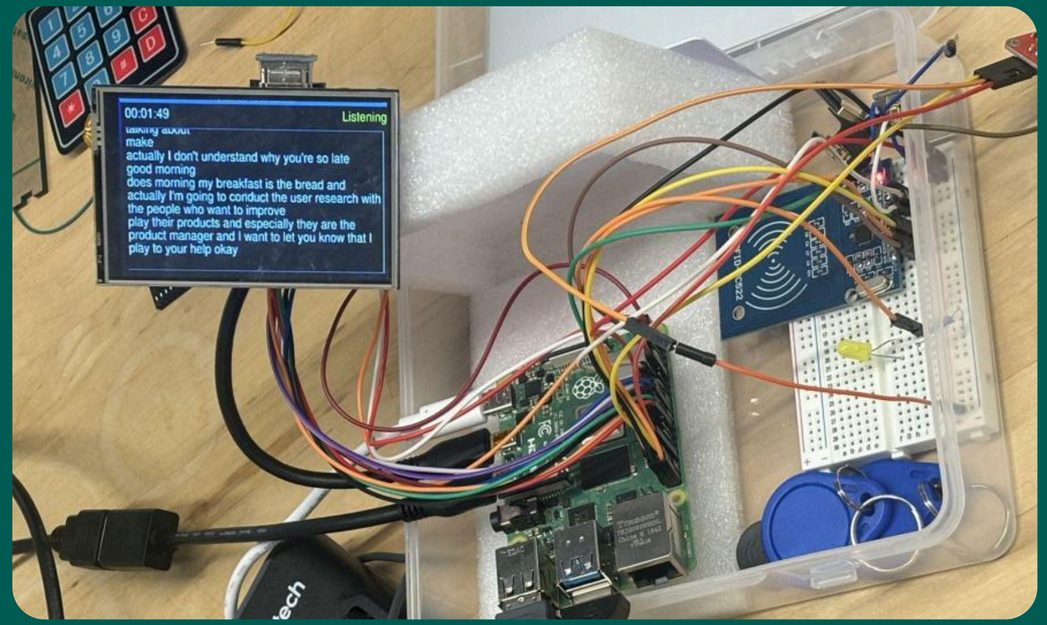
everyday, the kid stuff every shift will right? If something happened or something didn't happen. That's all well and good. But then isn't it? Yeah,	Functionality/Features	scenario（when/how/who/where/frequency）	
We for us, we use what is called Point Click care. There's a software point, click care. So PCC, and there, you're able to the caregiver, there are tasks that the nurse has put in. So how much do they eat, what percentage they eat? Do they were they able to do their own dressing, they use the bathroom by themselves was there was there incontinence, all those things, that behaviours, aggression, were they to quiet confusion, those things. So these are we use it, that's what we use to track it down until the nurse the RN, hi, we'll set that up. So the software comes up on the Tablets of the US that it will be able to see. So for James, this is what we need to do. And if there are any, so it like it only says, say for example, James is independent is in the bathroom. But the last two shifts, we've had to, you know, he sold himself. And we have to change that. So they report that they put that on the software, it comes to the night and then and so give the report to the doctor.	Functionality/Features	scenario（when/how/who/where/frequency）	
Everybody who saw like for us who everybody goes, especially when it's memory everybody has to be tracked has to be like there has to be a chart, there's a form, you have to show that you're taking care of that person you're monitoring Harvey and doing because now they get to that level where they depend more on the care team than on themselves. So that's every shift the the date the instructions and tasks for them to do.	scenario（when/how/who/where/frequency）		
Know, I think what is most important is that is missing is that it is too it's good for the nurses. But it's not intuitive for the caregiver. Because I feel like so let me go you got yourself on our it's on the top, you need to make it easy for the caregiver, to be able to put in the data that you want, the way we have it set up, I think it's a little bit too complicated. For them, like by the time you get to the by the time you get to, you know, this is James, these are the tasks and this is what you know, and how to input the data data of what you find today. I feel it could be more user friendly. So that, you know, for the most part caregivers and not very, not everybody but for the most part, they're not very academically or they're not very educated, you know? So they just have that instinct of being knowing how to care for a person and taking care of a person. So when you have too much technology for them, then then they have to figure out how to get to that level. Then you want no they either. Do not give you the exact record that you want. because it's too much too cumbersome for them to get to. So you're not getting something that's accurate. And then you're also adding more tasks that you're adding to them that they don't necessarily see you know it. So you want to make it more user friendly. So I feel that's that's.	Functionality/Features	Pain point	Need/Expectations
So yeah, so we, we always ask them to clarify. You know, please make it as simple as possible, you know, and sometimes they'll break it down. Sometimes it'll make it so much easier, so that anybody, not necessarily very highly trained can be able to read and understand what is expected and be able to put that in there. There has to be constant communication with the doctor. As far as somebody's progress is concerned.	Need/Expectations		
Yes. So we have to so everybody, the way we are set up here, everybody has the kind of their own personal doctor. So it's each and everybody has their own doctor that we communicate with on as needed basis on a daily basis to try and improve the care, you know, and to improve what you do for the for the particular resident.	scenario（when/how/who/where/frequency）		
User: Um, I think that generally, Alzheimer's, dementia is still not understood by many even like for doctors.			

