

# Depression detection app



*Subject: CS691  
Prof. Henry Wong*



# Agenda

01



Project Description and problem statement

02



Description of minimal viable product and all attributes, including product backlog

03



Acceptance Criteria & user stories

04



Sprint 3 backlog and test cases

05



Team metrics for this sprint & plans for sprint 3

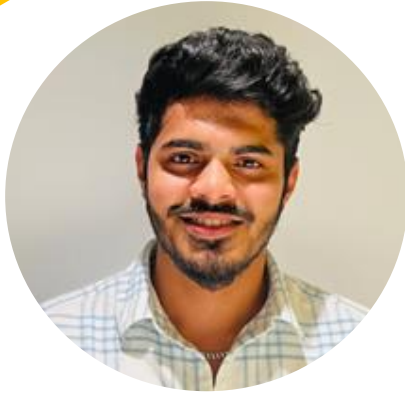
06



Application screenshot & ML model description

# TEAM

## Members



**Omkar Shitole**  
Developer & DBA



**Yuxiang Liu**  
Developer



**Shivani Chavan**  
Developer



**Wangbo Gu**  
Developer



**Artem Kolmogorov**  
Developer & Project Manager



**Siddarth Ravirala**  
Developer

# Improvements made from professor's feedback

## User Stories



User stories are improved and made according to provided templates

## Sprint Backlog



Sprint backlog are improved and not done with screenshots

## Complete Stories



Stories are improved and made without use of screenshots

# Project Description



Our detection system will be trained by a unique dataset for depression faces from messages and images. We believe that certain linguistic traits can be examined and linked to possible depressive symptoms as well as used to forecast self-destructive behavior. The training result we want is that the system can analyze the input (messages, images, and video) from users, and detect the type of depression such as anxiety, bipolar, or paranoia. Finally, the possibility of different depressions that the person might have will be provided.

# Problem Statement

Depression is a prevalent mental health disorder that affects millions of people worldwide. The condition is characterized by a persistent feeling of sadness, hopelessness, and loss of interest in daily activities. It significantly impairs a person's ability to function and can lead to a range of physical and emotional problems. Early detection of depression is crucial for effective treatment, as it can reduce the severity and duration of symptoms and improve a person's quality of life.

However, traditional methods of detecting depression, such as self-report questionnaires or clinical interviews, have several limitations. Self-report questionnaires rely on a person's ability to accurately report their symptoms, which can be influenced by various factors, such as social desirability bias, memory recall bias, and language barriers. Clinical interviews can also be subjective and may vary depending on the clinician's experience and training.

As a result, there is a need for an objective and reliable method of detecting depression. One potential solution is the use of machine learning algorithms to analyze various data sources, such as speech patterns, facial expressions, and physiological signals, to identify indicators of depression. These systems have shown promising results in early studies and have the potential to revolutionize the field of mental health.

Detecting depression early is essential, as the condition can lead to a range of negative outcomes, including increased risk of premature death, suicidal thoughts, and impaired daily functioning. By developing accurate and reliable detection systems, we can improve the lives of millions of people who suffer from depression worldwide.

# Teamwork agreement

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## Team Agreement

### Communication

- The team will communicate with each other through a variety of channels. For weekly meetings for meaningful team discussions, zoom meetings will be used. All the team members are highly encouraged to keep their cameras on, which will be able to build trust between the team members and reflect transparency;
- To discussion regarding minute details and doubts or anything urgent, a Whatsapp messenger group will be used.
- To share the final deliverables, Google docs will be used where all the team members can edit the document.
- A common platform called Trello has been set up for all team members, where designated groups have been created, such as Developers, Business Analyst, Product Owner.
- Database management, bugs, attendance, weekly plan, and meeting minutes. This manages all the bits and pieces of the project and makes the project management efficient.

### Work division and Participation

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- The entire project work should be divided into equal parts, and equal responsibilities should be given to all the team members.
- Each team member should complete their division of work before the deadline. If they are unable to complete the work on time, that hinders the performance of the entire team. If in case a team member is facing trouble and issues at some point, they can share it with others so that they can help each other and complete the work before the deadline.
- All the team members are expected to attend the meetings promptly.
- Absence during multiple meetings will affect the team's performance and efficiency. The team member can discuss beforehand with the team leader if he/she is going to miss the meeting or make it up for it before the next meeting is scheduled.
- Work is separated between members of the group separated voluntarily, however if members lack participation product owner is entitled to assign necessary tasks to absentee members.
- In case member is absent during meetings, member pledges to support whichever decision is approved during that meeting.

### Meetings

- All the team members will meet on zoom virtually every Tuesday and Friday. All the team members have to be present, as attendance is mandatory unless there is an exceptional case.
- The team leader would be responsible for sending meeting details and conducting the meeting.
- A meeting track or meeting minutes report would be listed after every meeting to keep track of the project and its progress.
- Every team member is expected to come up with ideas, participate in the discussion, and give an update on their progress for their part of the work.

### Respect

- Making sure all team members always have chance to share their opinion

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- All members agree to respect each others personal time and try not bother members during night time unless it is urgently required by the project.

Team Member	Email
Shivani Chavan	<a href="mailto:shivani.chavan@pace.edu">shivani.chavan@pace.edu</a>
Yunxing Liu	<a href="mailto:y126411u@pace.edu">y126411u@pace.edu</a>
Omkar Chitale	<a href="mailto:o331634n@pace.edu">o331634n@pace.edu</a>
Wangbo Gu	<a href="mailto:w10154n@pace.edu">w10154n@pace.edu</a>
Siddharth Raviada	<a href="mailto:sr44139n@pace.edu">sr44139n@pace.edu</a>
Artem Kolmogorov	<a href="mailto:ak21778n@pace.edu">ak21778n@pace.edu</a>

TEAM AGREEMENT

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# Personas

## Jack



### Profile

Jack, a 35-year-old software engineer who has a history of depression and anxiety. He often finds himself feeling overwhelmed at work and is struggling to balance his job and personal life. He wants to find a way to manage his symptoms so that he can be more productive and happier.

Name: Jack

Age: 35

Location: Chicago, MI

Job: Software Engineer

Salary: 92 000 – 110 000\$/annually

Family: Single

### Interests

- Riding Bike
- Goes Kayaking
- Attending live concerts

### Frustration

- Managing depression
- Wants to change job, but unable

### Goals

- Moving to south
- Finding friends
- Buying a bigger house



# Personas

## Sarah



### Profile

Sarah, a 25-year-old graphic designer who has been feeling down for the past few months. Despite her successful career and supportive friends and family, she feels unfulfilled and struggles to find joy in her everyday life. She wants to find a way to manage her depression and is open to using technology to help her do so.

Name: Sarah

Age: 25

Location: Los Angeles, CA

Job: Graphic Designer

Salary: 66 000 – 70 000\$/annually

Family: Single

### Interests

- Writing own comic books
- Everyday swimmer
- Loves animals
- Watching series

### Frustration

- Traffic in Los Angeles area
- Living alone for a long time

### Goals

- Buying her own house
- Building lifelong relationships
- Finding friends

# Personas

## Lisa



### Profile

Lisa, a 40-year-old stay-at-home mom who is feeling overwhelmed and exhausted. She is struggling to keep up with the demands of taking care of her children and household, and she often feels like she is failing as a mother. She wants to find a way to manage her stress and feelings of inadequacy.

Name: Lisa

Age: 40

Location: New-York, NY

Job: Unemployed

Salary: N/A

Family: Married, two kids

### Interests

- Reading romantic novels
- Going for beach holidays
- Loves animals
- Watching series

### Frustration

- Her husband going for a long business trip
- Having troubles with her kids

### Goals

- Taking dog from shelter
- Helping kids with college

# Personas

## Tom



### Profile

Tom, a 50-year-old small business owner who is feeling stressed and burnt out. Despite the success of his business, he is feeling overwhelmed by the responsibilities and pressure of running it. He wants to find a way to manage his stress and anxiety so that he can enjoy his success and have a better work-life balance.

