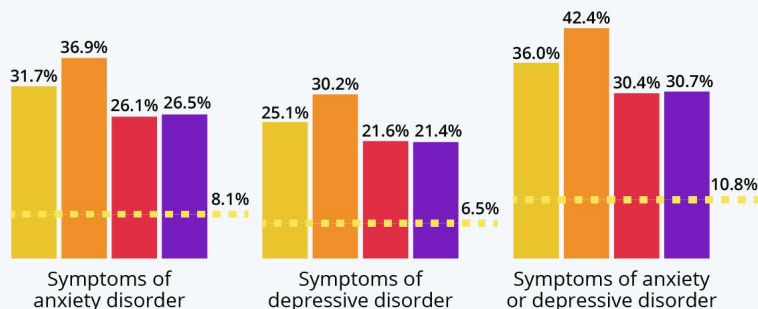# Walking Friend

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

Symptoms of anxiety disorder: 31.7%, 36.9%, 26.1%, 26.5%, 8.1%

Symptoms of depressive disorder: 25.1%, 30.2%, 21.6%, 21.4%, 6.5%

Symptoms of anxiety or depressive disorder: 36.0%, 42.4%, 30.4%, 30.7%, 10.8%

* 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

statista

- 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

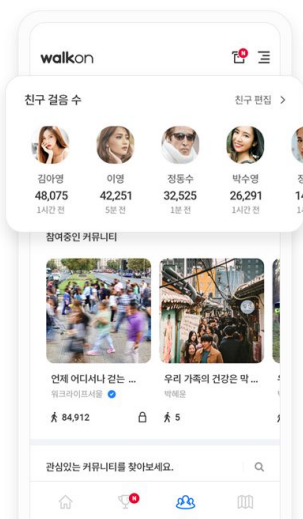- People need fun motivation for outdoor activities

2
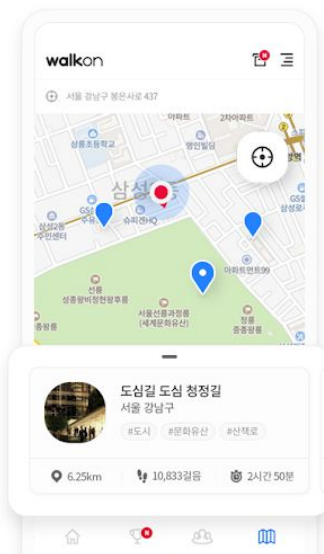
# Target Users
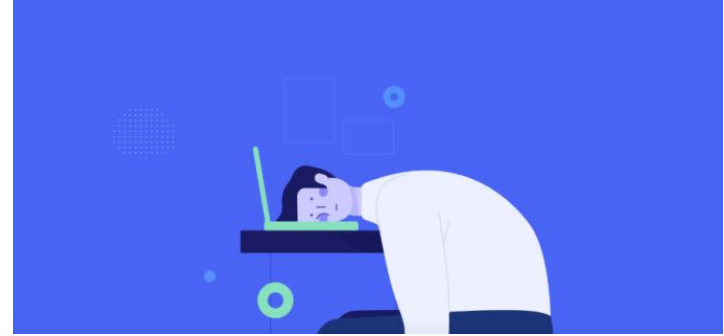
People with sedentary lifestyle

People who want lightweight, gamified exercises
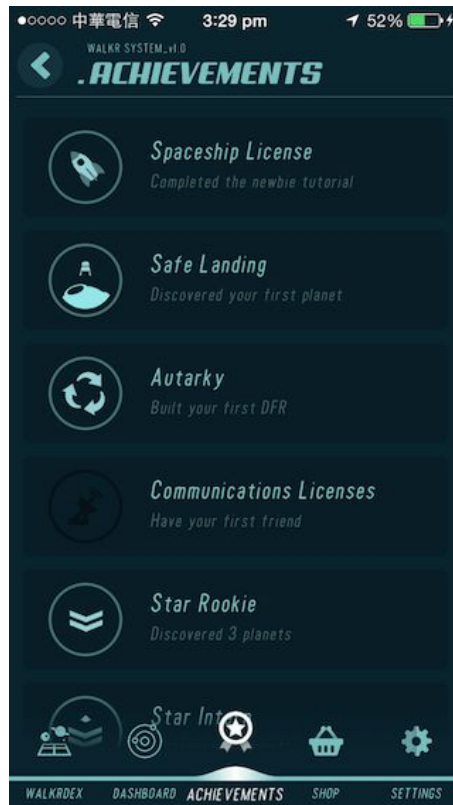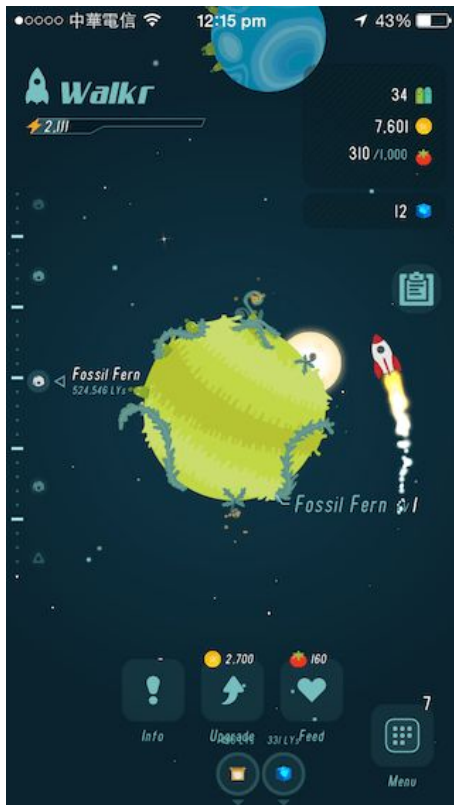
# Existing Solutions: WalkON



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 augment 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

# Usage Scenarios



How about trying a different course?

