DermAI

Skin disease detection

Team Thunder Buddies Sprint 2

Agenda

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- Retrospective
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- Test Cases
- Demo Video of application

Team Members

Bhargava Chilukuri
Front end developer

Kushal arya neela
Front end developer

Manideep Kumar Reddy Kotha
Backend developer

Jagadeesh Mekhapotula
Backend Developer and Tester

Akshara Uppu
Backend Developer

Sai Praneeth Chagiri
Front-end Developer

Srinath Madagoni
Machine learning engineer

Manoj Kumar Madhavarapu
Machine learning engineer

Improvements after Professor’s Feedback

- Updated the sprint and design
- Team roles updated
- Added more details in personas
- Removal of market analysis
- Detail description on Technologies
- More detailed retrospective
- Addition of link to Wiki Page
- Updated team agreement

Problem Statement

The diagnosis of the dermatological problem is quite complex and requires expert knowledge and accurate results. At present digital solutions lack accuracy and simplicity usage of the application. Thus ,it creates a gap between the human solution and the digital solution. So DermAI comes in place which has a user-friendly interface and employs deep learning to diagnose skin conditions and give precision results. Which empowers everyone from general public to have expert dermatologists in their hands.

Project Description

Project Name:	DermAI
Team:	Thunder Buddies
Project Description:	Derm AI's deep learning technology democratizes dermatology by increasing diagnostic speed, accuracy, and accessibility, all of which improve patient outcomes and save costs. **For** dermatological problem **who** find lack of digital accuracy and usage of application **the** Artificial Intelligence solution **is an** AI based Mobile application **that** simplifies a user-friendly interface and employs deep learning to diagnose skin conditions and give precision results. **unlike** the traditional method of booking an appointment and visiting the dermatologist **our application** empowers everyone from general public to have expert dermatologists in their hands.
Benefit Outcomes:	• Proficient Access: Derm AI empowers the general populace with advanced technology to obtain dermatological diagnoses at the level of experts. • Efficient and Accurate: Implements deep learning techniques to augment the accuracy and velocity of skin condition evaluations. • The provision of a user-friendly platform ensures that dermatological care is readily available to all individuals, irrespective of location. • Enhanced Outcomes: Advocates for improved treatment strategies and enhances the general health and well-being of the epidermis.
Github Link:	https://github.com/htmw/2024S-Thunder-Bubbies

Teamwork Agreement

Team Name: Thunder Buddies
Our goal is to bring collaborative knowledge and skills together for the completion of the Computer Science Capstone Project. Our project might have challenges to tackle and we would overcome challenges and deliver the project on time.
Team Agreement
1.All teammates should share their opinions and even respect each other's opinions. The sharing of information should be transparent, if any of the team members is having any issue, they can react to other team members and try to solve the issue. If any teammates have new ideas and thoughts, they can share in our sprint meetings.
2.Team Members should be responsible for their respective tasks and deliver the required project deliverables before the due date and if they are unable to finish it before the due date, they can reach out to other members.
3.All the roles are given based on your strengths , ideas and commitment and there shouldn't be any conflict between team members regarding roles.
4.Communication between front end, backend and machine learning team should be interactive and weekly 2 meetings will be held one on Wednesday and the other on Saturday and all team members are requested to take part in the team meetings and all communications are done via Slack.
5.If any team member is unable to attend the meeting, then they have to prior inform the scrum master about it, and missing any team meeting is not advisable.
6.All members should equally take part and give their best effort.

PERSONA 1

EMMA
THE BUSY PROFESSIONAL

EDUCATION: JURIS DOCTOR (J.D.) FROM HARVARD

AGE: 29

OCCUPATION: CORPORATE LAWYER

TECH-SAVVINESS: HIGH

NEEDS: QUICK AND RELIABLE SKIN CONDITION DIAGONISES DUE TO HER BUSY SCHEDULE.

PAIN POINTS: LACK OF TIME TO VISIT DERMATOLOGISTS AND THE NEED FOR IMMEDIATE ADVICE ON SKIN CARE.

FITNESS ROUTINE: IN THE MORNINGS, EMMA MAKES TIME FOR 30 MINUTES OF HIGH-INTENSITY INTERVAL TRAINING WORKOUTS OR GOING FOR A JOG AROUND THE NEIGHBORHOOD TO STAY HEALTHY. THESE EXERCISES KEEP HER FEELING ENERGIZED AND FOCUSED THROUGHOUT HER BUSY DAY

PERSONA 2

DAVID
THE RURAL RESIDENT

EDUCATION: BACHELOR'S IN AGRICULTURAL SCIENCE,

AGE: 45

OCCUPATION: FARMER

TECH-SAVVINESS: MODERATE

NEEDS: ACCESS TO DERMATOLOGIST CARE, NEAREST IS FEW HOURS AWAY

PAIN POINTS: GEOGRAPHICAL ISOLATED LOCATION AND RARE COMMUTE TO CITY MAKES IT DIFFICULT FOR REGULAR CHECKUPS.

FITNESS ROUTINE: DAVID'S FITNESS IS ALL ABOUT THE HARD WORK OF FARMING. HIS DAYS ARE FILLED WITH TOUGH JOBS LIKE DIGGING, PLANTING, AND HARVESTING CROPS. THESE DEMANDING TASKS KEEP DAVID ACTIVE AND STRONG. HE DOESN'T NEED A SPECIAL WORKOUT ROUTINE BECAUSE HIS DAILY FARM CHORES PROVIDE ALL THE EXERCISE-HE NEEDS. FOR DAVID, STAYING FIT ISN'T A SEPARATE ACTIVITY BUT JUST PART OF HIS REGULAR WORKDAY. THE PHYSICAL LABOR OF FARMING HE-LPS BUILD HIS ENDURANCE AND MUSCLE POWER.

PERSONA 3

EDUCATION: LIFELONG LEARNER WITH A MIX OF FORMAL EDUCATION AND SELF-TAUGHT KNOWLEDGE.

AGE: 70

OCCUPATION: RETIRED

TECH-SAVVINESS: LOW

NEEDS: EASY TO USE INTERFACE TO CHECK SKIN CONDITIONS.

PAIN POINTS: PREFERS SIMPLICITY AND EASE IN TECHNOLOGY, OFTEN CAUTIOUS ABOUT TRYING OUT NEW DIGITAL TOOLS.

FITNESS ROUTINE: MICHAEL'S FITNESS ROUTINE KEEPS THINGS SIMPLE, YET EFFECTIVE. HE STARTS EACH MORNING WITH SOME EASY STRETCHES. THEN HE HEADS OUT FOR A PEACEFUL WALK AROUND THE PARK. THIS DAILY STROLL LETS HIM STAY ACTIVE AND SOCIALIZE TOO. TWICE WEEKLY, MICHAEL ATTENDS YOGA CLASSES AT THE COMMUNITY CENTER FOR SENIORS. THE CLASSES HELP HIM STAY FLEXIBLE AND STEADY ON HIS FEET. THESE ACTIVITIES ARE KEY FOR MICHAEL'S HAPPY, ENERGETIC LIFESTYLE- AS HE GROWS OLDER.