Name: Tom

Age: 50

Location: Austin, TX

Job: Self-Employed

Salary: 150 000 \$/annually

Family: Divorced

### Interests

- Going hunting & fishing
- Taking rides in his chopper

### Frustration

- Declining business profits
- Having health problems

### Goals

- Building strong portfolio for his 401-k
- Finding new friends

# MVP, Technologies & Algorithms

# Minimal Viable Product



## Home Page

- A welcome message that briefly introduces the app and its purpose
- A button or link to create an account or log in if you already have one
- A list of features and resources available within the app, such as self-assessment questionnaires, mood trackers, and mental health resources
- A prominent call-to-action encouraging users to take a self-assessment or start tracking their mood
- Information about the app's privacy policy and data handling practices, as well as any relevant disclaimers or warnings
- Contact information for the app's support team or customer service, in case users have questions or need assistance.



## Profile/History of Consultation

- A section where you can edit your personal information, such as your name, email address, and password
- A dashboard that displays your mental health history and mood trends over time, based on the data you've inputted into the app's mood tracker
- A list of any self-assessments you've taken within the app, along with their results

# Minimal Viable Product



## Image upload/Take Picture

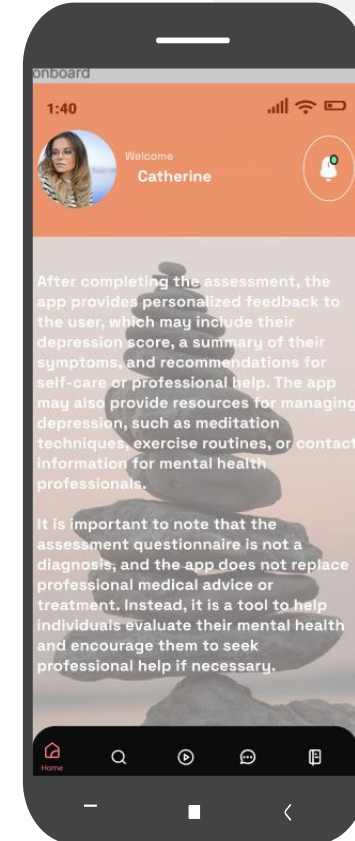
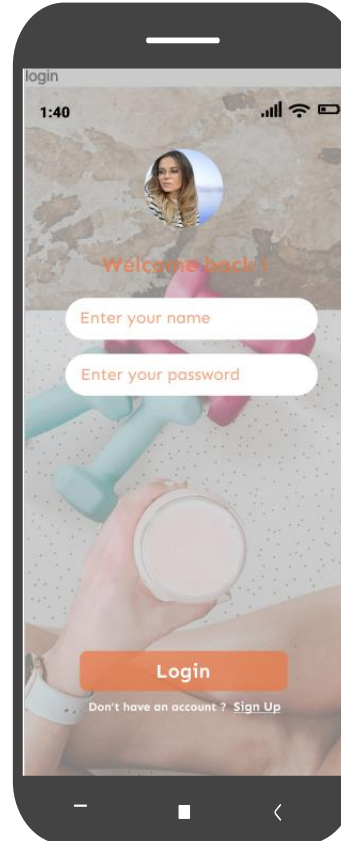
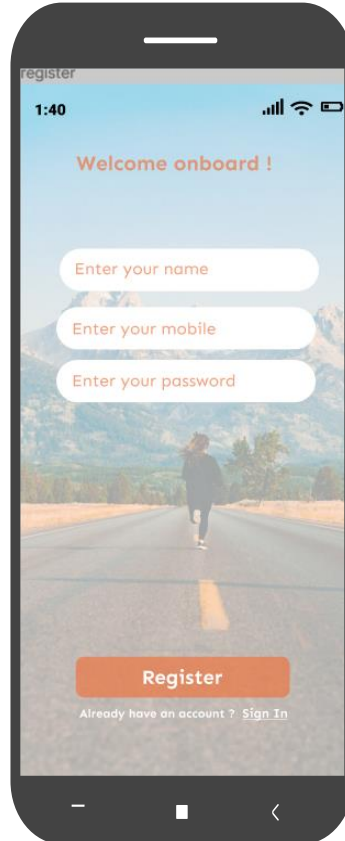
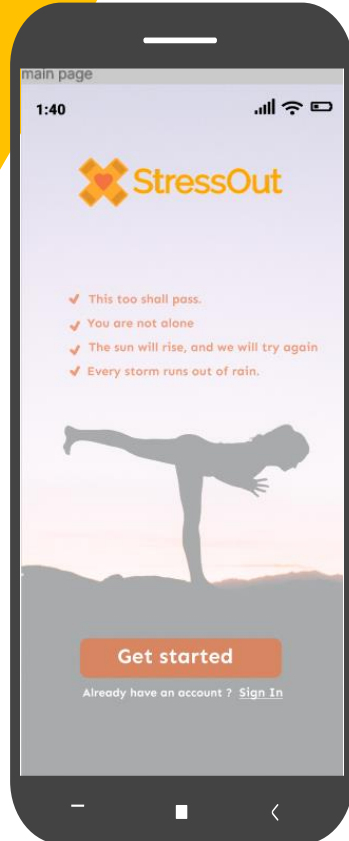
- A camera button that allows you to take a picture directly within the app
- A gallery button that allows you to upload pictures from your camera roll
- An option to add captions or notes to each image, to help you remember important details or context



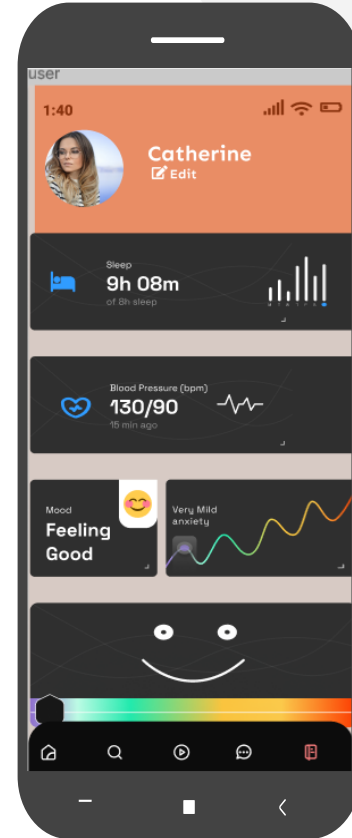
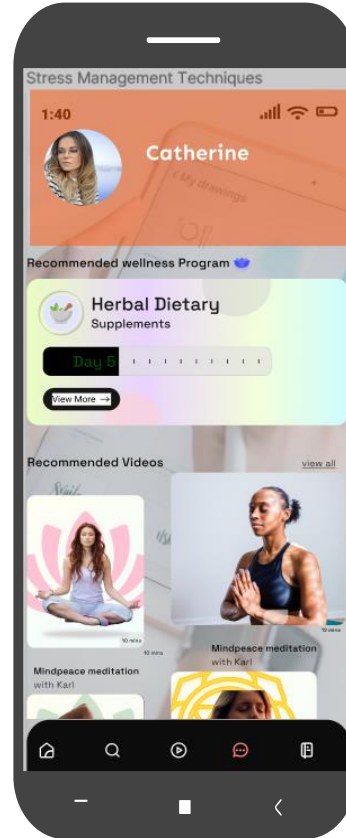
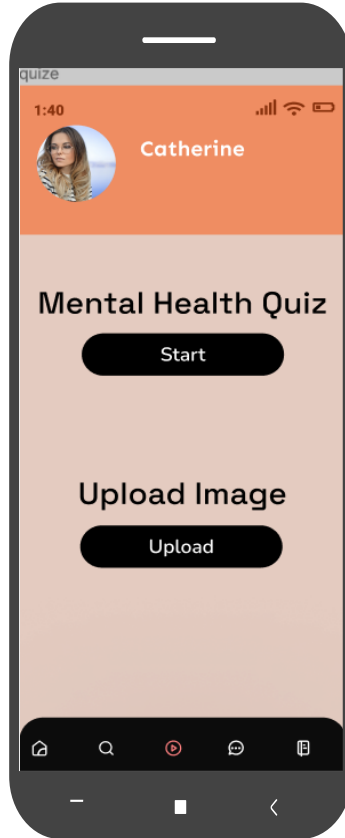
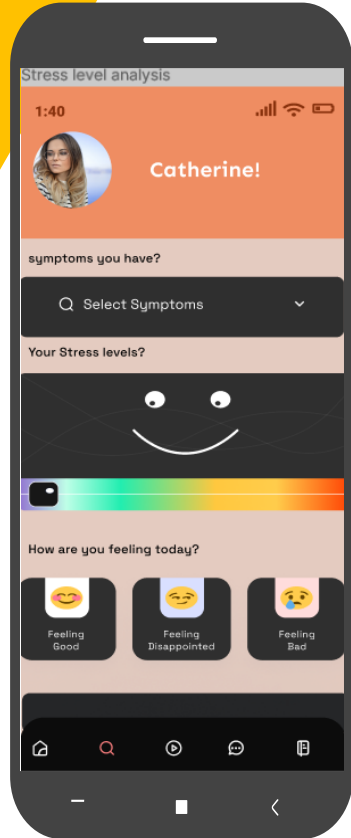
## Recommendation

