

TEAM 01 - ANKIT KUMAR

Human Stress Detection & Prediction

Using ANN

Team Members:

1. Ankit Kumar - (Team Leader)
2. Kishore Batchala
3. Sheggari Pooja Goud
4. Amrutha Tamada
5. Anand Panda
6. Meera Iwar
7. Naga Sai Ganesh



Project Presentation



Presenter

(Sheggari Pooja Goud)

Project Introduction

Human Stress Detection and Prediction

Stress has become a significant health concern, impacting both physical and mental well-being. This project addresses the need for an efficient method to monitor and predict stress levels based on physiological data, offering users a proactive approach to managing stress.

Objective

This project aims to develop an Artificial Neural Network (ANN) model that predicts individual stress levels based on specific health parameters related to sleep, movement, and respiration.

Tools and Technologies

- Programming Language: Python
- Framework: Django
- IDE: Visual Studio Code
- Model Type: Artificial Neural Network (ANN)
- Data Visualization: Matplotlib, Seaborn



Project Overview

Project Uses

This project offers an accessible tool for stress monitoring, helping individuals to proactively understand and manage their stress levels. It serves as a practical application for everyday health management and preventive care.

User Tour

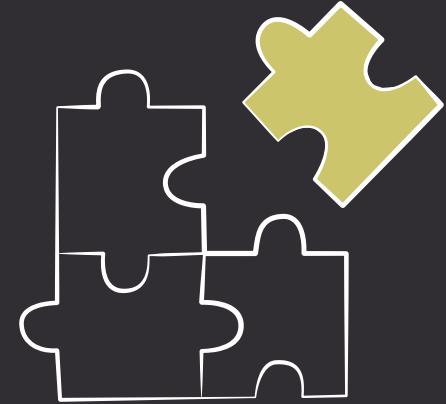
A Django-powered web app serves as the main interface, where users can:

Log in to access their personalized dashboard.

Input Health Data including parameters such as Snoring Rate, Respiratory Rate, Body Temperature, Limb Movement, and more.

Receive Stress Prediction Results generated by the ANN model, enabling them to track and manage stress effectively.

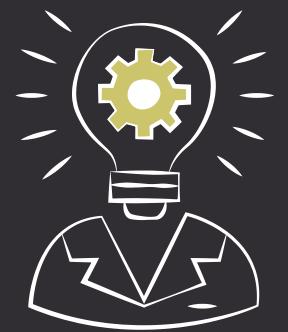
Project Milestone



Data Preprocessing & Visualizations

Preprocessed and cleaned data for accurate analysis. Used visualizations like bar charts, correlation matrices, and pair plots to uncover relationships among variables.

Milestone - 01



Model ANN Design

Designed the ANN model, with structured layers tailored to the input parameters, enabling robust stress level predictions.

Milestone - 02



Model Training and Visualization

Trained the model on the dataset, optimized hyperparameters, and visualized the training process with metrics like accuracy and loss to track model performance.

Milestone - 03



Model Deployment

Deployed the ANN model within the Django application, creating a seamless user experience where predictions are generated in real-time based on user inputs.

Milestone - 04

Milestone - 01

Data Preprocessing & Visualizations



Presenter

(Kishore Batchala)

Data Preprocessing & Visualizations

Dataset Description

	Snoring Rate	Respiratory Rate	Body Temperature	Limb Movement	Blood Oxygen	Eye Movement	Sleep Hours	Heart Rate	Stress Levels
count	630.000000	630.000000	630.000000	630.000000	630.000000	630.000000	630.000000	630.000000	630.000000
mean	71.600000	21.800000	92.800000	11.700000	90.900000	88.500000	3.700000	64.500000	0.600000
std	19.372833	3.966111	3.52969	4.299629	3.902483	11.893747	3.054572	9.915277	0.490287
min	45.000000	16.000000	85.000000	4.000000	82.000000	60.000000	0.000000	50.000000	0.000000
25%	52.500000	18.500000	90.50000	8.500000	88.500000	81.250000	0.500000	56.250000	0.000000
50%	70.000000	21.000000	93.000000	11.000000	91.000000	90.000000	3.500000	62.500000	1.000000
75%	91.250000	25.000000	95.500000	15.750000	94.250000	98.750000	6.500000	72.500000	1.000000
max	100.000000	30.000000	99.000000	19.000000	97.000000	105.000000	9.000000	85.000000	1.000000