MICHAEL

THE SENIOR CITIZEN

MVP (Minimum Viable Product)

- Home Screen: Simple UI
- Photo Screen: Upload/Capture
- Analysis Screen: Results
- Profile Screen: User Info
- Login Screen: Authentication

Language and Tools - Frontend

Expo is react native wrapper which makes developing an mobile application faster and it does most of complex just by **npx create-expo-app my-app.**

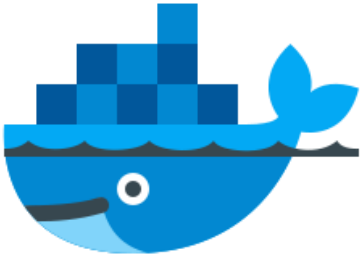
Language and Tools - Backend

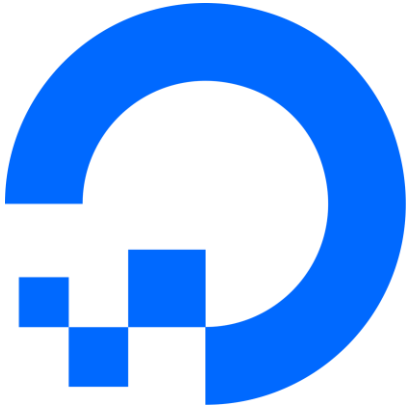
For backend both flask and node js has been used. Flask is mainly to create a machine learning model api which is going to be connected via node js. Node js is mainly used to do basic CRUD operations.

Language and Tools - Backend

Tensorflow is a machine learning framework and it is used to build Image classification model. For this project, tensorflow is used to build skin disease classification model.

Language and Tools - Other technologies





Docker is used for containerizing dependencies which ensures portability, consistency and scalability. Firebase is used for authentication and database where as digital ocean is used of running the backend code and run those apis on cloud then in local machine.

Language and Tools - Design Tools

Those 2 are the design tools and these are mainly used for design UI and for flowcharts. Figma is used for UI design whereas Miro is used for designing charts.

Algorithms

CNN Algorithms:

- CNNs uses layered architecture to process visual data, extracting features through filters for image recognition tasks.

EfficientNet:

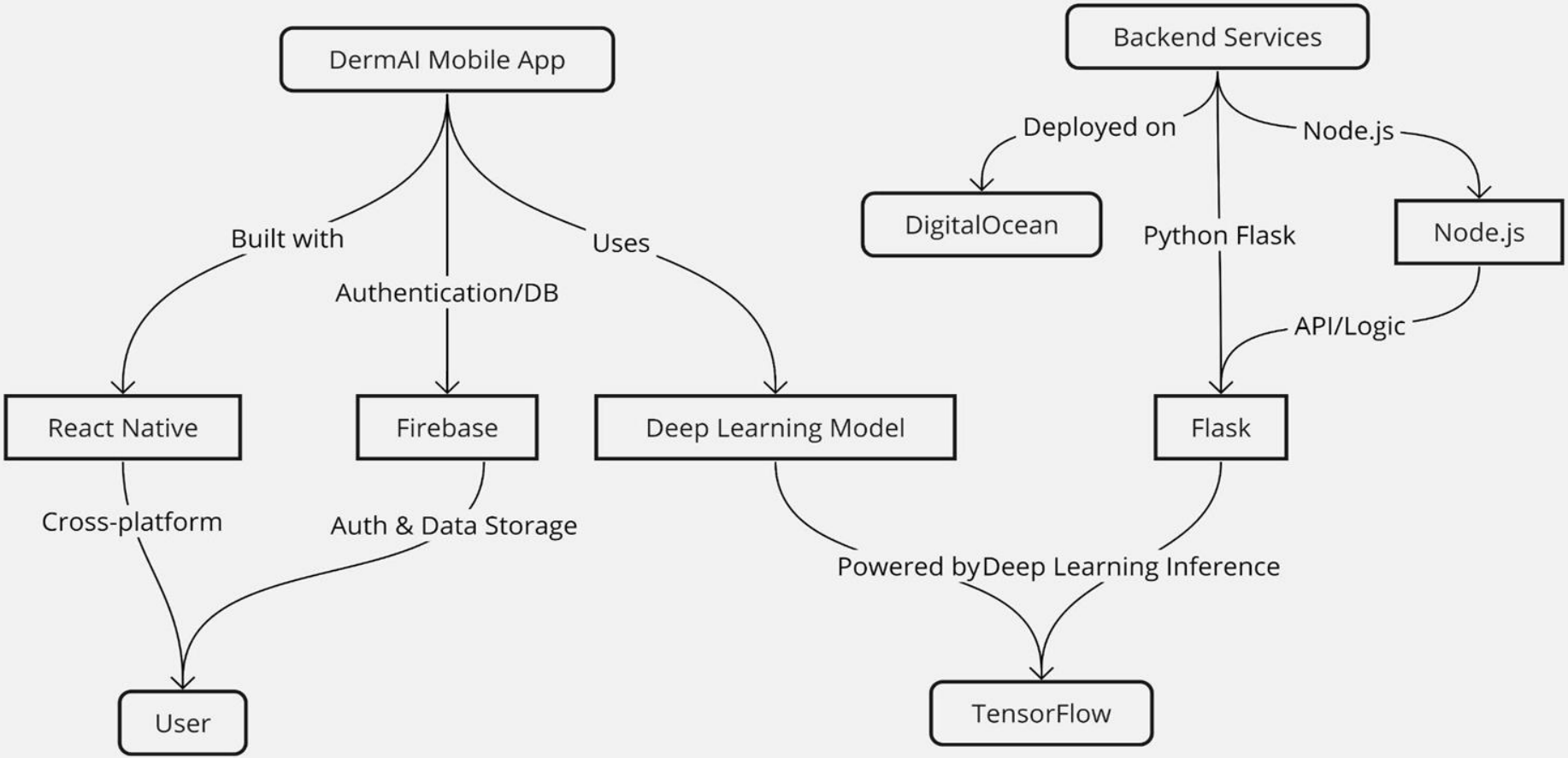
- EfficientNet scales CNNs uniformly across width, depth, and resolution, enhancing efficiency and accuracy.

