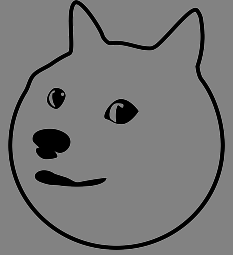


DogeWalk: a companion

Mid-term Presentation

Team 7

Byeonghyun Ko
Minhee Han
Minjae Kim
Changjin Jeong

GENERAL OVERVIEW

PROJECT OVERVIEW

- **GOAL:** encourages the **visually impaired people** to move
- **HOW:** gives them **the motivation** to go out and move
- **MAIN FOCUS:** works like workout applications, but has different focuses
- **IMPLEMENTATION:** **an android app** that **records** the user's activities and provides the summary of the activities

TARGET USERS AND THE PROBLEM

Target users: Visually impaired people

Problems

- **The right of mobility** has been an issue recently, but still no consideration of visually impaired people
- Visually impaired people are not only physically restricted, but also mentally restricted due to the immobility → out project aims at **encouraging them to move**
- **The vicious cycle**: bad accessibility → low mobility of disabled people → less care for disabled people → bad accessibility → .....
- Social changes and infrastructural improvements are needed, but **this side of the approach is also needed**

MAIN CHANGES FROM THE ORIGINAL PROPOSAL

Originally:

- Focused on the technical aid
- **Aid-centric**
  - Helping people “while they move”
- Basically a navigation service

Changed to:

- Focuses more on the ‘non-technical’ features
- **Motivation-centric**
  - Helping people “to move”
- Removed the navigation feature

KEY SOLUTIONS

- **How can we motivate them?**
- Gamification and quantification
  - records of activities
  - that includes photos and their automatically generated captions
  - leaderboards and achievements

even this small thing can work

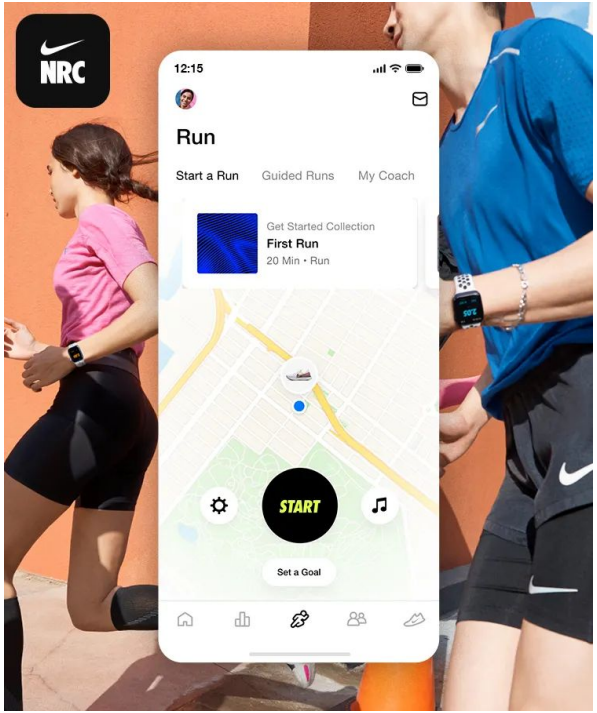
KEY SOLUTIONS

- **How can we motivate them?**
- Socialization
  - recommendations of good locations for visually impaired people
  - share records and photos on social media
  - “I’ve been to these places, I came this far today”