- A dashboard that displays any recommendations or next steps based on your self-assessment results, including suggestions for lifestyle changes, self-care practices, or professional treatment options
- Resources and information about different types of mental health treatment, such as therapy, medication, or alternative therapies
- Tips and strategies for managing symptoms of depression or other mental health conditions, such as mindfulness exercises, stress reduction techniques, or sleep hygiene practices

# Prototype



# Prototype





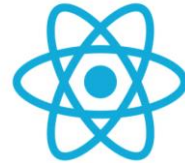
# Algorithms & Technologies



TensorFlow



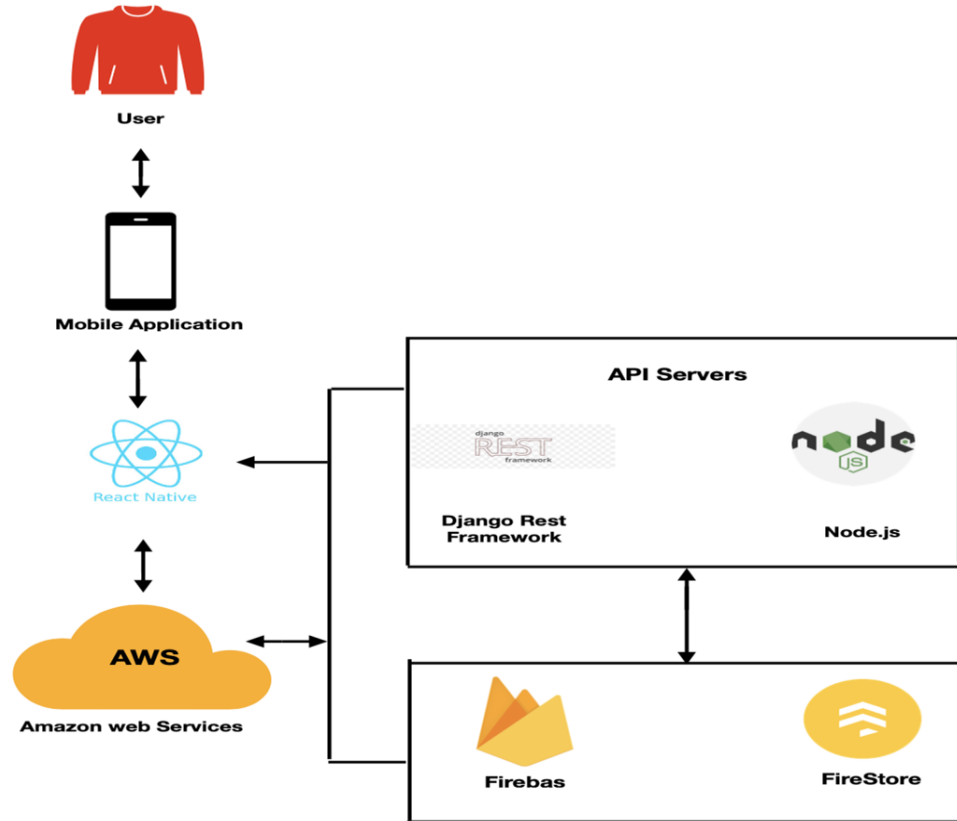
Keras



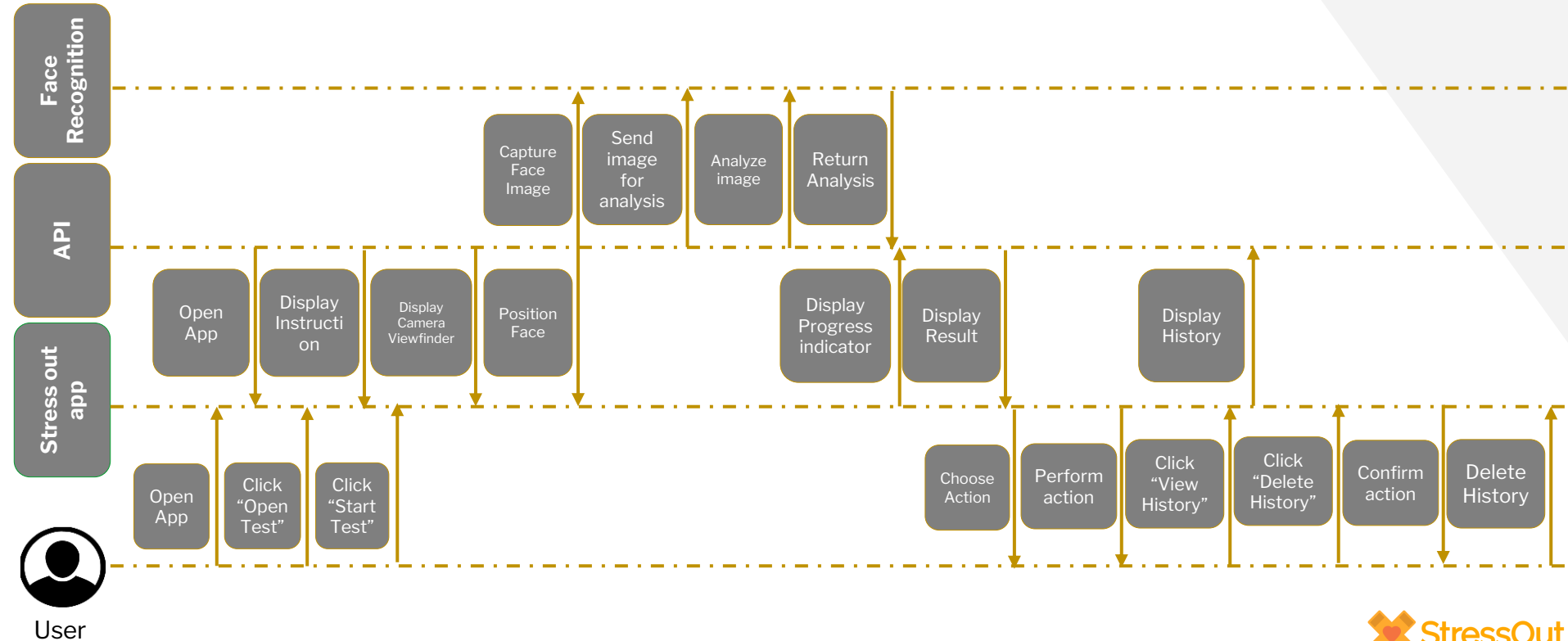
React Native



# Conceptual Architecture Diagram



# Sequence Diagram



# Product Backlog

## User Stories

Key	Summary	Status	Place
STRES-19	As a user, I want to register myself to the application. So that I can keep my account private and login using email/phone and password.	Done	Home Page
STRES-20	As a user, I want to login in app. So that I can use it to store all my information.	Done	Home Page
STRES-21	As a user, I want to upload my picture from phone gallery to analyze	Done	Image Upload/Take Picture
STRES-22	As a user, I want to take a picture from my front and back camera to upload for analyze	Done	Image Upload/Take Picture
STRES-23	As a user, I want to view my upload history and their results	To be done	Profile/History of consultation
STRES-24	As a signed in user, I want to log out So that I can have my privacy in the app.	Done	Logout/Login
STRES-25	As a user I want to be able to find contacts for professional help	To be done	Recommendation
STRES-26	As a user I want to be able to view history of my recommendation	To be done	Recommendation
STRES-27	As a user, I want to create my profile So that I can store my account information.	Done	Profile/History of consultation
STRES-28	As a user, I want to be able to edit my information detail	To be done	Profile/History of consultation
STRES-29	As a user I want to be able to add captions for pictures I have uploaded	To be done	Image Upload/Take Picture
STRES-30	As a user, I want to be able to view personalized tips and strategies for managing symptoms	To be done	Recommendation
STRES-31	As a user, I want to know the sign of depression, and the risk of depression	To be done	Recommendation
STRES-32	As a user, I want to link to the hospital so that I can make a appointment with doctor	To be done	Recommendation
STRES-33	As a user, I want the app to keep checking my depression level	To be done	Profile/History of consultation
STRES-34	As a user, I want to know the risk of depression about me after I take pictures	To be done	Image Upload/Take Picture
STRES-35	As a user, I want to know some tips for revealing depression	To be done	Recommendation

# Test cases & Acceptance Criteria

# Acceptance criteria

Scenario	Summary	Criteria
1. User needs to get his mental health to be checked without going to the clinic	<p><b>Given</b> I'm in the role of customer searching for a way to get his/her treatment from home.</p> <p><b>When</b> I open the app</p> <p><b>Then</b> the app asks me to register and login</p> <p><b>And</b> then after my successful login, I should be able to tell my problems</p> <p><b>And</b> I click the "submit" button</p> <p><b>Then</b> the system starts to depict and analyze my Depression status.</p>	<p><b>Accuracy:</b> The app should provide the user to login and provide an accurate and reliable depiction of depression, including its symptoms, causes, and treatments. This information should be based on scientific research and clinical evidence.</p> <p><b>User Experience:</b> The app should have an easy-to-use interface and be designed with the user's experience in mind. It should be visually appealing, intuitive, and engaging.</p>
2. User wants to access account from a different device	<p><b>Given</b> I'm in the role of the user trying to login to my account from another device</p> <p><b>When</b> I try to login from another device</p> <p><b>Then</b> the app asks me for my login details on the other device now</p> <p><b>Then</b> I login to my account</p>	<p><b>Compatibility:</b> The app should be compatible with a wide range of devices and operating systems, including smartphones and tablets.</p>