Database


Amazon RDS
xrj-warehouse
概要
连接和安全性


Structure
Content
Relations
Triggers
Table Info
Query
TABLES
in_stock
interview
out_stock
product
product_stock
sentence
INDEXES
TABLE INFORMATION

Consideration



Hardware Selection & Battery Life

- Tested multiple components and battery types
- Ensured long battery life, minimizing recharge needs

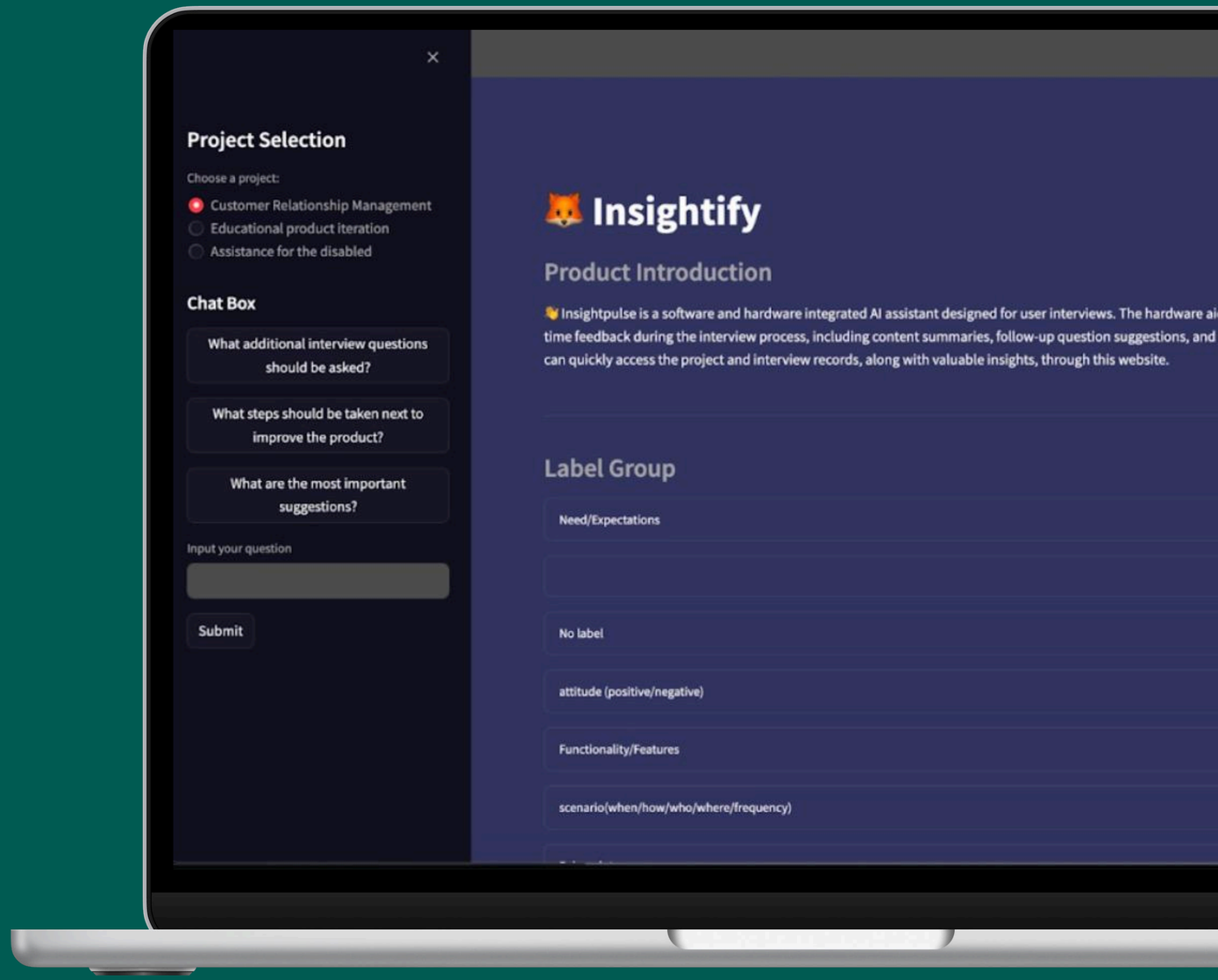
Device Size & Interaction

- Optimized for portability and ease of use
- Simplified design to keep users focused on the interview

Software Design

1 Project Management

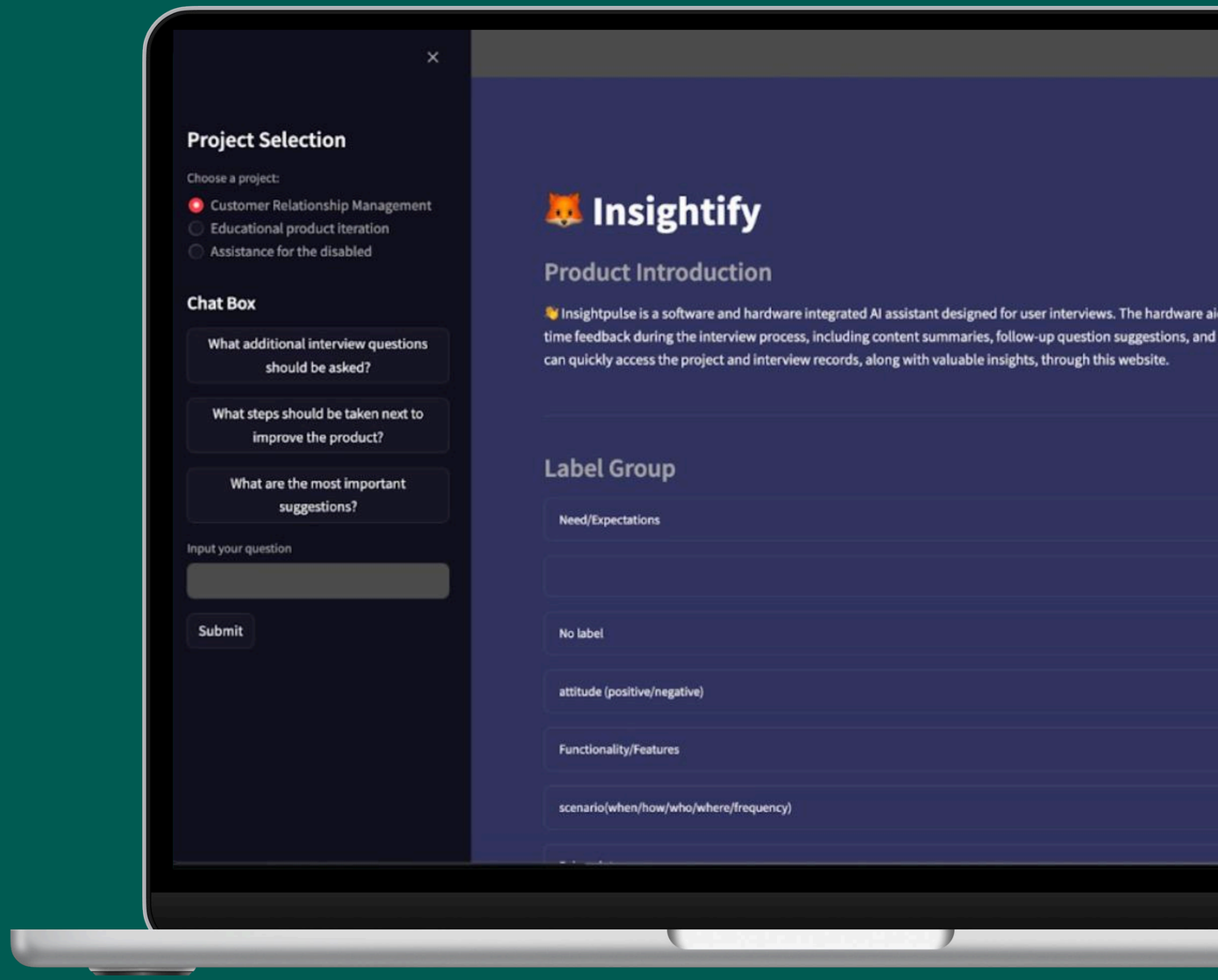
- Secure access
- Overall project summary for insights across all interviews.