we love this

KEY SOLUTIONS

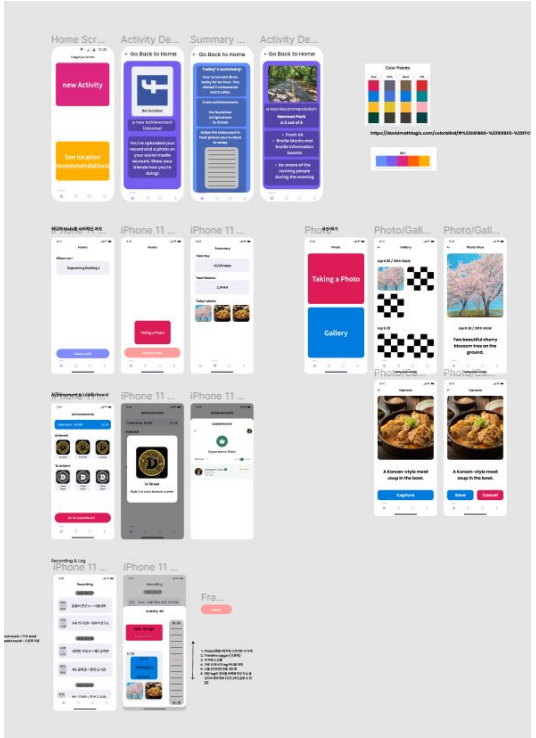
- **How can we motivate them?**
- make the application easily accessible
  - Use of TTS / voice recognition
  - Most of the visually impaired people still have a little vision left, so the application should be designed in an accessible way



Not an ideal UI for visually impaired people

GENERAL UX DESIGN

- The focus on the UX aspects
  - because it’s **important**
- Screen-reader friendly UI designs
  - Minimize the unpredictable touch flow
  - The main screen can be used with only vertical swipes
- Color-blind friendly color schemes



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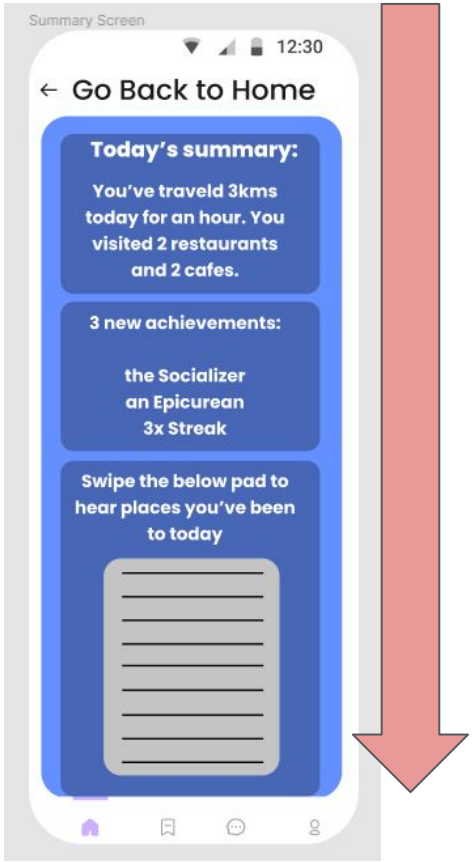