Stress Levels

```
1    378  
0    252
```

```
Name: count, dtype: int64
```

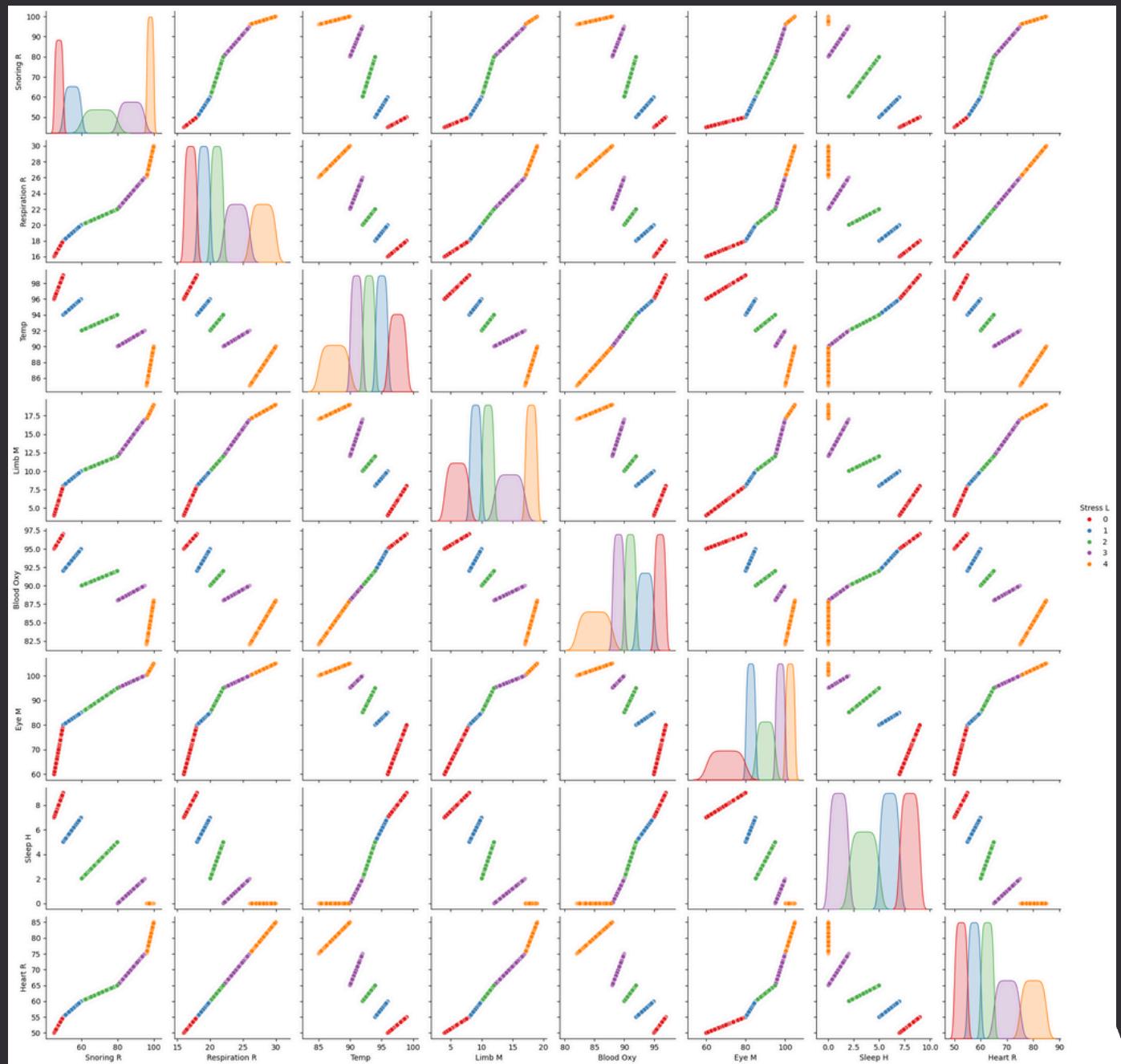
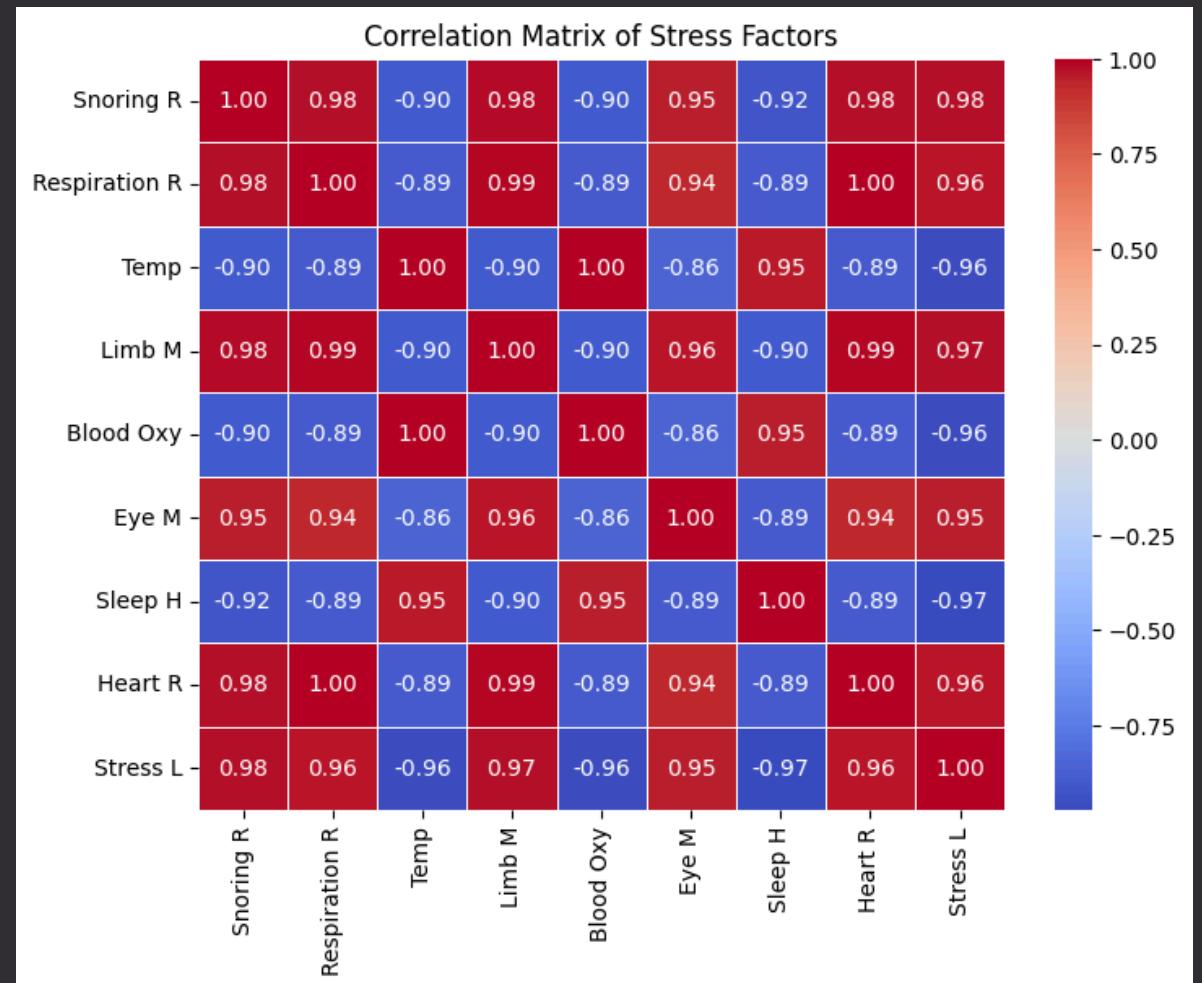
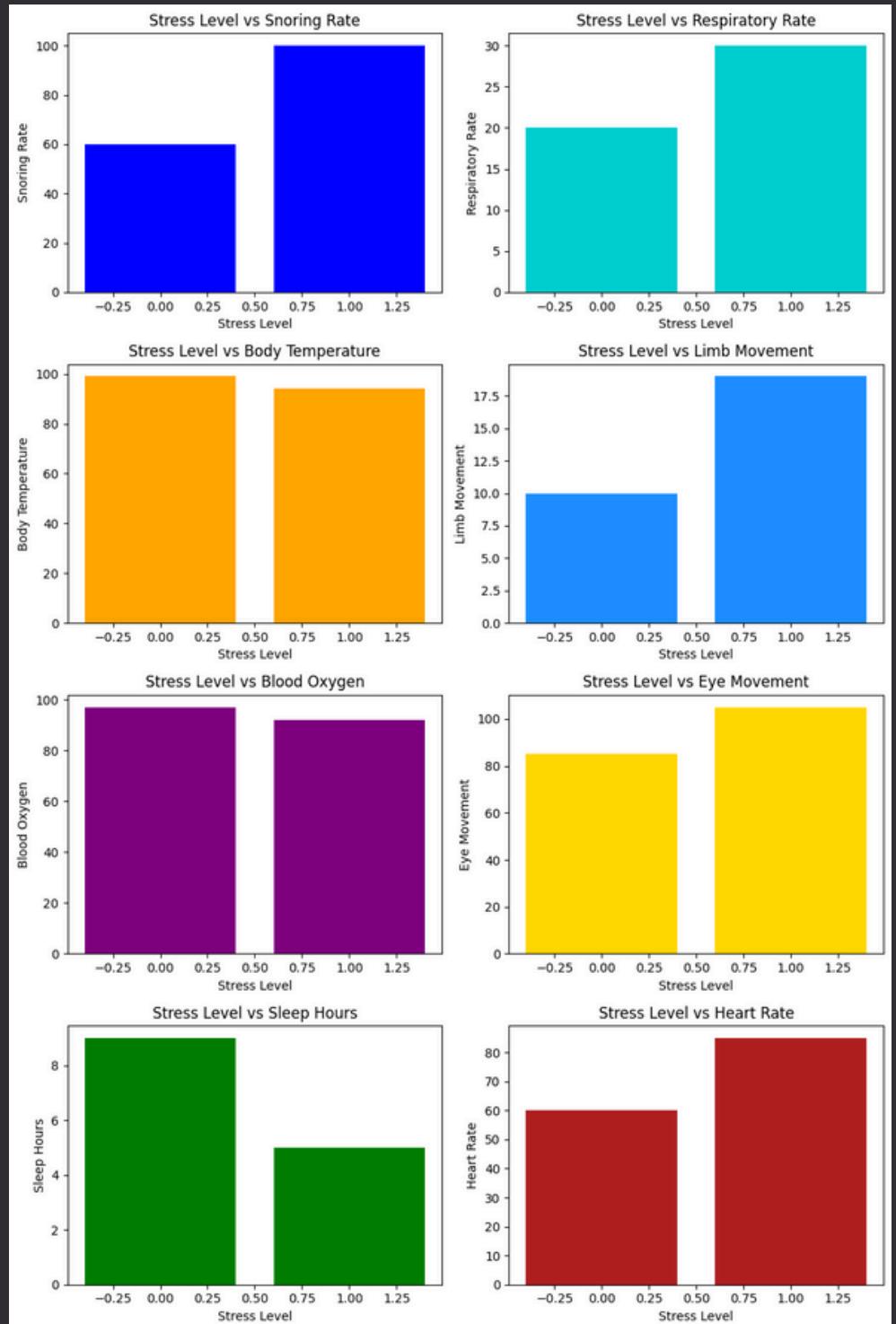
	Snoring Rate	Respiratory Rate	Body Temperature	Limb Movement	Blood Oxygen	Eye Movement	Sleep Hours	Heart Rate	Stress Levels
0	93.80	25.680	91.840	16.600	89.840	99.60	1.840	74.20	1
1	91.64	25.104	91.552	15.880	89.552	98.88	1.552	72.76	1
2	60.00	20.000	96.000	10.000	95.000	85.00	7.000	60.00	0
3	85.76	23.536	90.768	13.920	88.768	96.92	0.768	68.84	1
4	48.12	17.248	97.872	6.496	96.248	72.48	8.248	53.12	0

