MICHIGAN STATE UNIVERSITY

Project Plan Presentation

Smart Personal Trainer

The Capstone Experience

Team Launch

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From Students…
…to Professionals

Project Sponsor Overview

- Software contracting company that designs applications for corporate clients
- Established in 2023 as a branch of NTT
- Worked with Adidas, Jeep, Robinhood, UPS, etc..
- Specializes in AI, Data Services, and Cybersecurity



Launch
by NTT DATA

Project Functional Specifications

Problem

- Many people find exercising confusing and intimidating
- Lack of feedback makes it hard to know if exercises are done correctly

Solution

- An AI-powered workout coaching application that tracks exercises and analyzes user movement
- Provides real-time feedback on exercise form using computer vision

Impact

- Helps users exercise more safely and efficiently
- Supports a wide range of workouts, including strength training, cardio, and yoga
- Adapts workouts over time based on user performance and progress

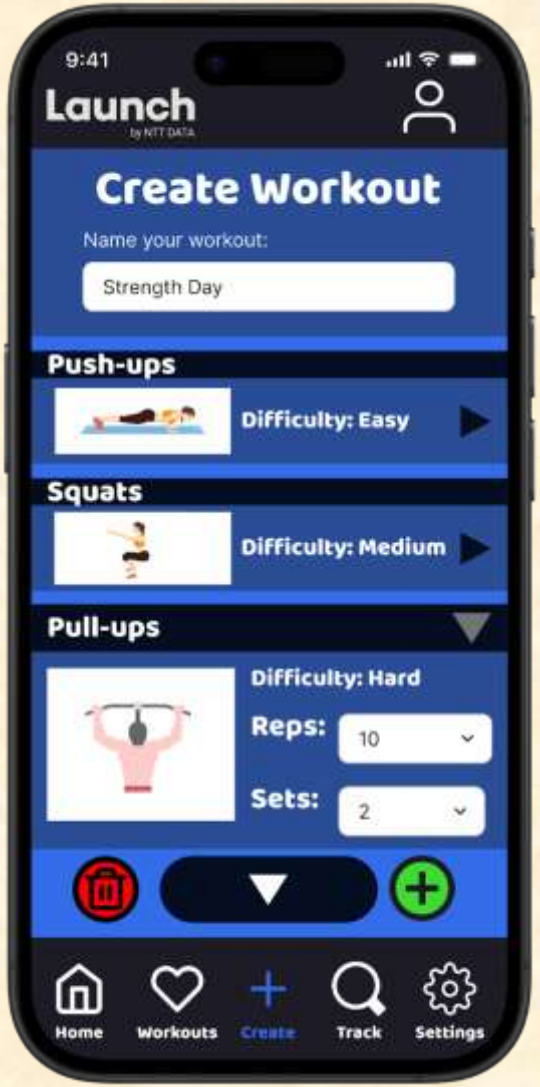
Project Design Specifications

- User-Friendly Interface
- Pose Estimation Feedback Loop
- Adaptive Workout Recommendation System
- Long-Term Progress Tracking