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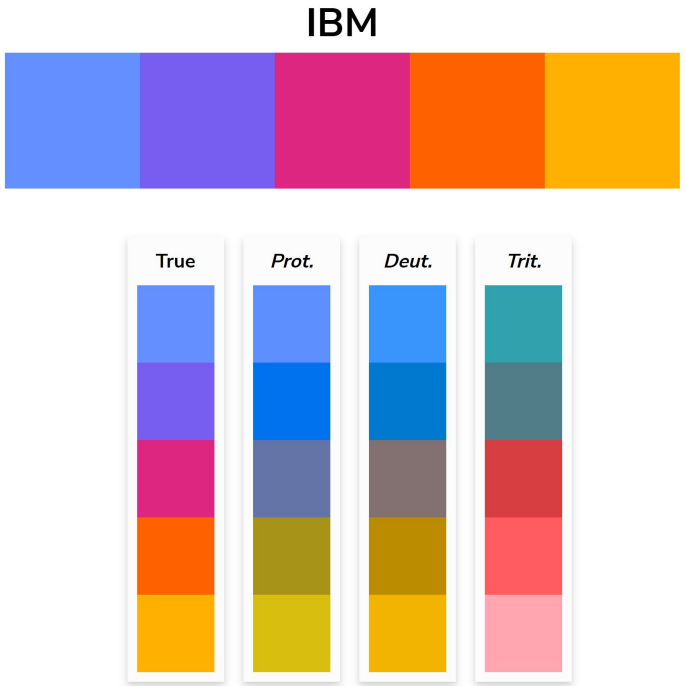
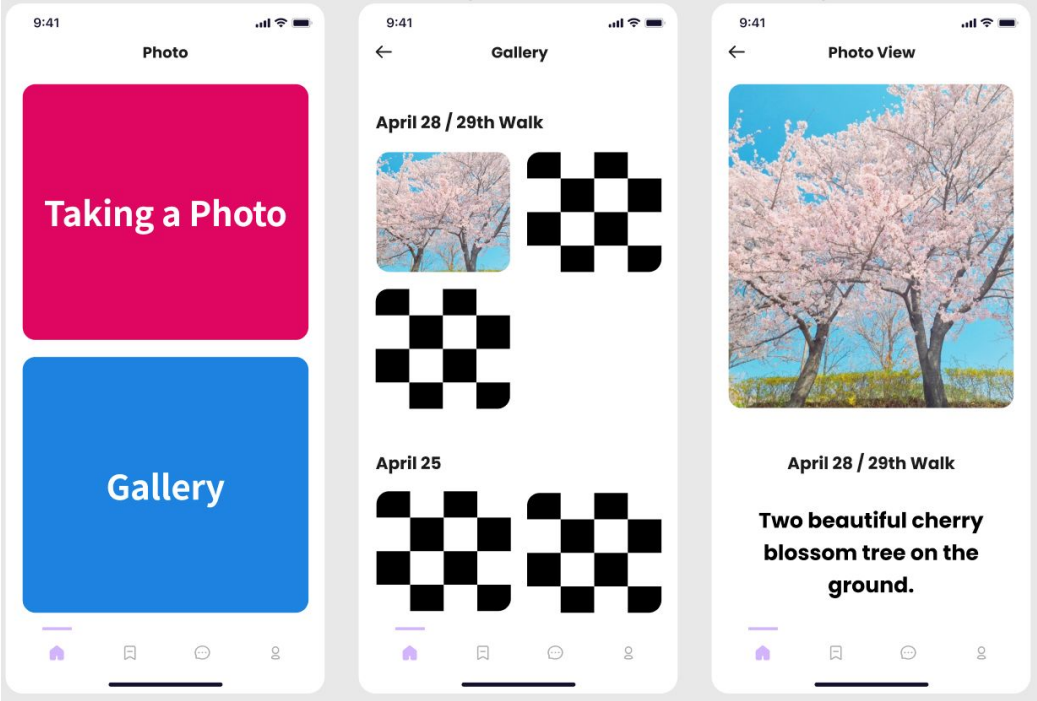


