



Walking Friend

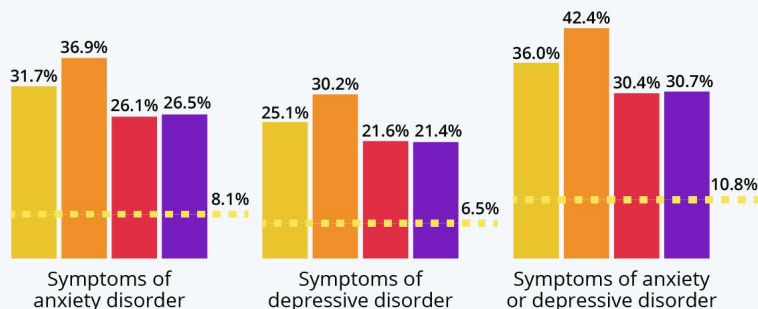
Kim Minji, Jeong Minkyung, Jae Yong Kim, Yeom Joonho

Motivation

Pandemic Causes Spike in Anxiety & Depression

% of U.S. adults showing symptoms of anxiety and/or depressive disorder*

--- 2019 ■ Jun 2020 ■ Dec 2020 ■ Jun 2021 ■ Dec 2021



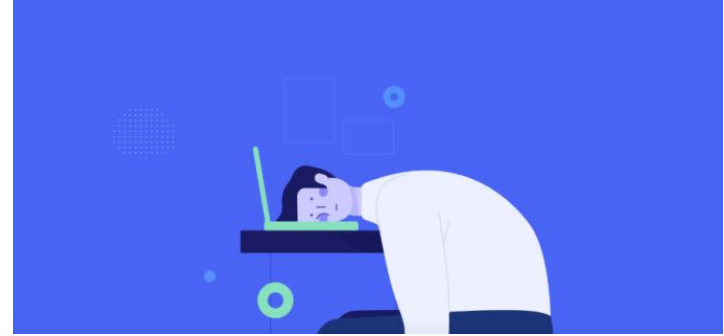
* Based on self-reported frequency of anxiety and depression symptoms. Derived from responses to Patient Health Questionnaire (PHQ-2) and the Generalized Anxiety Disorder (GAD-2) scale.

Sources: CDC, NCHS, U.S. Census Bureau



- The pandemic has made people less likely to be outdoors.
- Indoor lifestyle tends to exacerbate not only one's physical health but also mental health
- People need fun motivation for outdoor activities

Target Users

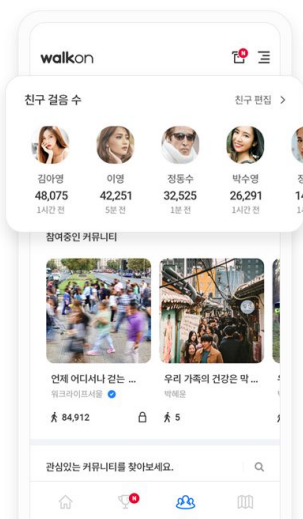


People with **sedentary lifestyle**

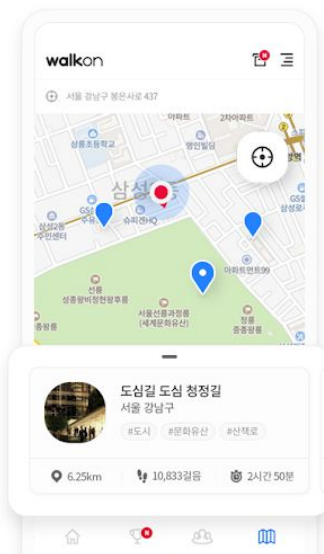
People who want **lightweight, gamified exercises**