Software Design 2

2 Customizable Analysis

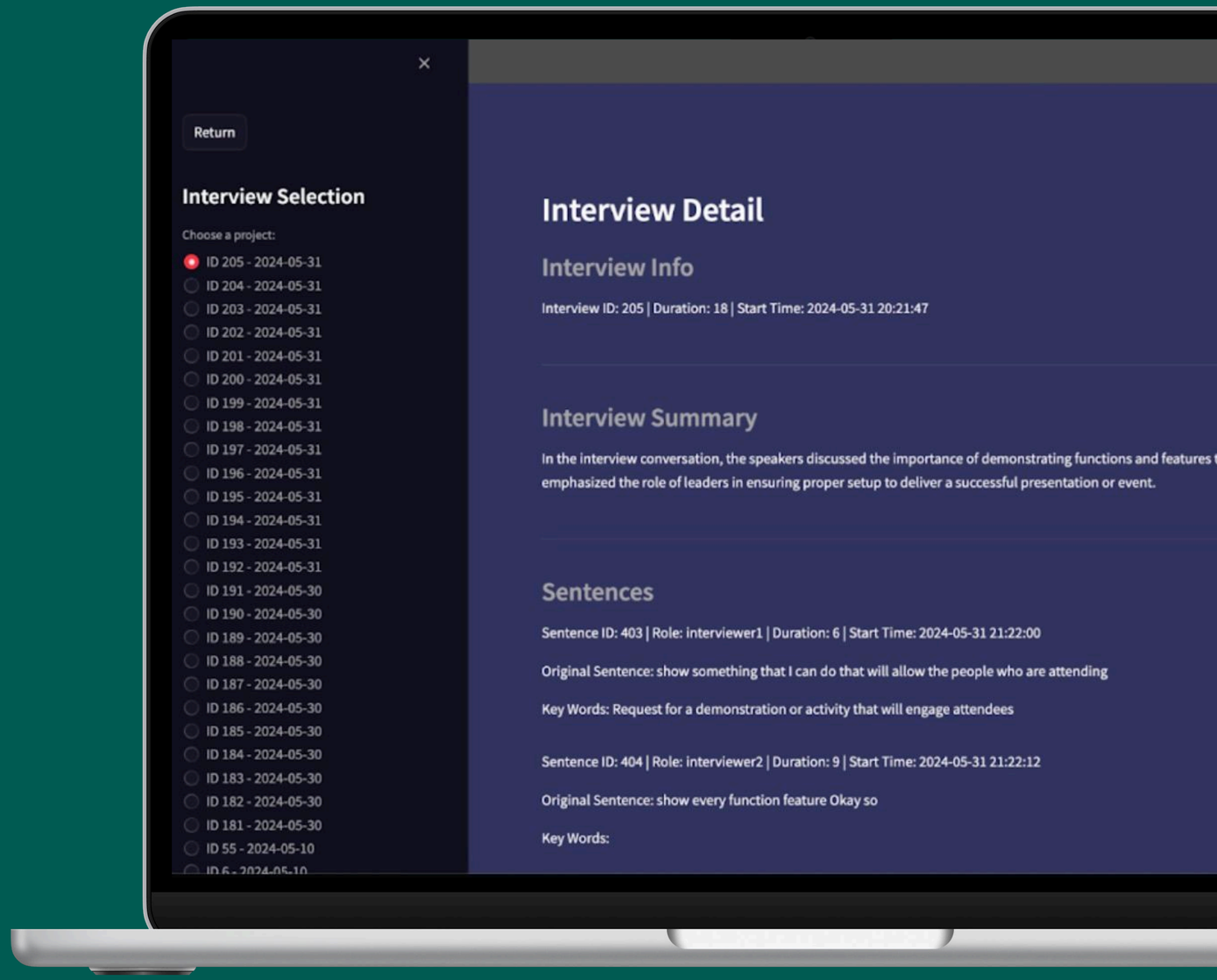
- Project-specific goals and analysis tags tailor insights to unique research needs.