# Acceptance criteria

Scenario	Summary	Criteria
3. User forgot password	<p><b>Given</b> I'm in the role of the user trying to login but I have forgot my password</p> <p><b>Then</b> the app shows me the option of 'forgot password'</p> <p><b>Then</b> the app asks me for my registered phone number or the registered email id</p> <p><b>Where</b> I will get the opt used for logging in my account again</p>	The app should save the users registration details so that if they forget their passwords then the app will be able to connect to them through their registered phone number or email id.
4. User wants to contact proper counselors or mental health professionals.	<p><b>Given</b> I'm in the role of the user looking for proper mental health professionals</p> <p><b>Then</b> the app shows me the option to connect to the app's support team</p> <p><b>Where</b> I can get the relevant details, I want.</p>	The app should let the user to connect to the customer service team.

# Acceptance criteria

Scenario	Summary	Criteria
5. User wants to give his feedback.	<b>Given</b> I'm in the role of the user who have got my depression and mental health checked by the app <b>Then</b> the app gives me my results <b>And</b> allows me to give my feedback.	<b>Continuous Improvements:</b> the app should be regularly updated and improved based on user feedback and changes in the field of depression research and treatment.
6. User want to keep personal information and results to himself.	Given I'm in the role of the user trying to see if anybody else can see my information Then I go to my home page and the settings section There I set my privacy settings.	Privacy: The app should be designed with privacy in mind, ensuring that users' personal information and data are kept secure.



# Test cases

Unit to test	Scenario	Test data	Expected Results
Login	Successful login	Email - <a href="mailto:user@stressout.com">user@stressout.com</a> Password - userpass	Check results on entering valid User id & Password
Login	Invalid Username or Password	Email - <a href="mailto:user@stressout.com">user@stressout.com</a> Password - userpass	Check results on entering valid User id & Password
Login	Invalid Username or Password	Email - <a href="mailto:user@stressout.com">user@stressout.com</a> Password - userpass	Check results when User id is Empty & Login Button is pressed
Sign Up	Successful login	Email - any, Password - anything between 8 to 16 characters	Check results on entering valid User id & Password
Sign Up	error message as “username already in use”	Email - <a href="mailto:user@stressout.com">user@stressout.com</a> , Password - userpass	Check results on entering valid User id & password
Forgot password	Will direct the email to reset the password	Email - <a href="mailto:user@stressout.com">user@stressout.com</a> , Password - user	Check respond when a Password is containing all the given parameters
Profile	Profile creation		A list of features and resources will show up

# Test cases

Unit to test	Scenario	Test data	Expected Results
Privacy	User data		All the user data is safe within their profile.
Profile	Show an error with missing fields		Check to missing/mandatory fields
Homepage	Services on the homepage will show up		Check if the categories are correct
Homepage	User should be able to access the homepage		Once directed with url, you will be first redirected to homepage
Homepage	User should be able to contact the customer service		Homepage must provide resources
Homepage	User should be able to search the desired resources		Contact information should be present for assistance

# Completed Stories

Date	Name	Status
3/25/2023	As a user, I want to register, so that I know what this app can do	Done
3/28/2023	As a user, I want to take the quiz, so that I can get a sense of my depression level	Done
3/31/2023	As a user, I want to take a picture, so that the app can analyze my depression level	Done
4/01/2023	As a user, I want to check the pictures I took before, so that I will know the mood changes during this time	Done
4/07/2023	Develop the ML model	Done