Existing Solutions: WalkON

건강으로 하나되는
가족, 회사, 지역 커뮤니티



우리 동네
걸기 좋은 길 추천



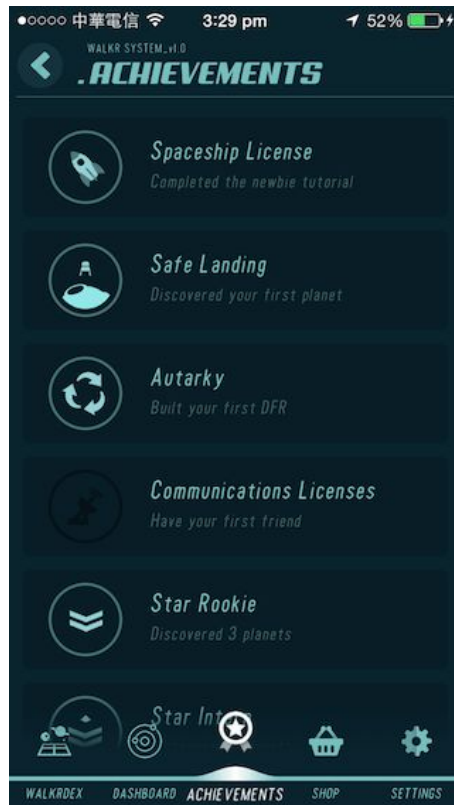
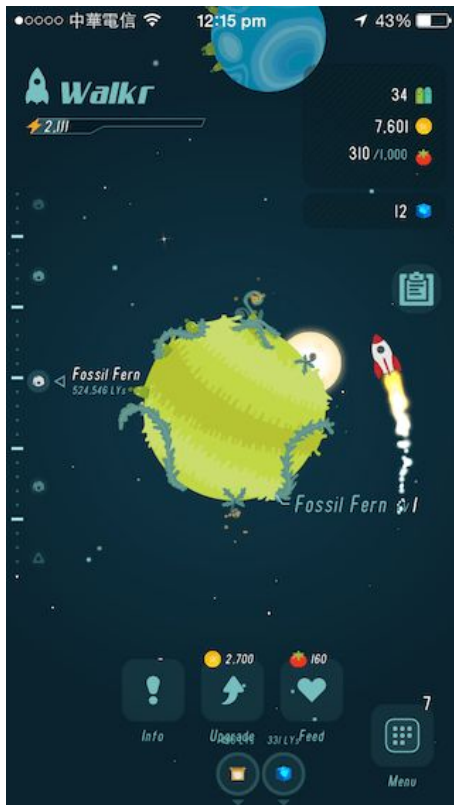
Pros

- Monetary reward from sponsor
- Groups with neighbors or friends
- Track walking history and provide informative statistics

Cons

- Feels like side job

Existing Solutions: Walkr-Galaxy adventure in your pocket



Pros

- Gamification of your walking history
- Compete with your friends

Cons

- Experiences are limited to virtual environment

Existing Solutions: Pokémon GO



Pros

- Through augmented reality, it makes the user more immersed in the activity
- Encourages outdoor activities in natural manner

Cons

- But does not directly motivate the physical activities

Proposed Solution

There's a tree!

Object :
Trees

Scene :
Park

Scene-based
Interaction

Location :
Seoul

Why don't we
get there?

Next Course

Location-based
recommendation

7 km / h

1.1km

Aren't we
walking too
fast?