DEMO

KEY FUNCTION DEMOS

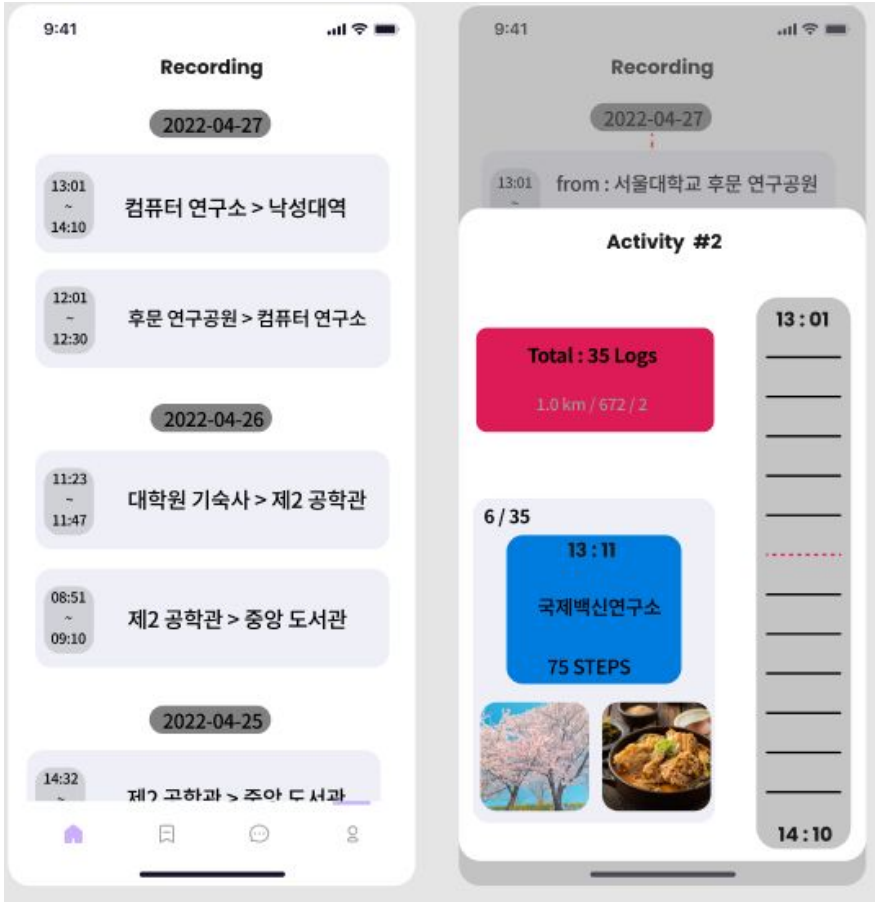
KEY FUNCTION DEMOS

- Implemented features
  - **Taking a photo with image captioning**



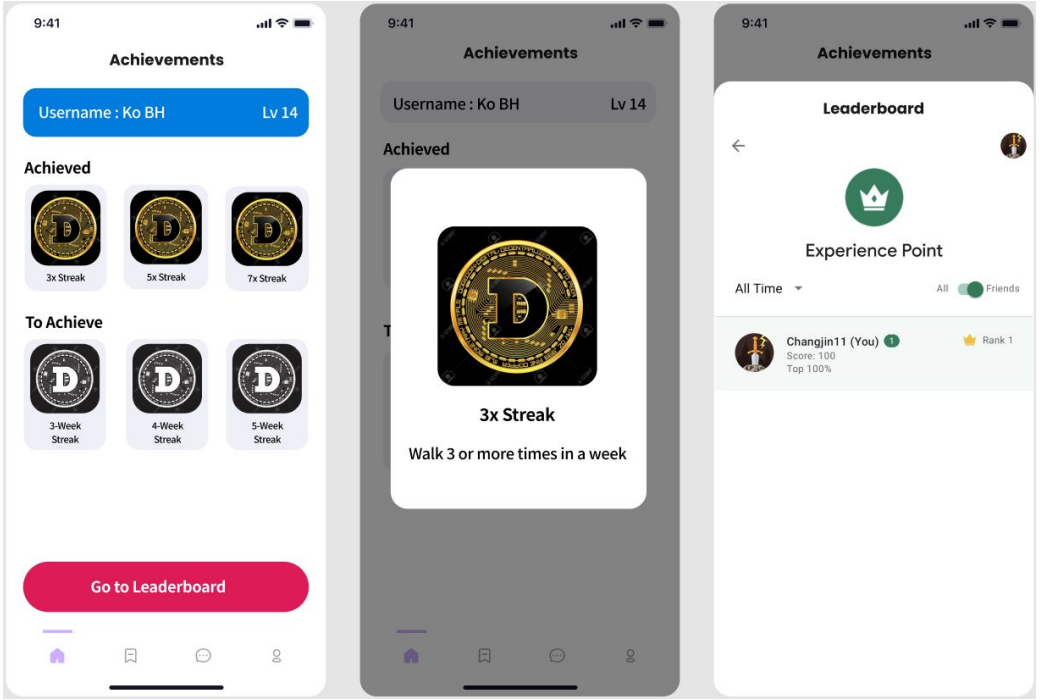
KEY FUNCTION
DEMOS

- Implemented features
  - Taking a photo with image captioning
  - **Records a walk and save on database**