Screen Mockup: Home Screen



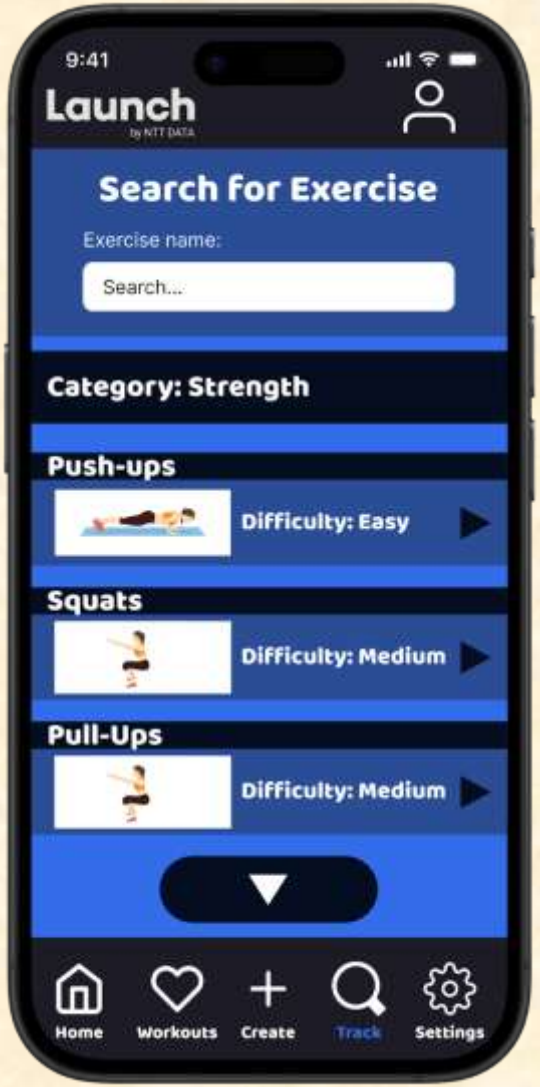
Screen Mockup: Create Workouts



Screen Mockup: My Workouts



Screen Mockup: Track Exercise



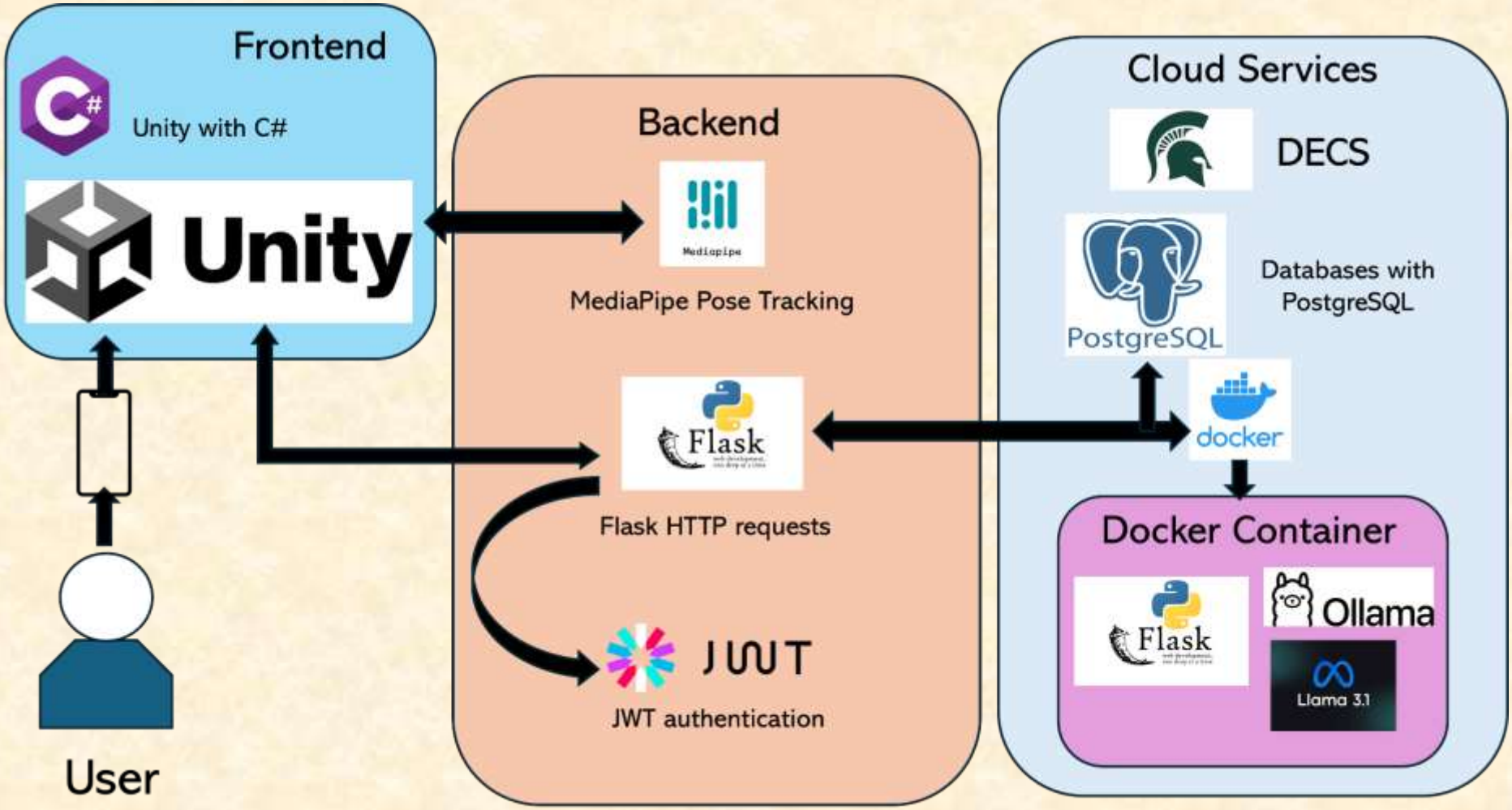
Screen Mockup: Exercise Feedback



Project Technical Specifications

- Mobile application
- MediaPipe Analysis of Pose Estimation
- Flask based APIs
- Llama 3.1 hosted locally for LLM suggestions
- Deployed on cloud based virtual machine

Project System Architecture



Project System Components

- Hardware Platforms
  - Mobile device (Android/iOS)
  - Development machine (iMac/PC)
  - Michigan State University DECS server
- Software Platforms / Technologies
  - Unity, Visual Studio Code (Python, C#), MediaPipe BlazePose
  - Flask, PostgreSQL, Docker
  - Llama 3.1 model

Project Risks

- Risk 1: Camera Framing
  - Imperfect camera framing can affect feedback negatively
  - Camera framing must meet specific requirements for tracking to begin
- Risk 2: Training Data
  - Lack of proper data for form validation
  - Manually program metrics for form evaluation and test on different users
- Risk 3: BYO Workout AI Suggestions
  - AI LLMs can give improper feedback
  - Use exercise science and user feedback to adjust LLM for balanced feedback
- Risk 4: Exercise Model Animations
  - Visualizing exercises with proper form using models and animations
  - Transforms recorded videos into model animations using joint positions and Blender models

Questions?