Walking intensity
management

Usage Scenarios



Turn daily walks into exercises

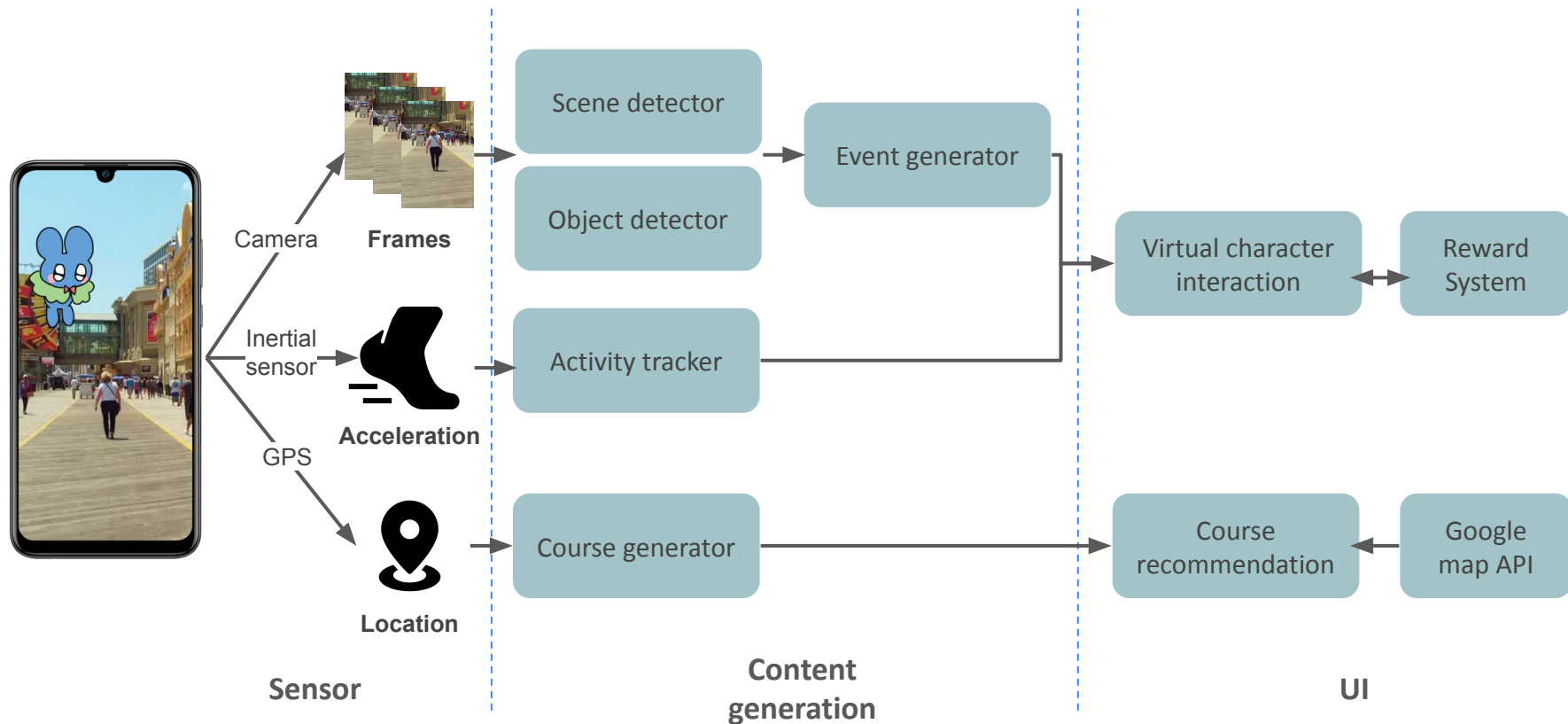
- assistance & recommendations



Turn exercises into gamified experience

- rewards & feedbacks

System Overview



Expected Challenges & Solutions

- Scene recognition performance issues
 - Decreasing image quality due to environments
 - Decreasing accuracy after continuing inference
 - Demands on fast & accurate recognition

→ Careful design to avoid environments decreasing performance

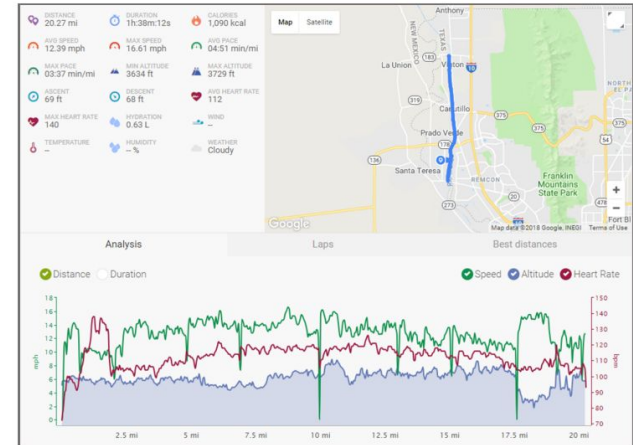
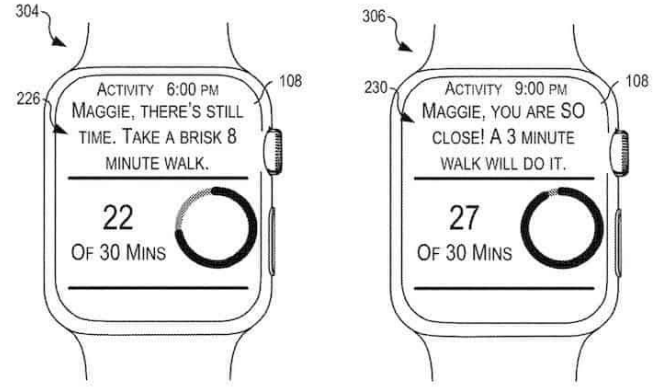
ex) short play at a time, avoiding detection during walking