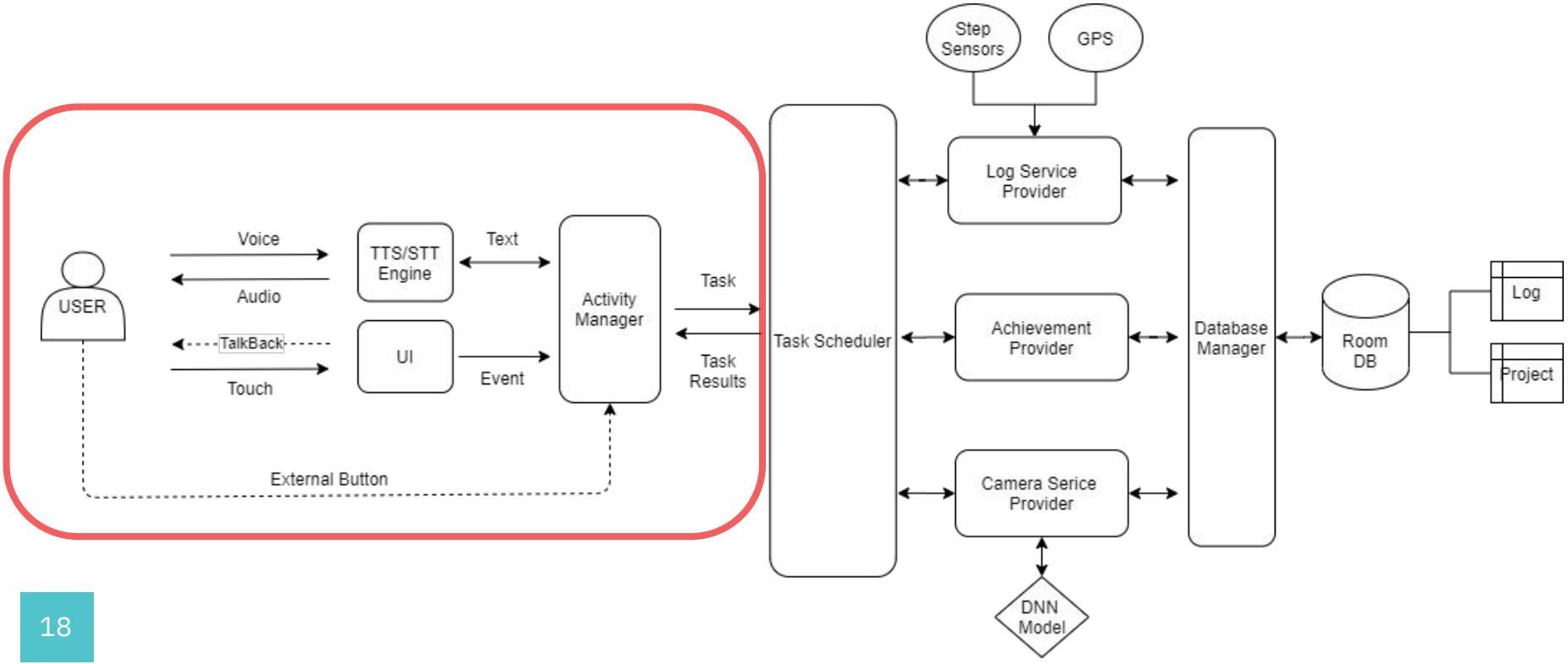
KEY FUNCTION DEMOS

- Implemented features
  - Taking a photo with image captioning
  - Records a walk and save on database
  - **Achievements and Leaderboard**