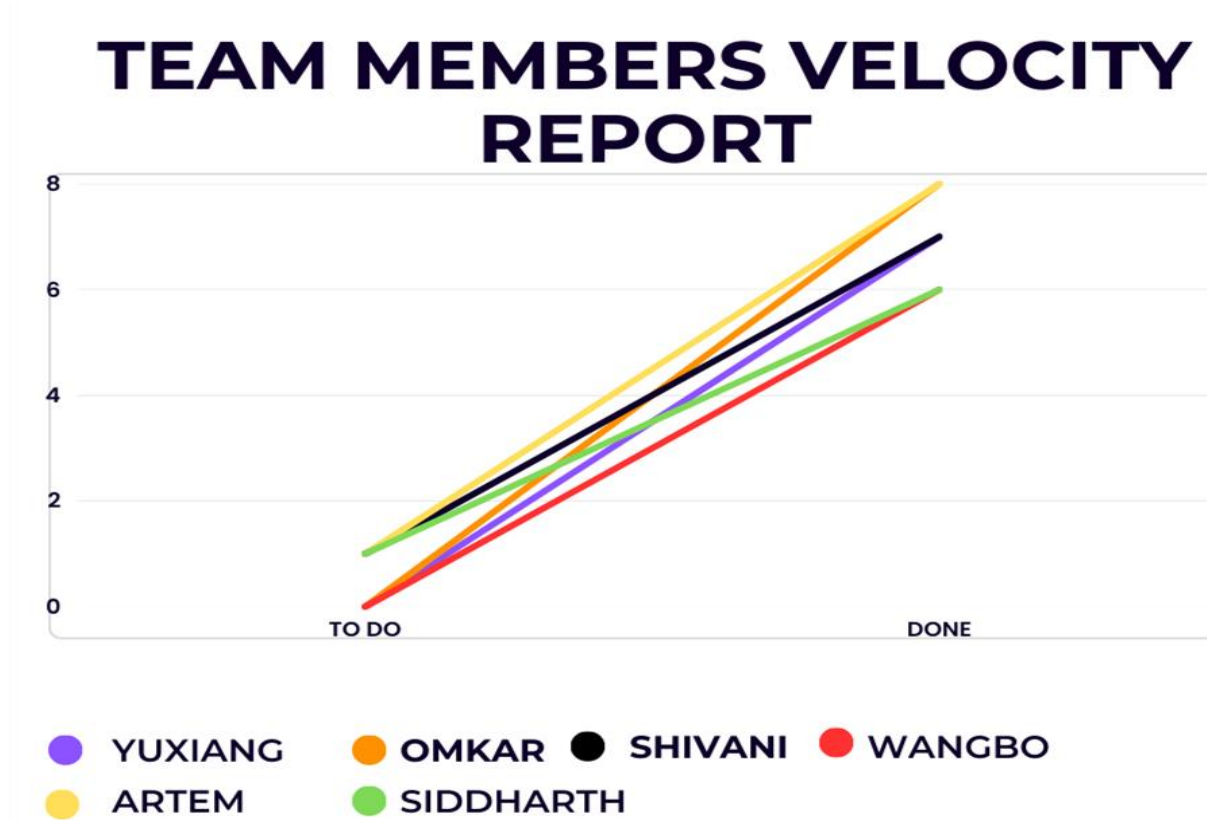
# Sprint Backlog

Issue type	Status	User stories
STRES-36	Task	Develop Front End - homepage
STRES-39	Story	As a user, I want to check the history of my photo. So that the app can keep checking my depression level.
STRES-42	Story	As a user, I want the app refer me to some therapists. So that I can get in touch with them
STRES-48	Story	As a user, I want to know some tips to help me. So that my depression doesn't get worse.
STRES- 50	Task	Further improve the accuracy of detecting happiness and depression

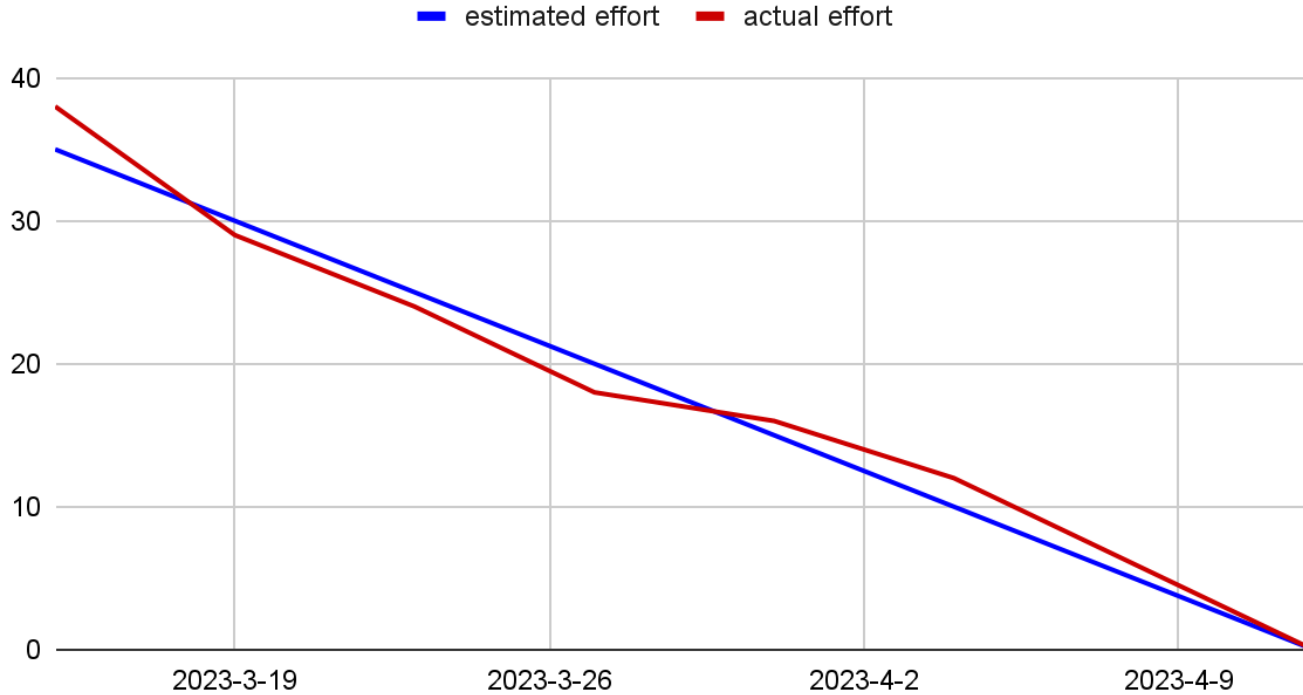
# Sprint Backlog

Issue type	Status	User stories
STRES-33	To be done	As a user, I want to create my profile so that I can store my account information.
STRES-41	To be done	As a user, I want to be able to edit my information details so that the app can keep an track of my information.
STRES-42	To be done	As a user, I want to be able to add captions for pictures I have uploaded so that the app can get more accurate information.
STRES-48	To be done	As a user, I want to link to the hospital so that I can make an appointment with doctor.
STRES- 52	To be done	As a user I want the app to keep checking my depression levels so that I can know when the status is high.

# Team members velocity report



# Sprint 3 Burndown chart



# Changes Introduced with Sprint 3

## Model Refinement

Model was refined with further training and achieved progress in model accuracy. Current model provides more than 95% accuracy.

## Added functionality

We were able to add ability to take picture from front/back facing cameras in user's smartphone.

## Text based quizzes added

We have added quizzes for the user that will be able to contribute towards accurately detecting depression.



# App Screenshots

## Home Page

App has 5 Functionality Buttons

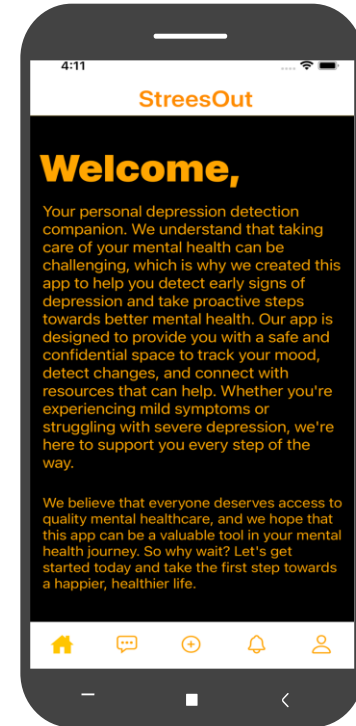
**Onboarding Screen:** A screen that welcomes the user to the app and provides an overview of its app.