"This was the foundational step. We worked with physiological data recorded during sleep, such as heart rate, respiratory rate, and body movements. The data was cleaned, normalized, and visualized using tools like Matplotlib and Seaborn."

Dataset Source

Kaggle: Sleep Stress Parameters

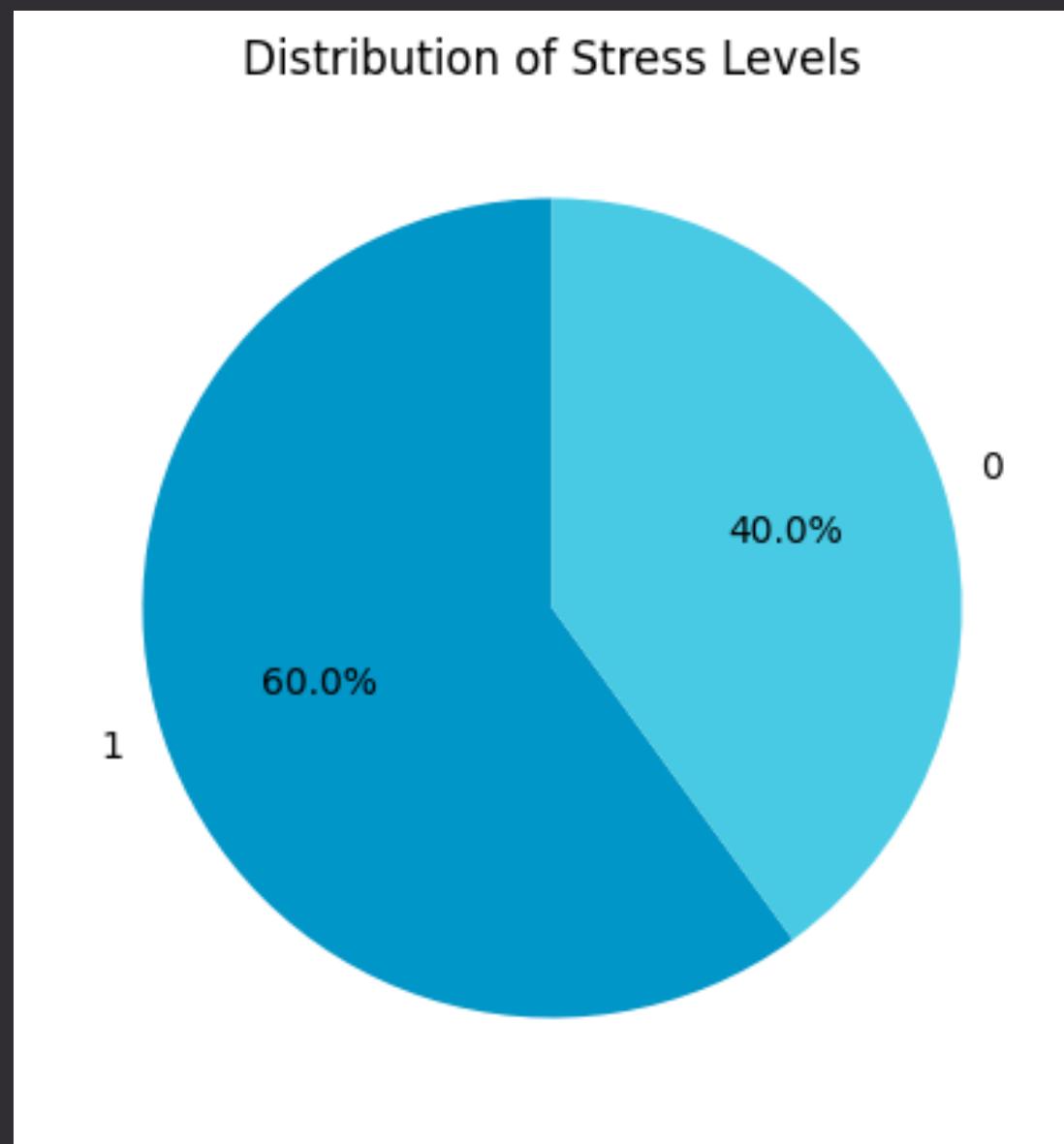
Data Preprocessing & Visualizations



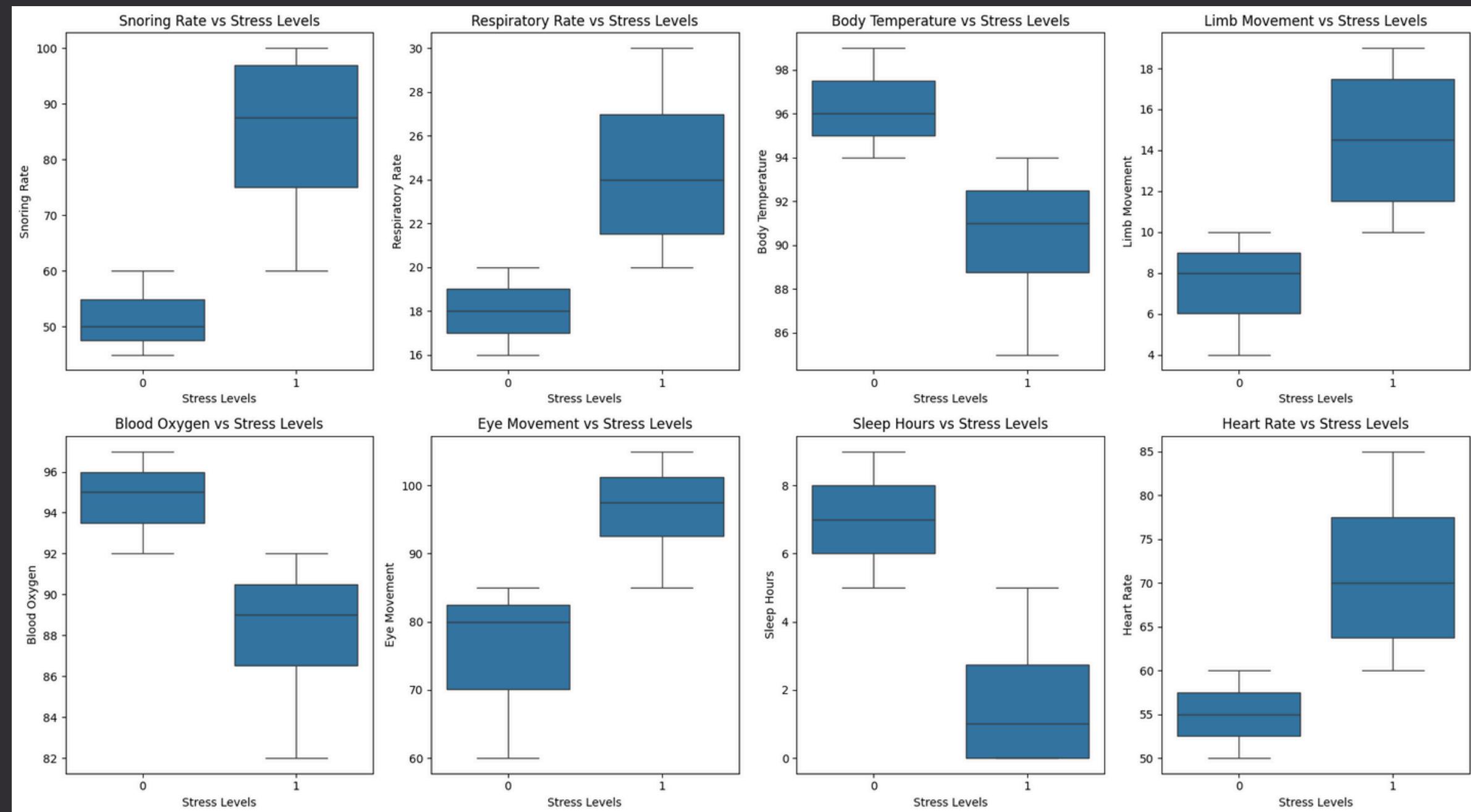
Bar Chart

3/5 Plots

Data Preprocessing & Visualizations



Pie Chart



Boxplot

5/5 Plots

Milestone - 02

Artificial Neural Network (ANN) Model Design



Presenter

(Amrutha Tamada)

Artificial Neural Network (ANN) Model Design

```
# Initializing the ANN model
model = Sequential()

# Adding input layer and the first hidden layer (neurons=64, activation='relu')
model.add(Dense(units=64, activation= 'relu', input_shape=(X_train.shape[1],)))

# Adding more hidden layers (neurons=32, activation='relu')
model.add(Dense(units=32, activation= 'relu'))

# Adding the output layer (for multi-class classification, use softmax)
model.add(Dense(units=1, activation= 'sigmoid')) # 2 classes for stress levels (0-1)

# Compile the model
model.compile(optimizer='adam', loss='binary_crossentropy', metrics=['accuracy'])

# View the model Summary
model.summary()
```

"Next, I designed the Artificial Neural Network. The ANN architecture consisted of:

- Input layer: Accepting multiple health parameters like heart rate and respiratory rate.
- Hidden layers: Implementing non-linear transformations to capture complex patterns in the data.
- Output layer: A binary classifier that predicts either 'Stressed' or 'Not Stressed.'