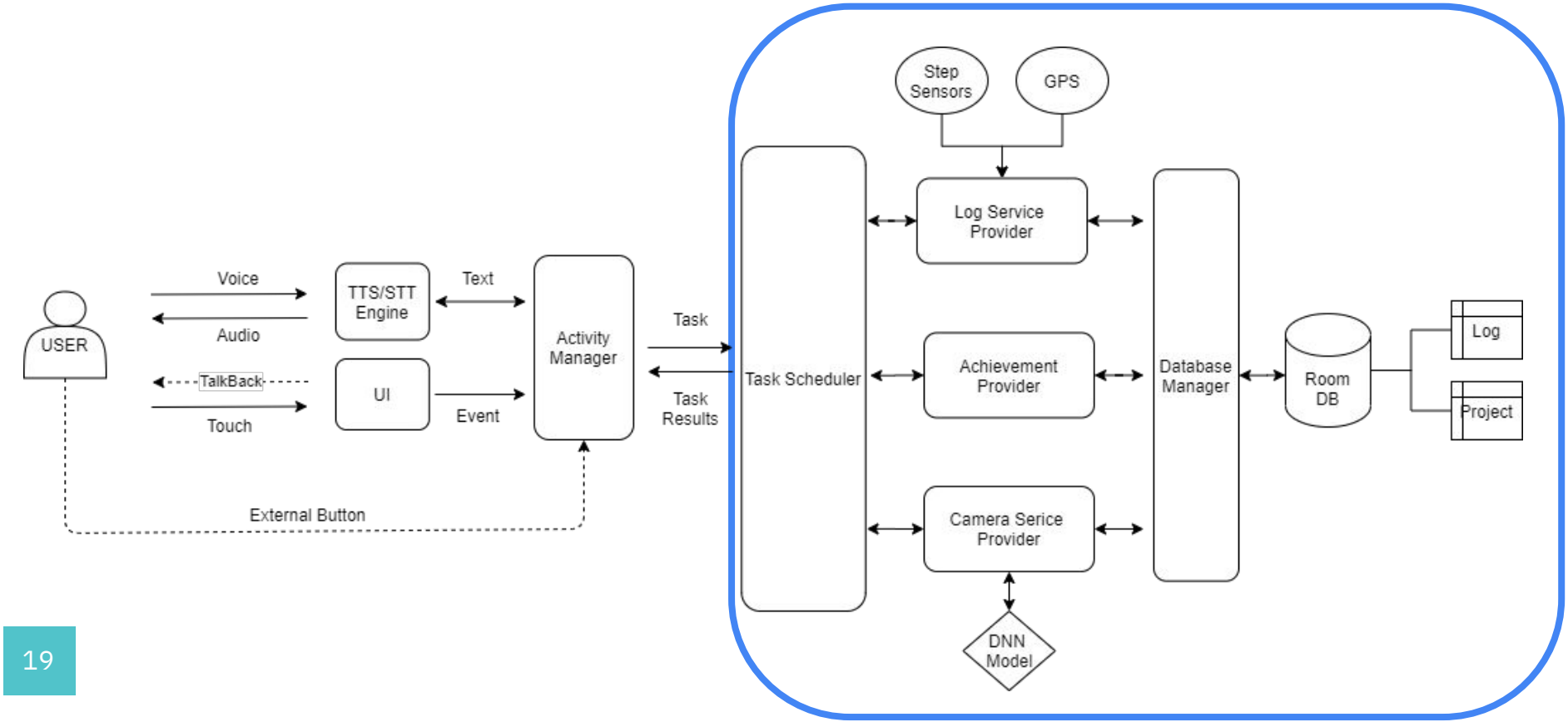


TECHNICAL DETAILS

SYSTEM DESIGN OVERVIEW (FRONTEND)