Pseudo Code: ML

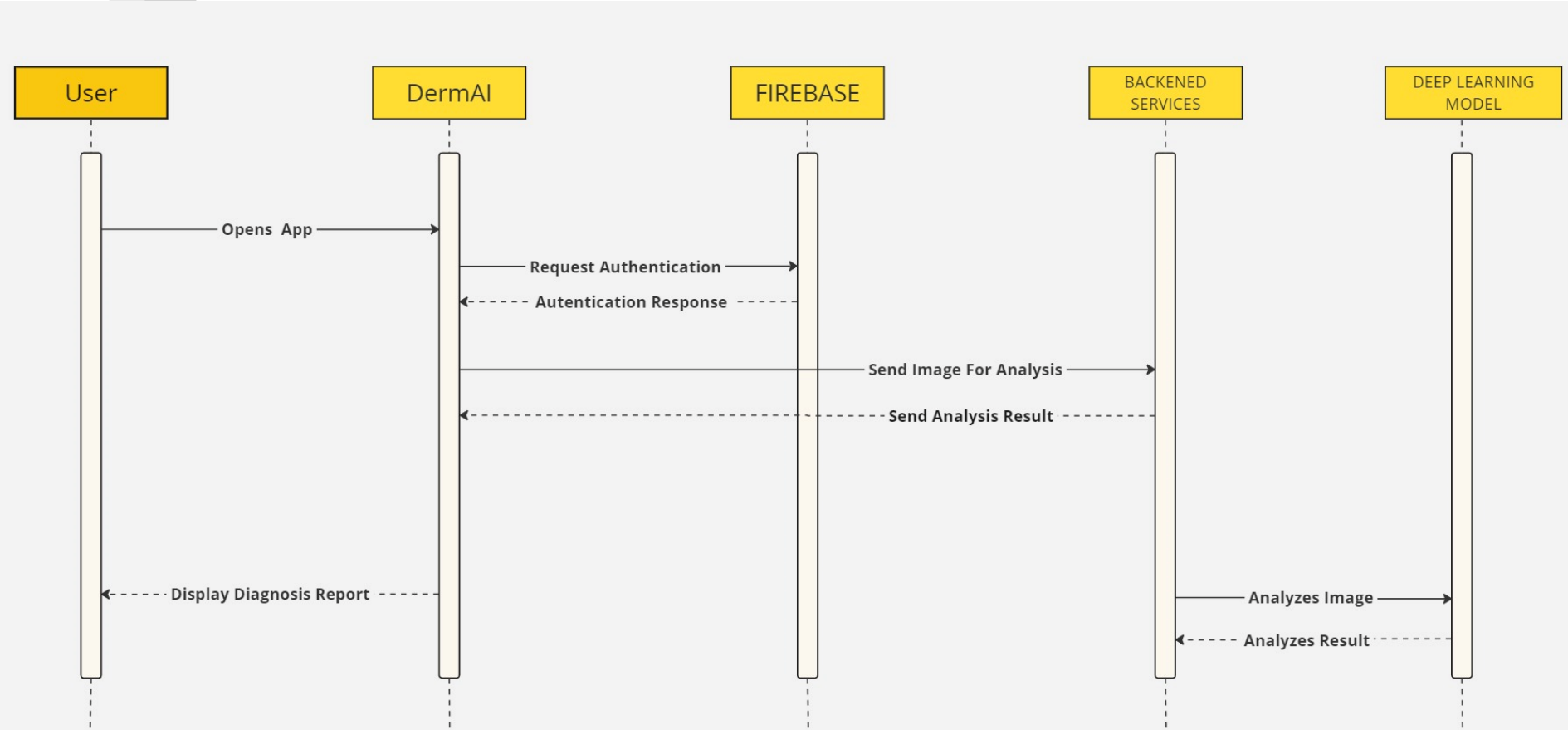
Efficient net pseudo code

```
import tensorflow as tf
from tensorflow.keras.applications import EfficientNetB0
from tensorflow.keras.layers import GlobalAveragePooling2D, Dense
from tensorflow.keras.models import Model

base_model = EfficientNetB0(include_top=False, weights='imagenet')

x = GlobalAveragePooling2D()(base_model.output)
output = Dense(10, activation='softmax')(x)

model = Model(inputs=base_model.input, outputs=output)

model.compile(optimizer='adam', loss='categorical_crossentropy', metrics=
['accuracy'])

model.summary()
```