**Stress level analysis screen:** A screen that displays the user's stress level based on the biometric data collected.

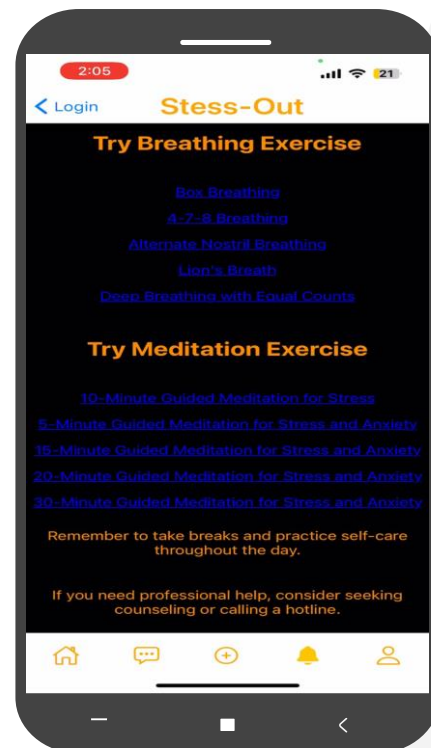
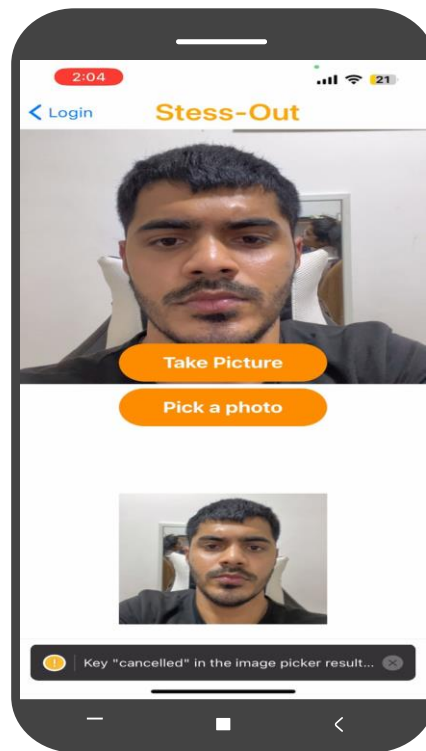
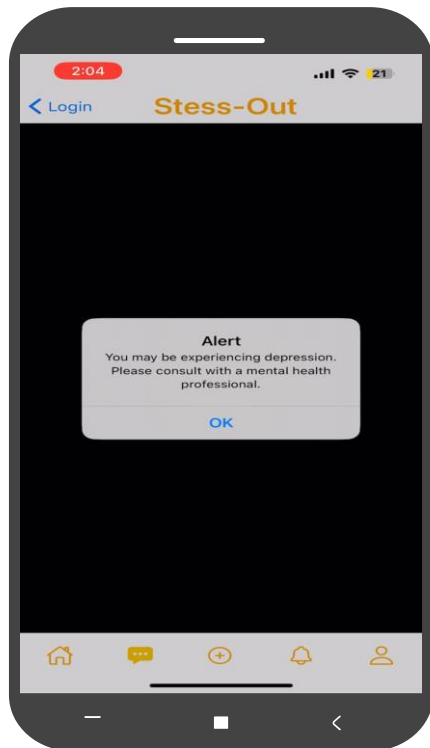
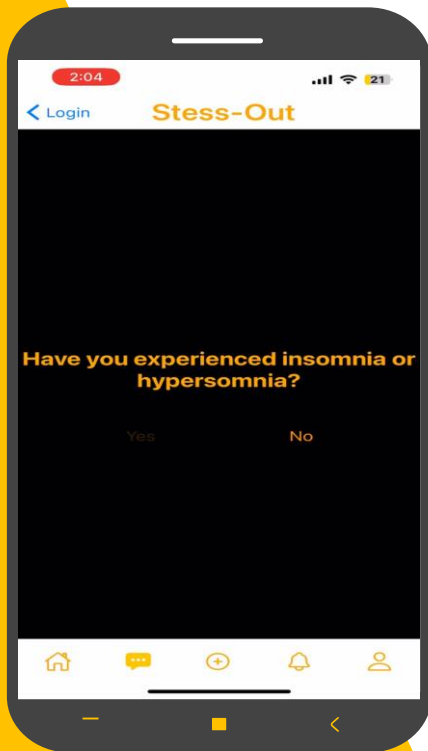
**Quiz / Upload Images Screen:** Quiz screen that asks the user questions to identify their sources of stress. Upload screen that allows the user to upload images

**Stress management techniques Screen:** A screen that provides stress management techniques, such as breathing exercises, meditation, or cognitive behavioral therapy.

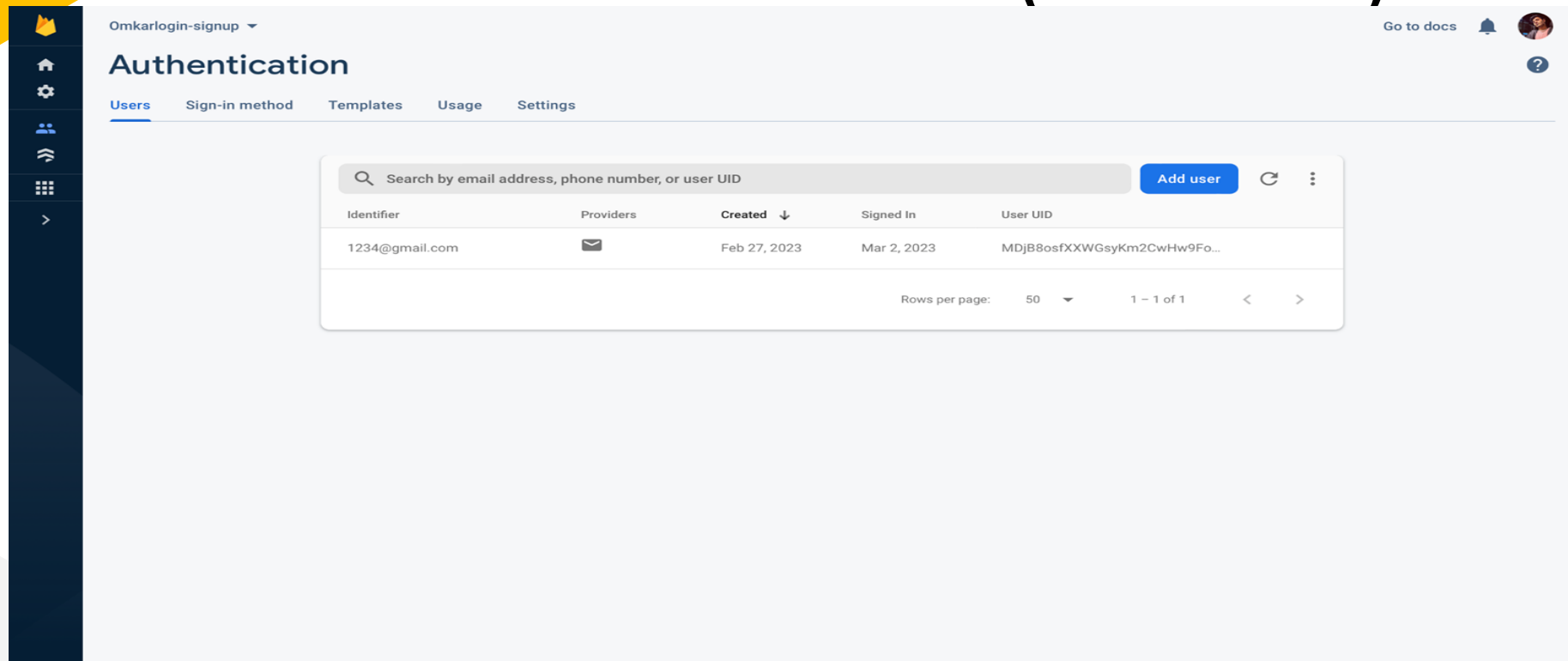
**Registration / Login Screen:** A screen that allows the user to create an account or log in to an existing one.