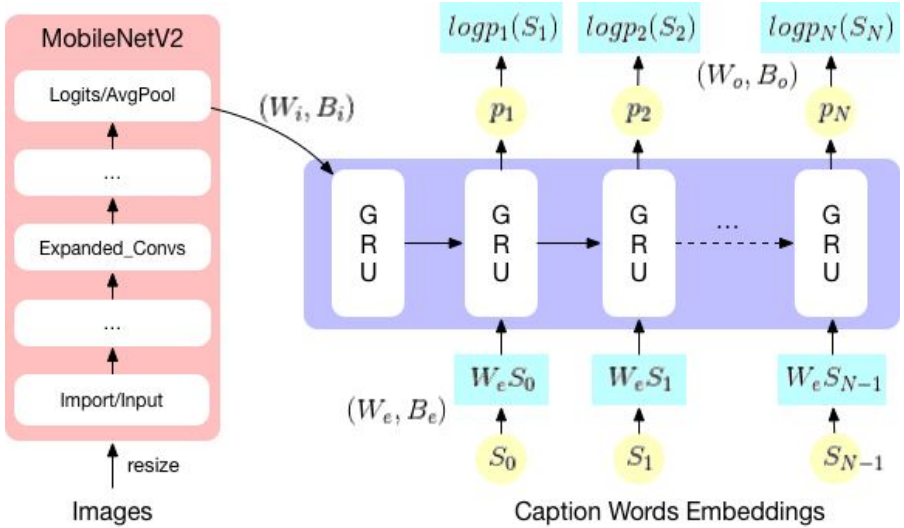


SYSTEM DESIGN OVERVIEW (BACKEND)



SYSTEM DESIGN OVERVIEW (DNN)

- We use MobileNetV2 and GRU
- Thanks to the mobile-friendly DNN architecture, we achieve near-real-time performance (15fps)



KEY TECHNIQUES

- **TTS / STT**
  - Android provides the Google TTS engine
    - available online/offline
    - the system-wide TTS engine is used
    - personal pitch / speed can be set
- **TalkBack screen Reader**
  - Android’s feature
    - reads the text contents when touched
    - double touch will execute the normal “touch” behavior

KEY TECHNIQUES

- **Image Captioning**
  - Android CameraX API
    - provides flexible support for various devices and Android versions
    - camera frame streaming & analysis
  - Tensorflow Lite
    - used for DNN inference
    - MobileNetV2 + GRU architecture (w/ 22 unrolled output tokens)
    - COCO Image Caption dataset is used to train the model

KEY TECHNIQUES

- **Recording**
  - CPU consuming works
    - Using additional background threads
  - Periodically update value and log data
    - GPS
      - Recording coordinates (latitude & longitude)
      - Convert to local address using Geocoder API
    - Step counter
      - Recording total count and section count

KEY TECHNIQUES

- **Achievements & Leaderboard**
  - Adopts Play Games Services API
    - seamless sign-in procedure with google accounts
    - easy achievement design
    - leaderboard to reflect users’ progress automatically

PROJECT PLAN & CRITERIA

PROJECT PLAN (1/2)

Task	Worker	3/28-4/3	4/4-4/10	4/11-4/17	4/18-4/24	4/25-5/1	5/2-5/8	5/9-5/15	5/16-5/22	5/23-5/29	5/30-6/5	6/6-6/12
		W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15
Set up development environment	All	V										
System design (use case & component)	All	V										
PlayStore achievement api check	CJ, BH		V									
Record GPS, step count	BH, MH		V	V								
FrontEnd TTS / STT	MH, MJ		V	V								
Image Captioning model exploration	MJ, CJ		V	V								
Implement Personal photo feature	MJ, CJ				V	V						
Prepare for mid-term presentation	All					V	**5/3**					

PROJECT PLAN (2/2)

Task	Worker	3/28-4/3	4/4-4/10	4/11-4/17	4/18-4/24	4/25-5/1	5/2-5/8	5/9-5/15	5/16-5/22	5/23-5/29	5/30-6/5	6/6-6/12
		W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15
Quest planning, success alarm	BH, CJ					V						
Share to SNS feature	MH, MJ											
Implement Daily summary feature	CJ, MH											
Implement Achievement system	CJ, BH								V			
Buffer (Obstacle alarm, Place recommendation)	MJ, MH											
Prepare for final presentation	All											
Project Due	All											**6/6**

FINAL DELIVERABLE & SUCCESS CRITERIA

FINAL DELIVERABLE

- Mobile Application
  - that encourages blind people to move around and be more active in their daily lives

SUCCESS CRITERIA

- General satisfaction from the users (visually impaired interviewees)
- Can image captioning camera capture meaningful memory for users?
- Does achievement/leaderboard module motivate users to be more active?
- Does this app have sustainable amount of power usage?

Thank you! 😀