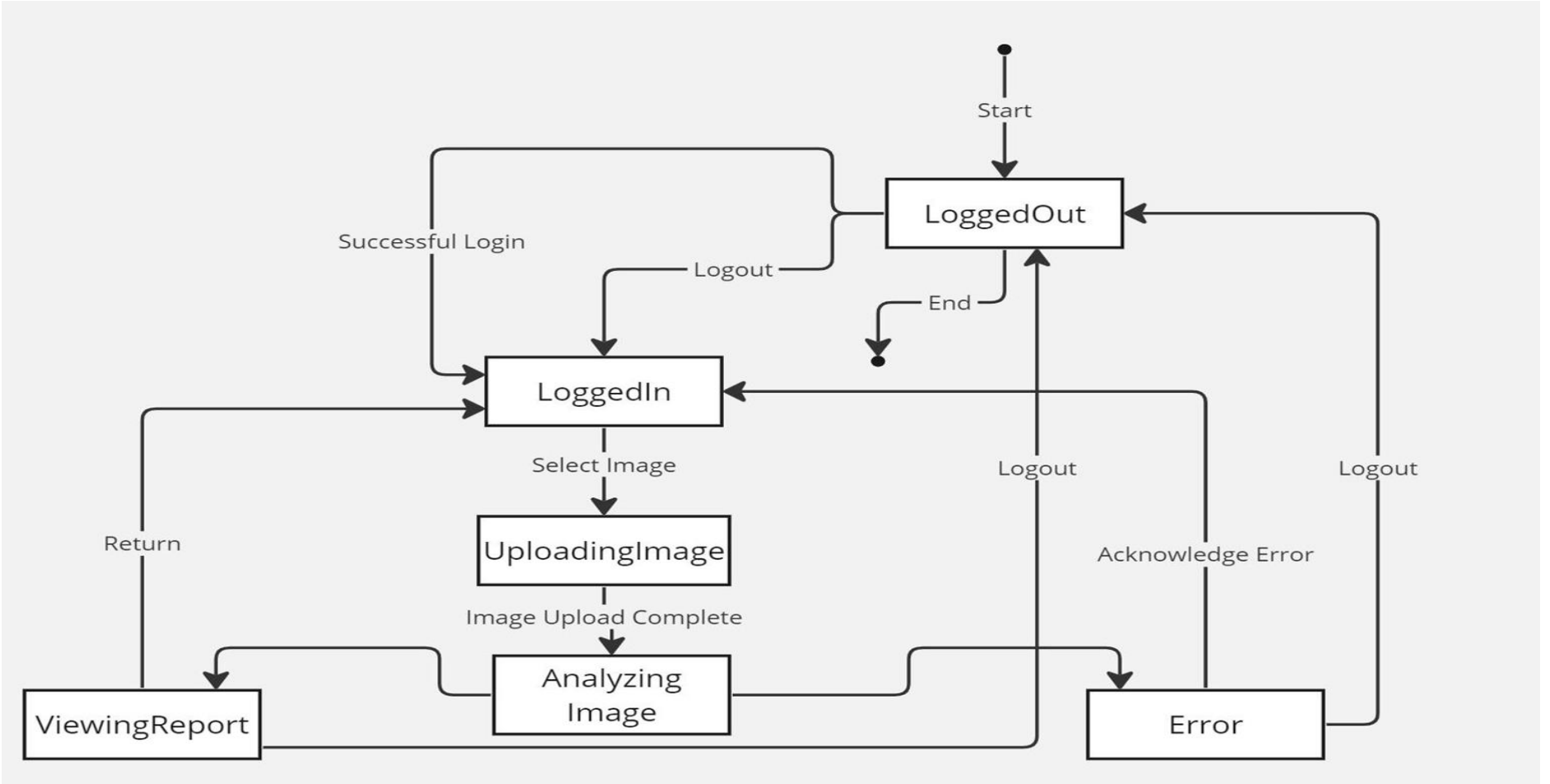
Conceptual Architectural Diagrams



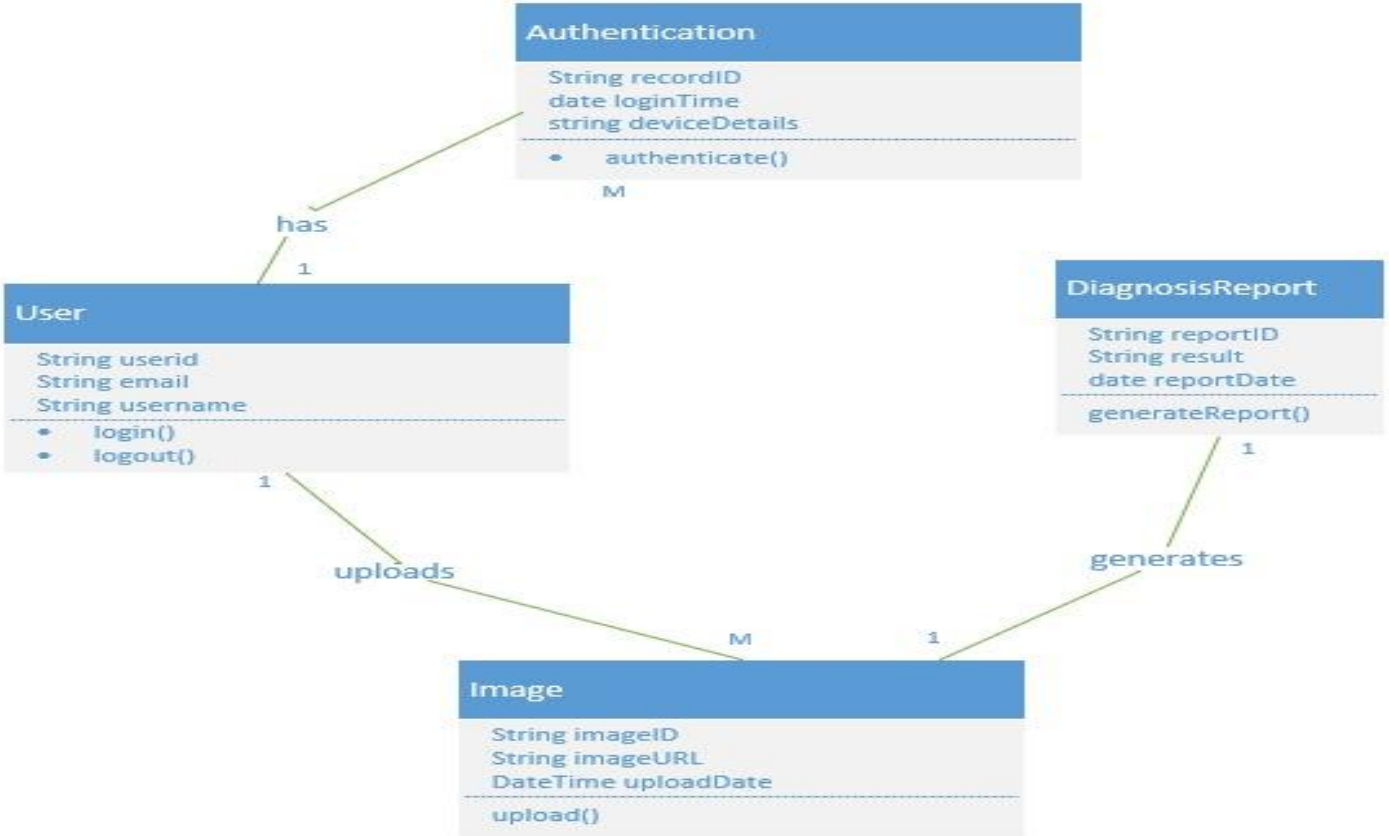
Sequence Diagrams



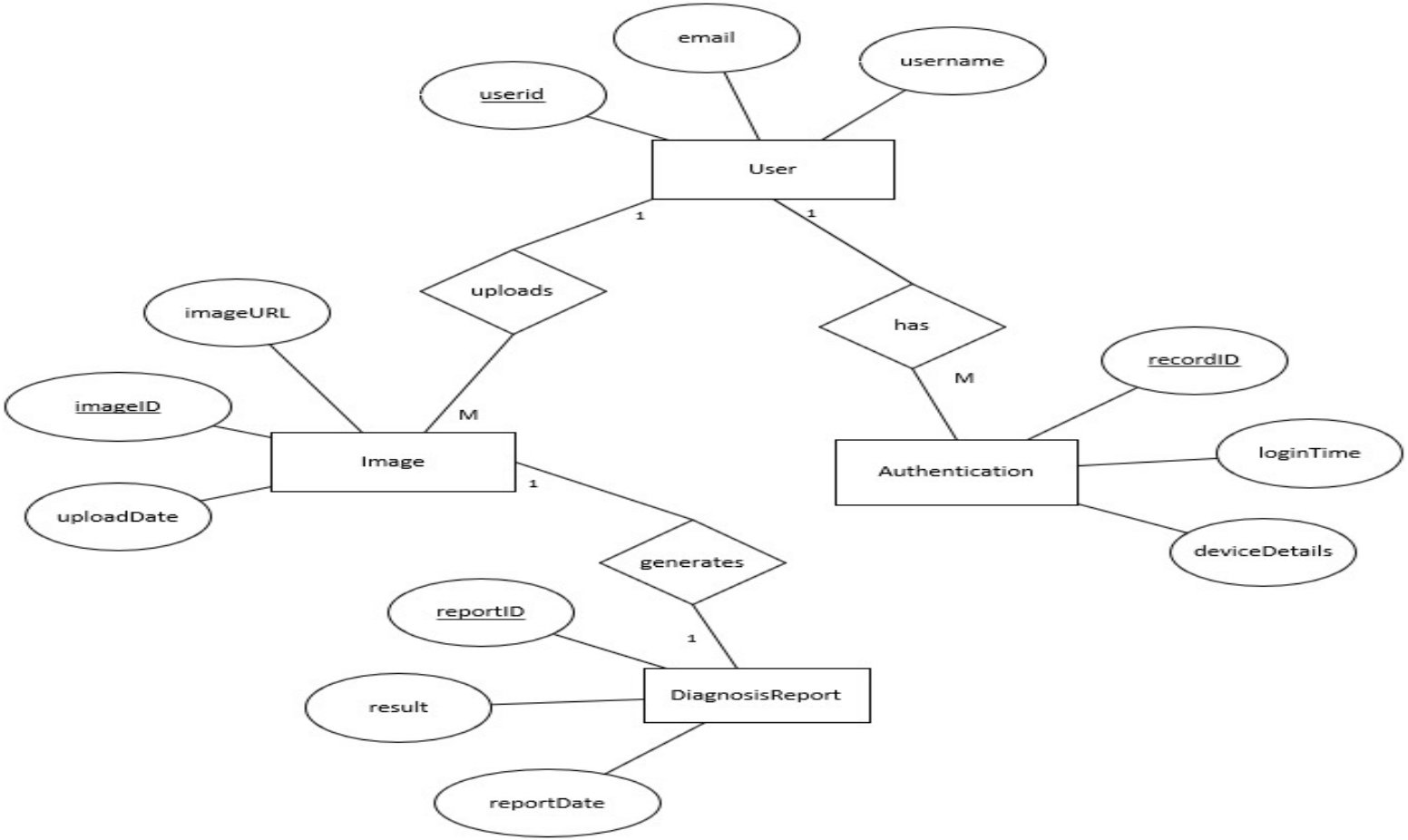
State Diagram



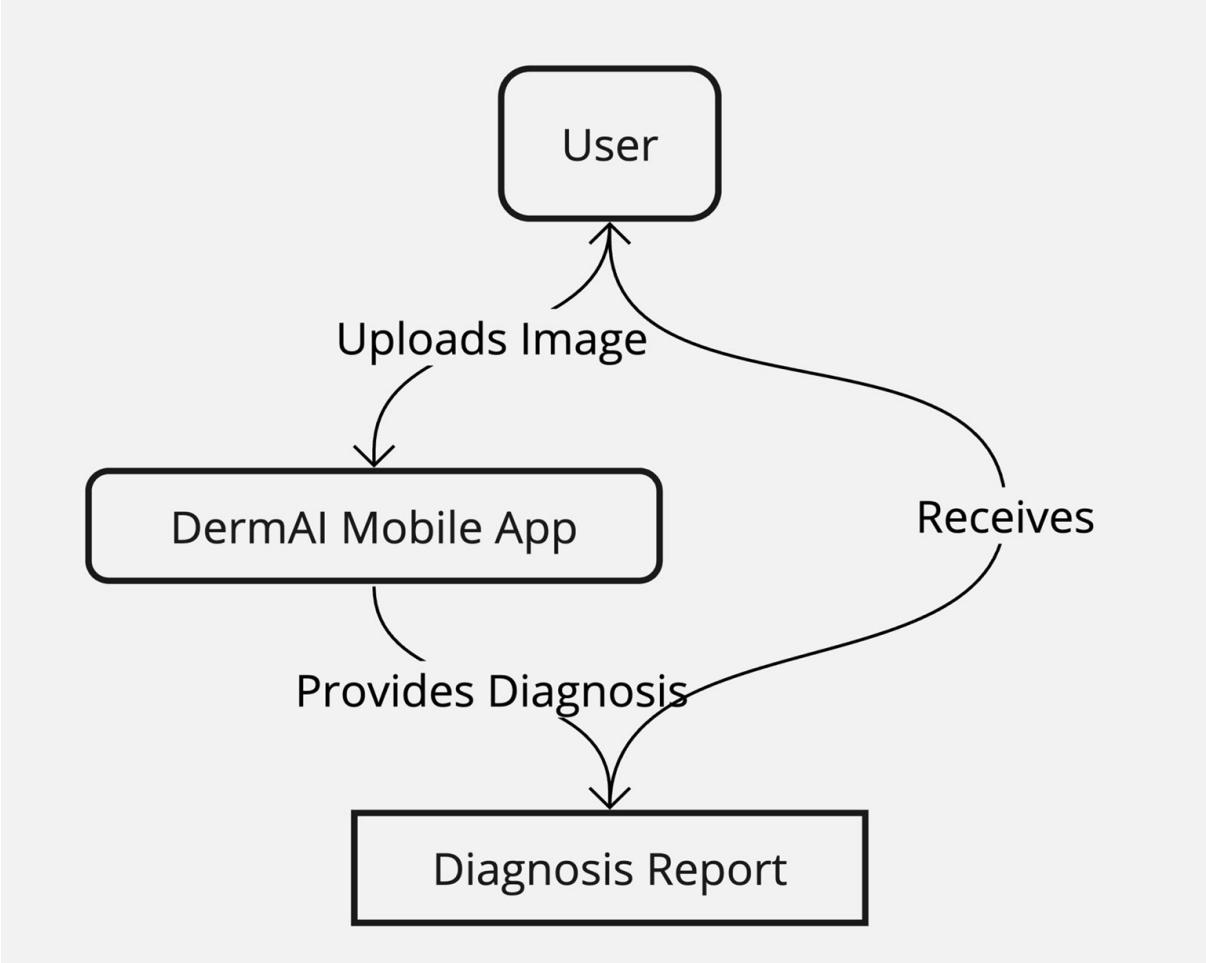
Class Diagram



Entity Relationship Diagram



Context Diagram



Sprint 2 Tasks and Stories

Task	Story Points	Complexity	Acceptance Criteria	Status
Firebase Integration	7	High	Firebase Authentication integrated	Done
Exploratory Data Analysis (EDA)	4	Medium	Understand the dataset	Done
Diagrams and Testing for Sprint 2	6	Medium	Draw all diagrams required, architecture diagram, context diagram, sequence diagram, state diagram, class diagram, ER diagram and testing the application.	Done
Authentication Implementation	5	Medium	Secure registration, login, logout implemented.	Done
Home Page Design	3	Low-Medium	Home screen design with upload and take image icons.	Done
Basic Backend API	4	Medium	Basic functionality endpoints implemented.	Done