Turn daily walks into exercises

- assistance & recommendations

You've walked a lot!
* 20 coins *

Turn exercises into gamified experience

- rewards & feedbacks

# System Overview



**Sensor**

Camera → **Frames**

Inertial sensor → **Acceleration**

GPS → **Location**

**Content generation**

Object detector → Event generator

Activity tracker

Course generator

**UI**

Music recommendation ← Music API

Virtual character interaction ↔ Reward System

Course recommendation ← Google map API

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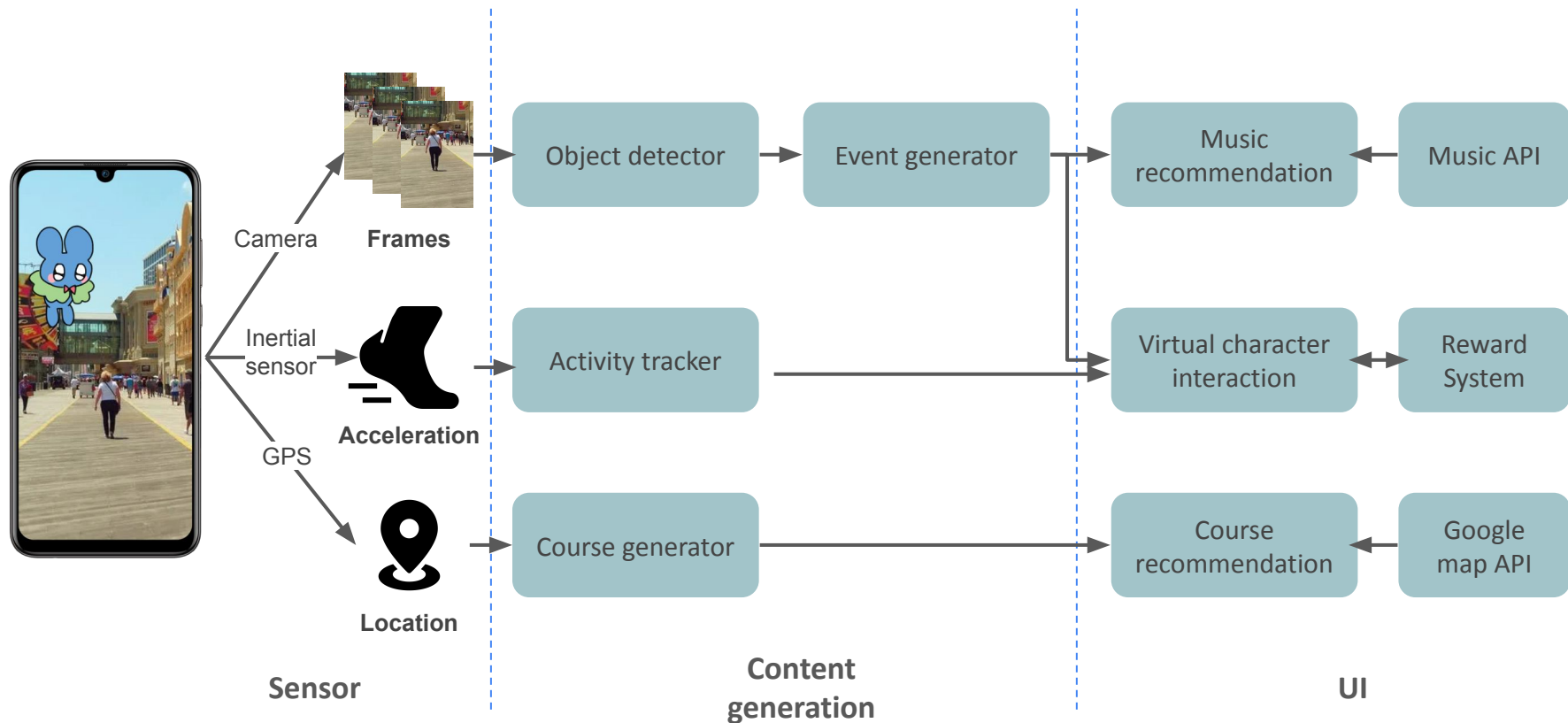
# Expected Challenges & Solutions

- Performance of Scene detection

    → On-demand Inference

        Utilizing geolocation information

        Careful interface design

# Expected Challenges & Solutions

- Difficulties of satisfying recommendations?

    →

# Expected Challenges & Solutions

- Safety issues

  → Design to minimize focusing on screen while walking

  Danger detection & alert

# 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 |

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# 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

# 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

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# 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