# API Screenshots



# Database of the User (Firebase)



The screenshot displays the Firebase Authentication console interface. On the left is a dark sidebar with navigation icons. The main header shows 'Omkarlogin-signup' and 'Authentication'. Below the header are tabs for 'Users', 'Sign-in method', 'Templates', 'Usage', and 'Settings'. The 'Users' tab is active, showing a search bar, an 'Add user' button, and a table with one user entry. The table columns are Identifier, Providers, Created, Signed In, and User UID. The user entry shows the email '1234@gmail.com', a provider icon, the creation date 'Feb 27, 2023', the sign-in date 'Mar 2, 2023', and a truncated User UID. At the bottom right of the table area, it indicates 'Rows per page: 50' and '1 - 1 of 1'.

Omkarlogin-signup ▾

Go to docs 🔔 👤 ?

## Authentication

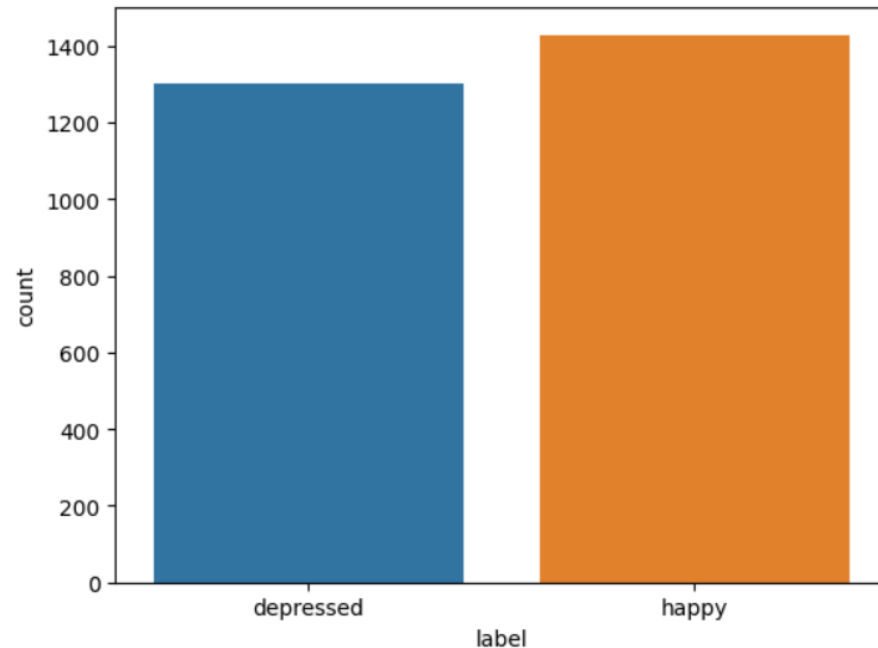
Users Sign-in method Templates Usage Settings

🔍 Search by email address, phone number, or user UID [Add user](#) ↺ ⋮

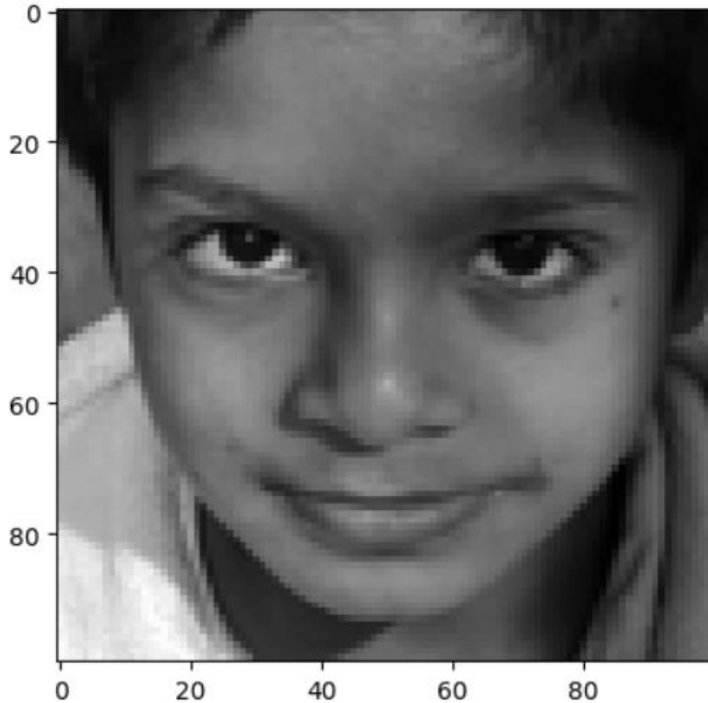
Identifier	Providers	Created ↓	Signed In	User UID
1234@gmail.com	✉️	Feb 27, 2023	Mar 2, 2023	MDjB8osfXXWGsyKm2CwHw9Fo...

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# Machine Learning Model : Data Collection

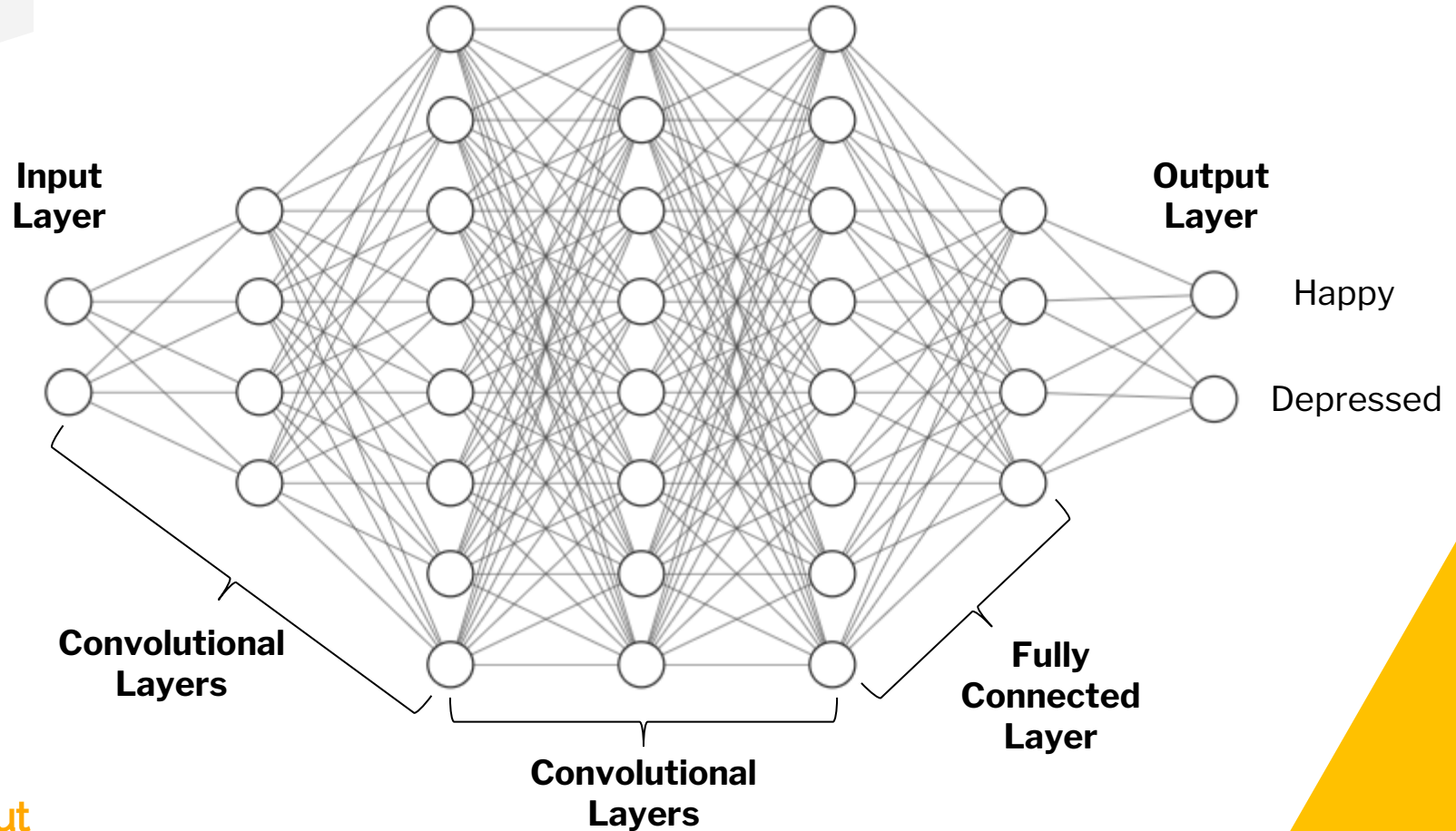


# Machine Learning Model : Data Collection



- Training dataset: 70% of the images
- Testing dataset: 30% of the images
- Resizing all images to 100x100 pixels
- Grayscale all images