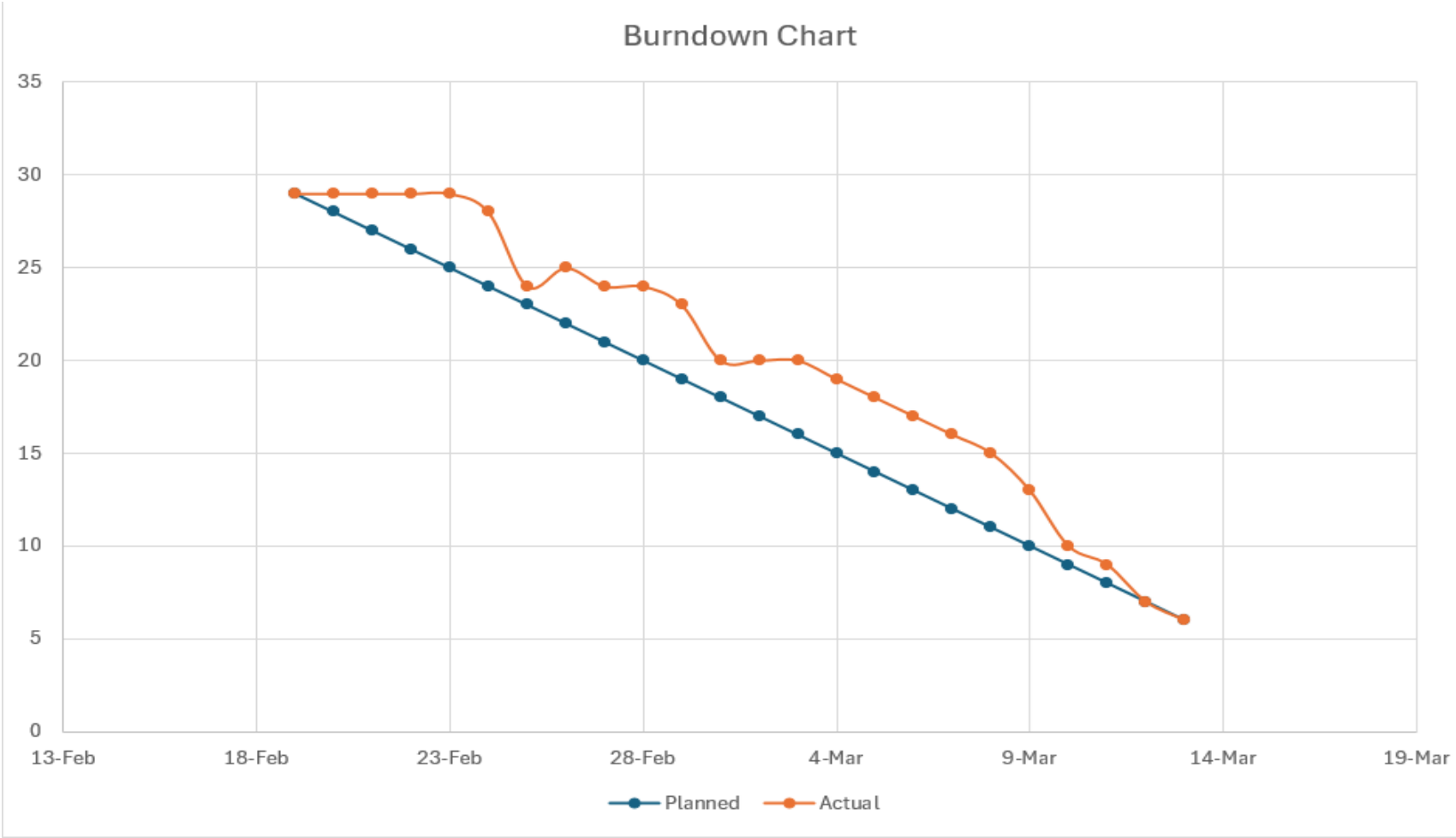
Team Velocity

29 Story Points

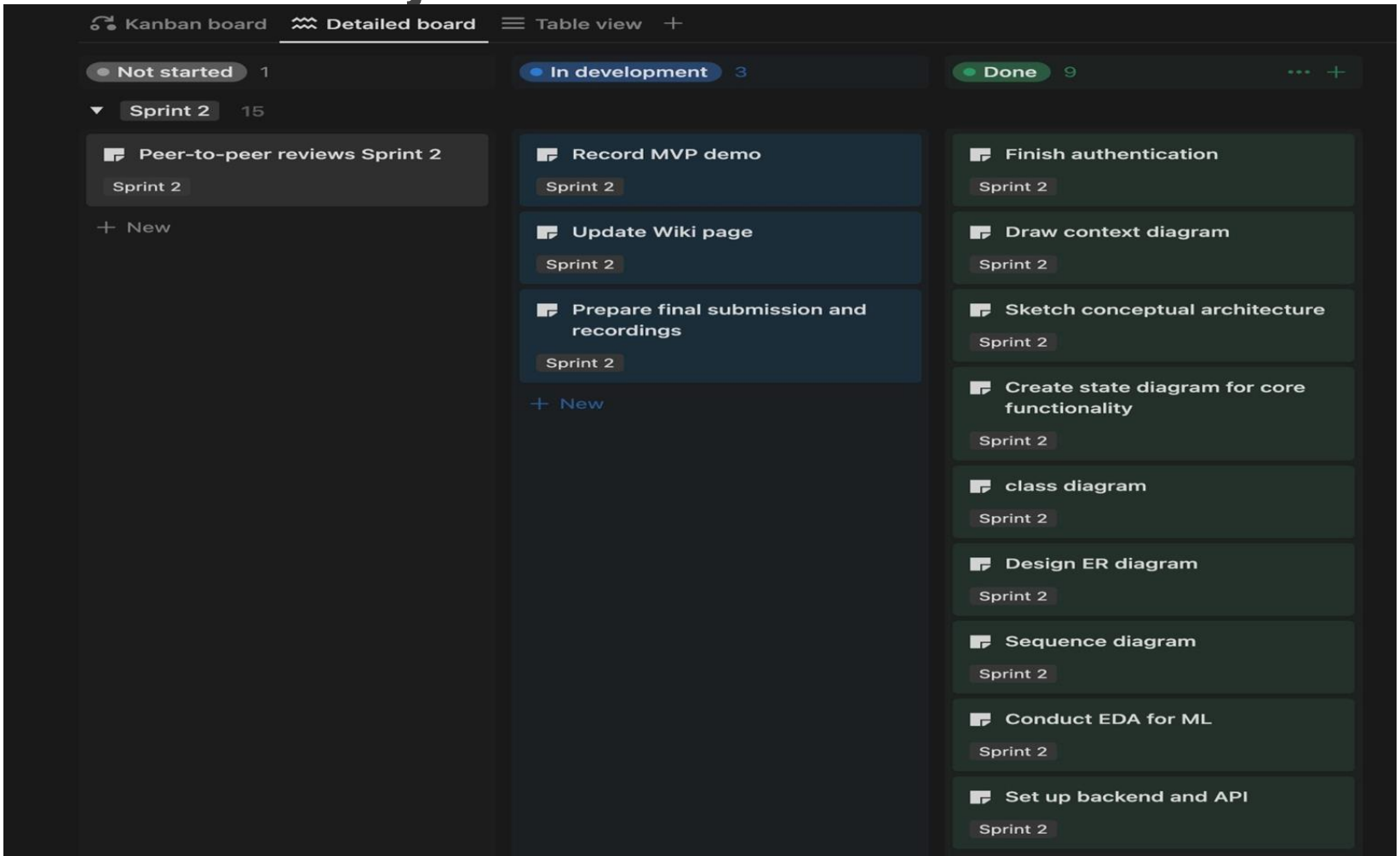
User Stories and Acceptance Criteria

Sprint	Feature	User Story	Acceptance Criteria
2	OAuth Integration	As a new user, I want to log in with Google for quick account access.	Login via Google is successful; user sees their dashboard.
2	Data Analysis	As a researcher, I want to analyze data to refine the AI diagnosis.	Access to data for improving the model.
3	Image Upload	As a user, I want to upload a skin image to get a diagnosis.	Image is uploaded and processed; feedback for incorrect formats.
3	Specialist Referral	As a user, I want specialist referrals post-diagnosis if needed.	Gets referral to specialist based on the diagnosis report.
3	Diagnosis Feedback	As a user, I want to confirm or dispute my AI diagnosis.	Mechanism for users to give feedback on diagnosis accuracy.
4	History Tracking	As a returning user, I want to see my past skin diagnoses.	Users can access a chronological history of their diagnoses.
4	Consultation Request	As a user concerned about skin cancer, I want to consult a doctor.	Users can request consultations with specialists through the app.
4	Account Management	As an admin, I want to oversee user accounts to ensure safety.	Admin tools are available for account moderation and support.
4	Security Alerts	As a user, I want notifications of account activity for my safety.	System sends notifications for new logins and significant actions.

Burndown Charts



Project Schedule



Project Backlogs

Project Backlog

Task ID	Task Description	Status	Assigned To	Notes
1	Finish authentication	Done	Kushal Arya Nella , Sai Praneeth Chagiri	Login with google
2	Draw context diagram	Done	Manideep Kumar Reddy Kotha	Outline key systems and interfaces
3	Sketch conceptual architecture	Done	Jagadish Mekhapotula	Identify major components