Software Design

3 Cloud Storage

- Secure AWS cloud storage enables quick access, search, and cross-project analysis.



Testing and Result

Enhancing Interview Efficiency and Quality Through Real-Time, AI-Driven Support

Test & Results

We compared two groups of interview data—one analyzed using traditional methods and multiple tools, and the other using InsightPulse with real-time assistance.

Key Points:

Post-Interview Processing: Reduced from 8 hours to 5 minutes with similar analysis quality.

Improved Question Flow: Real-time suggestions minimized repetitive and unclear questions, shortening interview duration..

Cost and Scalability

Enhancing Interview Efficiency and Quality Through Real-Time, AI-Driven Support

Cost and Scalability

Component	Unit Price (USD)	Units	Total (USD)
5-inch Screen	17.00	1	17.00
Raspberry Pi 5	70.00	1	70.00
RFID Module	0.95	1	0.95
Touch Sensor	0.50	1	0.50
Enclosure	2.00	1	2.00
		Hardware Total =	**90.45**
HW API	0.04	≈ 100	4.00
SW API	0.04	≈ 100	4.00
Hosting (AWS)	0.01	2	0.02
		Software Total =	**8.02**
		Total Cost =	**98.47**

Hardware: ~$90.45
Software: ~$8.02
(approximately 100 sets)

- Cheaper
- Easily adaptable

Conclusion

Exploring the Latest Innovations Visuals

Limitation

Reliance on External AI Models

Currently uses OpenAI's API instead of a custom-trained model, which may limit adaptability to specific user research needs.

Preliminary Hardware Design

The current hardware serves as a prototype, acting as a mediator for user interviews, but lacks the user-friendly design needed for optimal interaction.

Limited Applicability in Unstructured Interviews

Best suited for structured interviews; may struggle with vague emotions or complex contexts in free-form interviews.

Future Work

Develop In-House AI for Privacy and Flexibility

Develop in-house AI algorithms to enhance data privacy, scalability, and customization, reducing reliance on external providers.

Implementing Local Processing for Enhanced Security

Use devices like Raspberry Pi for offline data processing to boost privacy and reliability with secure, on-device analysis.

Upgrading Hardware for Versatile Research Needs

Integrate hardware such as cameras for capturing user actions and high-quality microphones, paired with intuitive controls, to support a range of research scenarios.

Broadening the Dataset for Greater Robustness

Test with diverse UX data to ensure system stability and performance across varied research contexts and interview settings.

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Thank You

Q&A Is there any questions I can answer?

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Contextualization