→ Additional heuristics with fine-tuned models to recognize several target scenes quickly



Expected Challenges & Solutions

- Difficulties of satisfying recommendations
 - Difficulties to fit individual exercise condition
- Personalized recommendation
- Wide customizability



Expected Challenges & Solutions

- Safety issues

→ Design to minimize focusing on screen while walking

Danger detection & alert

Pokemon Go: Major Highway Accident After Man Stops In Middle Of Highway To Catch Pikachu!



MASSACHUSETTS— 26 Year-Old Lamar Hickson is accused of causing one of the worst highway accidents after stopping in the middle of the highway to catch a Pikachu.

Lamar Hickson admitted to police that he was playing the newly released Pokemon app game know as "Pokemon Go" while driving. He said "Sh*t if you wanna catch them all you gotta risk it all so I put my car in park and started tossing these balls".

Evaluation Strategy

- Quantitative evaluation - App usage in 7 days
 - Average play frequency
 - Average playtime
 - Intensity of exercise
- Qualitative evaluation - Semi-structured interview
 - Did the application affect the frequency of walks?
 - Did the application change the walking experience?
 - (e.g., interests, safety, emotion...)
 - Was the application Interesting & Immersive?
 - GEQ, IPQ questionnaires

Project Plan

Tasks	3	4	5	6	7	8	9	10	11	12	13	14	15
Android / Unity Development Study	ALL	ALL											
UI design		ALL											
UI implementation		MJ, JY	MJ, JY										
Build interaction contents and walking courses			ALL	ALL									
Location-aware interaction implementation				MK	MK								
Object Detection model implementation				JY, JH	JY, JH								
Feature integration						ALL							
Mid-term presentation							MK, JY						
Scene-aware Interaction								MJ, MK	MJ, MK	MJ, MK			
Reward & reporting system implementation									MJ, JY	MJ, JY			
Performance Optimization									JH	JH			
Evaluation & Regression										ALL	ALL		
QA											ALL	ALL	
Presentation & Demo													ALL

Final Deliverable

- Complete, playable application
 - Confirm playtest in Seoul Natl.University campus
 - Full main features
 - Scene detection
 - Location-based course recommendation
 - Walking management
- Complete Evaluation Study
 - Gameplay test for 7 days
 - Semi-structured interview results



References

- [1] [Impact of coronavirus pandemic on mental health](#)
- [2] [WalkON](#)
- [3] [Walkr - Galaxy Adventure in Your Pocket](#)
- [4] [Pokémon GO](#)
- [5] [Outdoor Scene Classification Using Labeled Segments](#)
- [6] Ni, Jianmo, Larry Muhlstein, and Julian McAuley. "Modeling heart rate and activity data for personalized fitness recommendation." The World Wide Web Conference. 2019.

Proposed Solution

- Contextual walking guidance with gamification
 - Scene-aware interaction
 - Location-aware interaction
 - Reward system
- Course recommendation, interaction with surrounding objects based on the location.
- As walking along the course, the user plays and interacts with the virtual character
- Based on scene detection and localization, the context will continuously change

Features

- Scene detection 기반으로 음악 추천
- 코스 추천
- Virtual Character
 - object detection 기반으로 주변 사물과 scene-aware interaction
 - Rewards - 산책 목표 달성으로 캐릭터 키우기

Solutions

- Lightening model through the quantization
 - int8 post-training quantization with small amount of data
- On-demand Inference, utilize the geolocation information as much as possible
- Danger region alert

Expected Challenges & Solutions

- Battery shortage due to continuing scene detection
 - Lightened model through the quantization
 - int8 post-training quantization with small amount of data