4	Create state diagram for core functionality	Done	Akshara Uppu	Define states and transitions
5	Draft class diagram	Done	Manoj Kumar Madhavarapu	Determine classes and relationships
6	Design ER diagram	Done	Manoj Kumar Madhavarapu	Map entities, relationships, attributes
7	Sequence diagram	Done	Akshara Uppu	For key scenarios
8	Conduct EDA for ML	Done	Srinath Madagoni	Data collection, preprocessing, analysis
9	Record MVP demo	In progress	Bhargava Chilukuri	Prepare and record MVP walkthrough
10	Update Wiki page	In progress	Bhargava Chilukuri	Document progress and findings
11	Peer-to-peer reviews Sprint 2	Not Started	Team	Review and feedback cycle
12	Develop UI designs	Done	Bhargava Chilukuri	UI Design
13	Prepare final submission and recordings	In progress	Team	Compile documentation, record presentations
14	Set up backend and API	Done	Jagadish Mekhapotula,Akshara Uppu, Manideep Kumar Reddy Kotha	Basic API logic

Retrospective

thunder buddies

what went well

- regular sprint meetings +0
- project discussion about project +0
- updates on Wikipage +0
- Ui and System design +0
- Regular KT sessions on summary of applications +0
- regular follow-up and team coordination on tasks +0
- application improvement in discussions in group +0
- GitHub and pull request , branch inputs +0

what can be improved

- Improvement of time on research of technologies +0
- research on project forums and communities for information on application +0
- Consistency in Git branching and pull requests +0
- Research of additional technology for reference +0
- Analysis of EDA Process and Data Cleaning +0

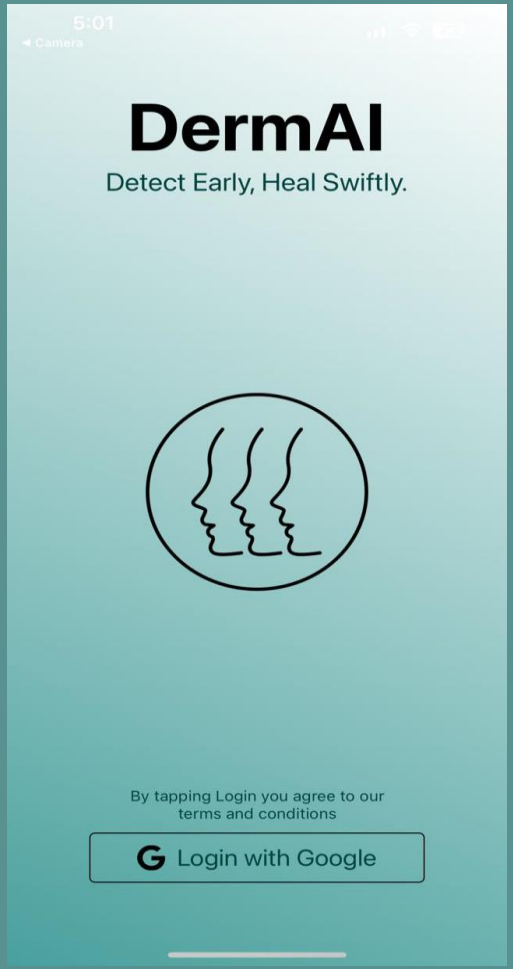
Action items

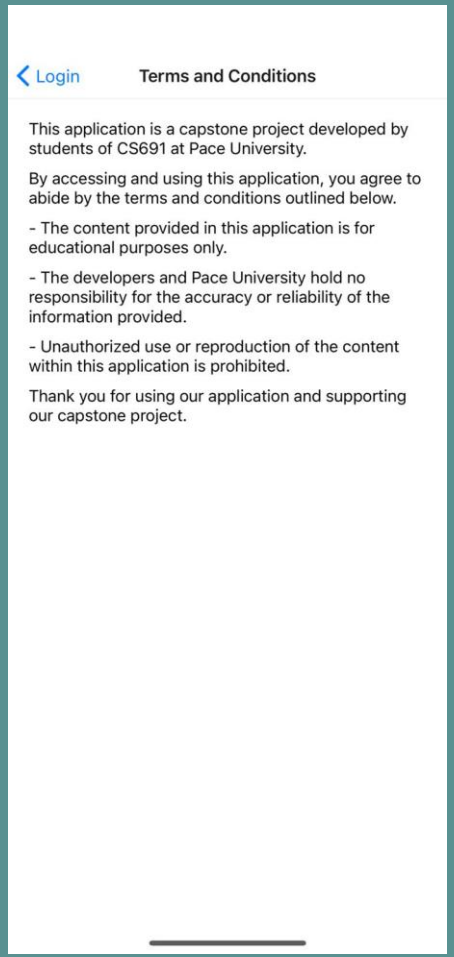
- Additional UI and application screens +0
- Testing phase in project +0
- code inputs in applications +0