# Machine Learning Model : Data Collection



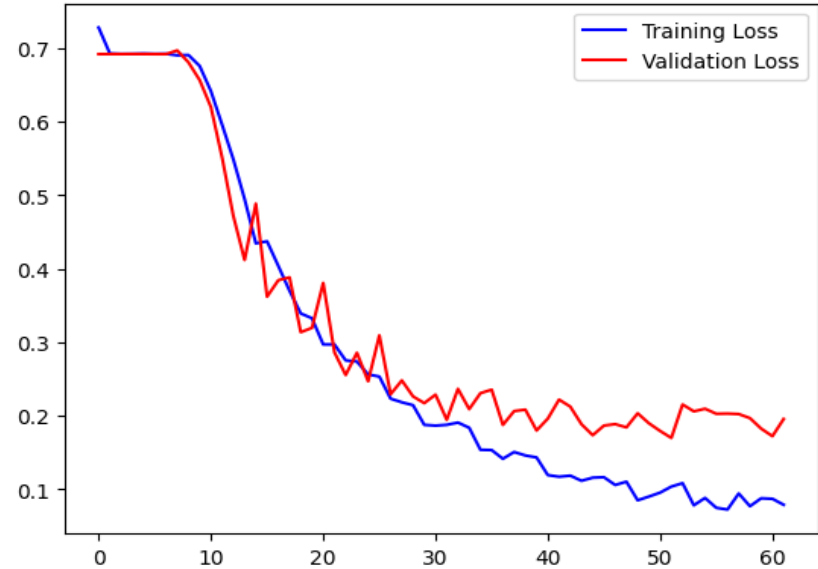
# Machine Learning Model : Data Collection

Accuracy Graph



Training accuracy: 97%  
Validation Accuracy: 93.52%

Loss Graph



Training loss: 79.10%  
Validation loss: 19.57%

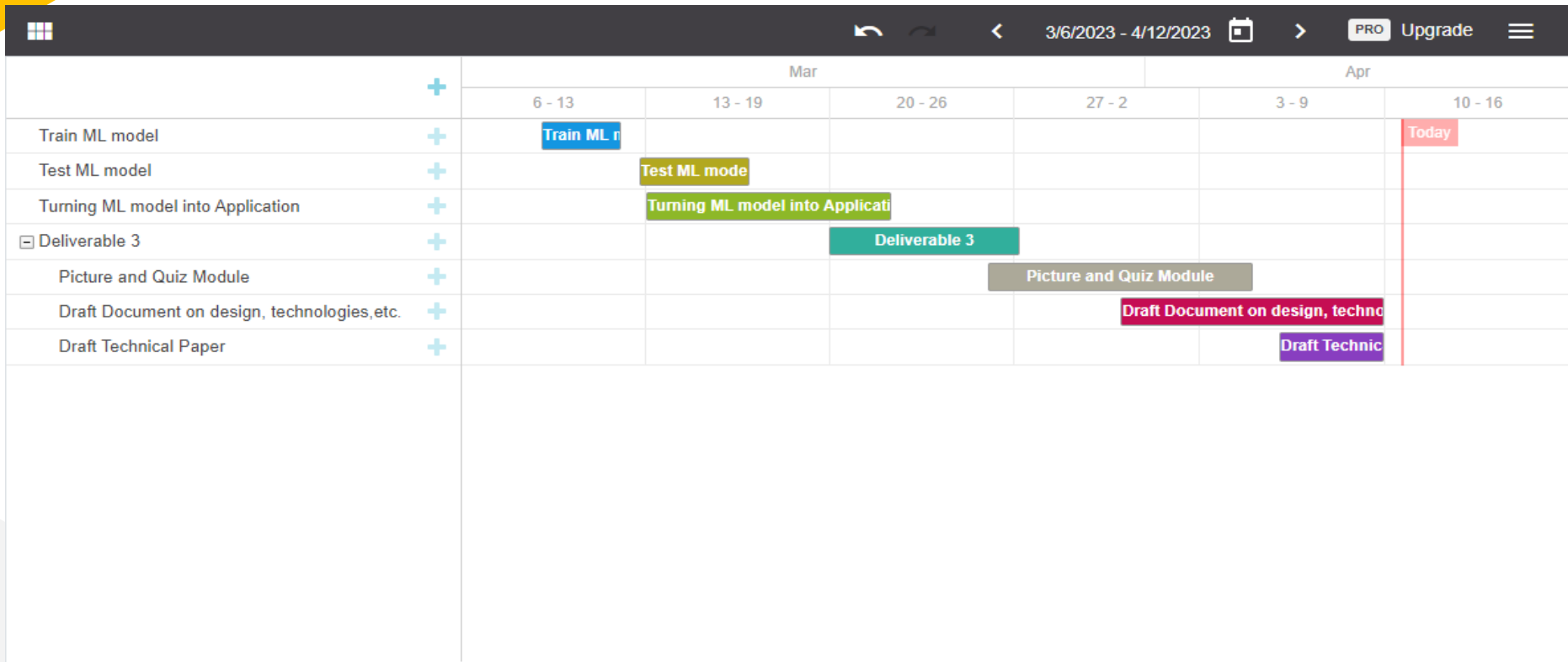
# Machine Learning Model : Data Collection



```
.. 1/1 [=====] - 33s 33s/step
Original : Predicted, depressed : depressed
1/1 [=====] - 0s 47ms/step
Original : Predicted, depressed : depressed
1/1 [=====] - 0s 12ms/step
Original : Predicted, depressed : depressed
1/1 [=====] - 0s 12ms/step
Original : Predicted, happy : happy
1/1 [=====] - 0s 41ms/step
Original : Predicted, happy : happy
1/1 [=====] - 0s 13ms/step
Original : Predicted, happy : happy
1/1 [=====] - 0s 12ms/step
Original : Predicted, happy : happy
{}
Overall Accuracy: 1.0
```



# Sprint 3 Schedule



	Apr																			May		
	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	01	02	03
Finish Application Development																						
Finish Project Demo																						
Finish Technical paper																						
Deliverable 4																						

# Retrospective

Overall, the team did a great job in delivering the third deliverable on time and with good quality. However, during the course of deliverable 3, it became clear that a technical paper was required, and this realization came rather late in the process. As a result, the team was under a great deal of stress to deliver the project on time, particularly given the mid-term exams that were taking place simultaneously.

Despite these challenges, the team pulled together and delivered everything needed for deliverable 3 on time. One area that could have been improved was communication. There were some breakdowns in communication regarding the technical paper, and the team could have benefited from more open and proactive communication about this requirement.

# Thank you



CS-691

Team 2: Bug Terminator

Depression Detection System