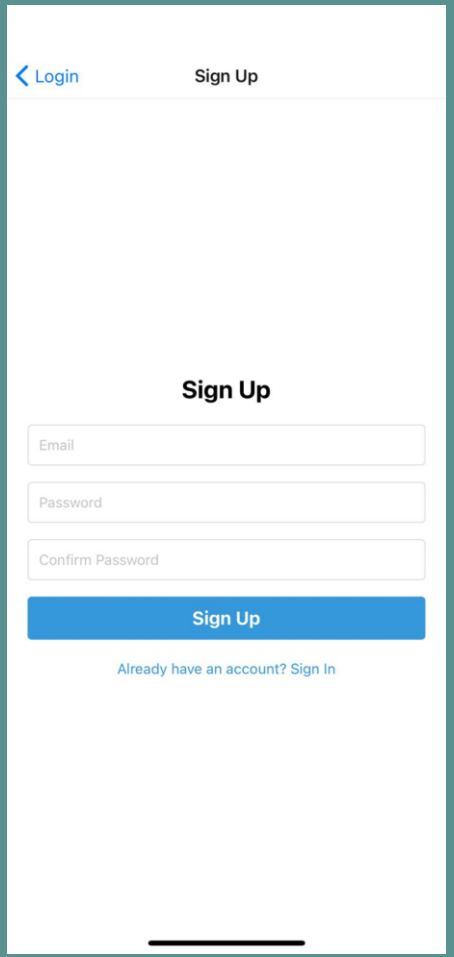
Sprint 3 Updates

- Develop RESTful Image Upload API
- Develop AI Diagnosis Model
- Integrate AI Diagnosis Model
- Firebase Cloud Storage
- Use Digital Ocean Services
- Dockerize Backend Services
- Update User Interface Design
- Automate Testing Suite
- Prepare Pilot Test Plan

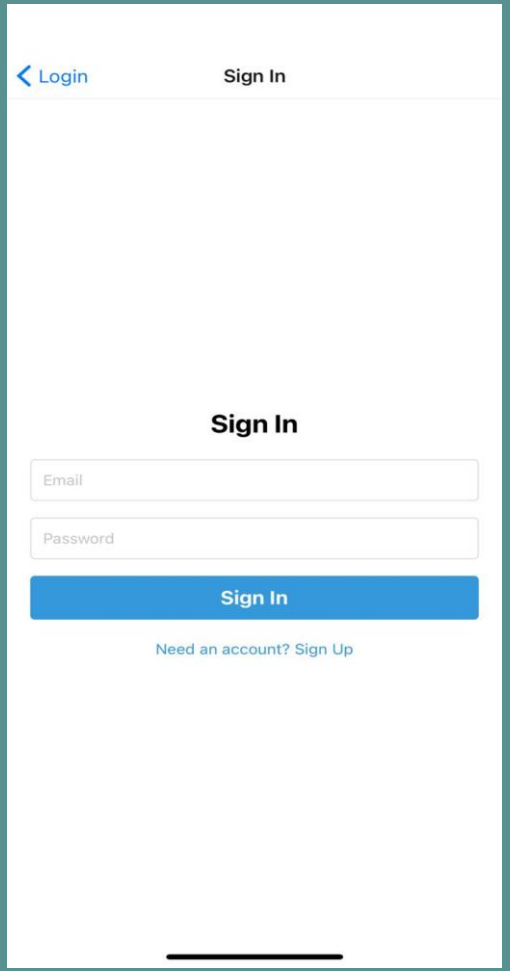
Application Screenshots

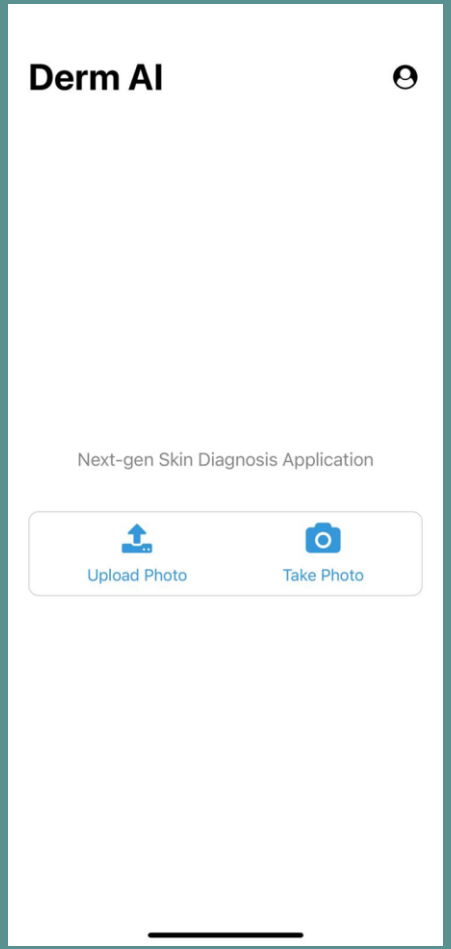






Application Screenshots





API and Backend

This Project utilizes Flask for machine learning, Node.js for I/O efficiency. It would Scale the components independently by enhancing application flexibility.
This application would separate concerns, enabling future expansion and microservices integration.

Test Cases -1

Test Case ID	Description	Steps	Expected Result
TC_LF_01	Valid Login	1. Enter valid email and password. 2. Click on the login button.	User is redirected to the home screen.
TC_LF_02	Invalid Email Login	1. Enter an unregistered or incorrect email. 2. Click on the login button.	Error message about incorrect email or password.
TC_LF_03	Invalid Password Login	1. Enter a registered email with an incorrect password. 2. Click on the login button.	Error message about incorrect email or password.
TC_LF_04	Empty Email or Password Fields	1. Leave the email or password field empty. 2. Click on the login button.	Error message indicating required fields.

Test Cases -2

Test Case ID	Description	Steps	Expected Result
TC_SF_01	Valid Signup	1. Enter a new, valid email, password, and confirm the password. 2. Submit the form.	Account is created; user is directed to the home screen or a confirmation email is sent.
TC_SF_02	Email Format Validation	1. Enter an invalid email format. 2. Submit the form.	Error message indicating invalid email format.
TC_SF_03	Password and Confirm Password Mismatch	1. Enter non-matching passwords in the password fields. 2. Submit the form.	Error message indicating the passwords do not match.

WikiPage

https://github.com/htmw/2024S-Thunder-Bubbies/wiki

Application Demo

- We would be presenting application demo of our project in this presentation

Thank you