- The architecture was optimized to balance performance and computational efficiency."

Model: "sequential"

Layer (type)	Output Shape	Param #
dense (Dense)	(None, 64)	576
dense_1 (Dense)	(None, 32)	2,080
dense_2 (Dense)	(None, 1)	33

Total params: 2,689 (10.50 KB)

Trainable params: 2,689 (10.50 KB)

Non-trainable params: 0 (0.00 B)

Milestone - 03

Training and Evaluation with Visualization

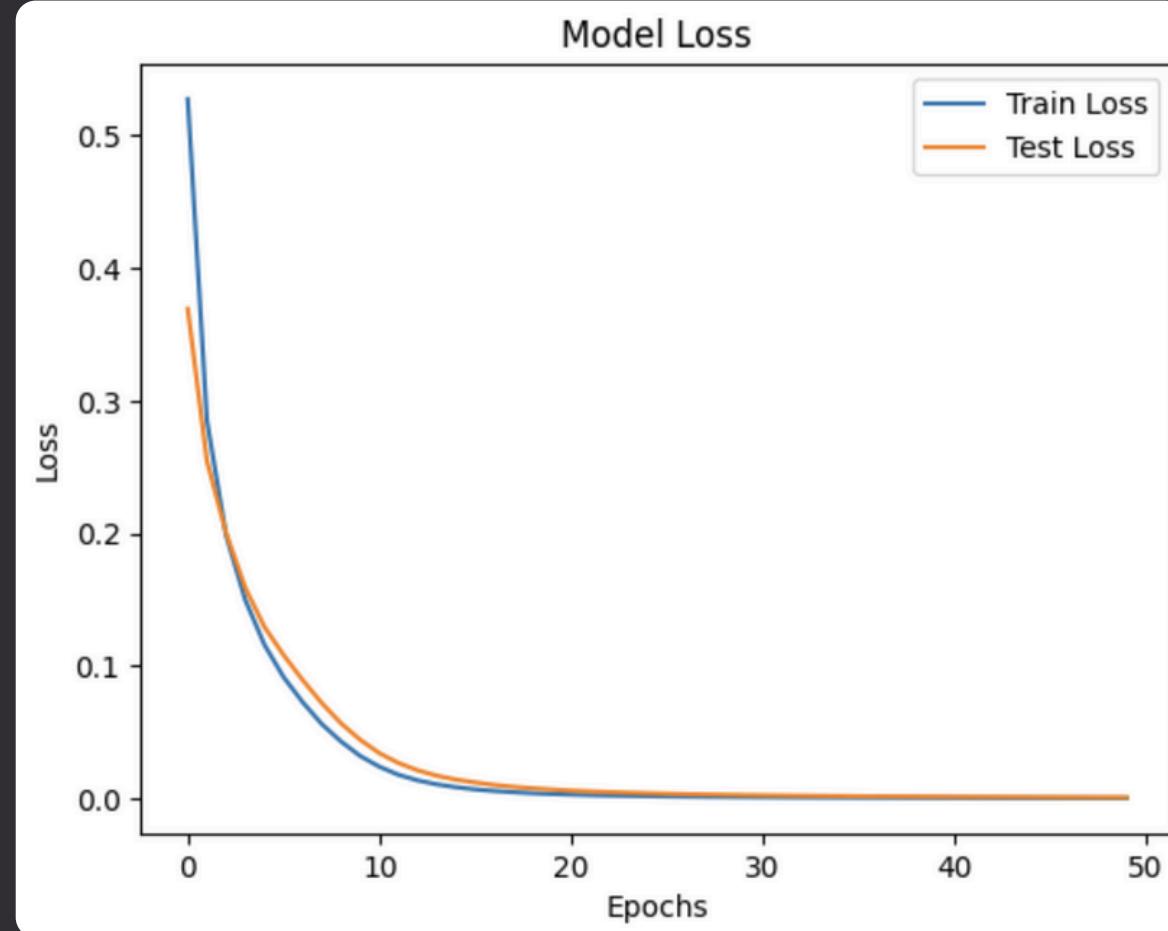
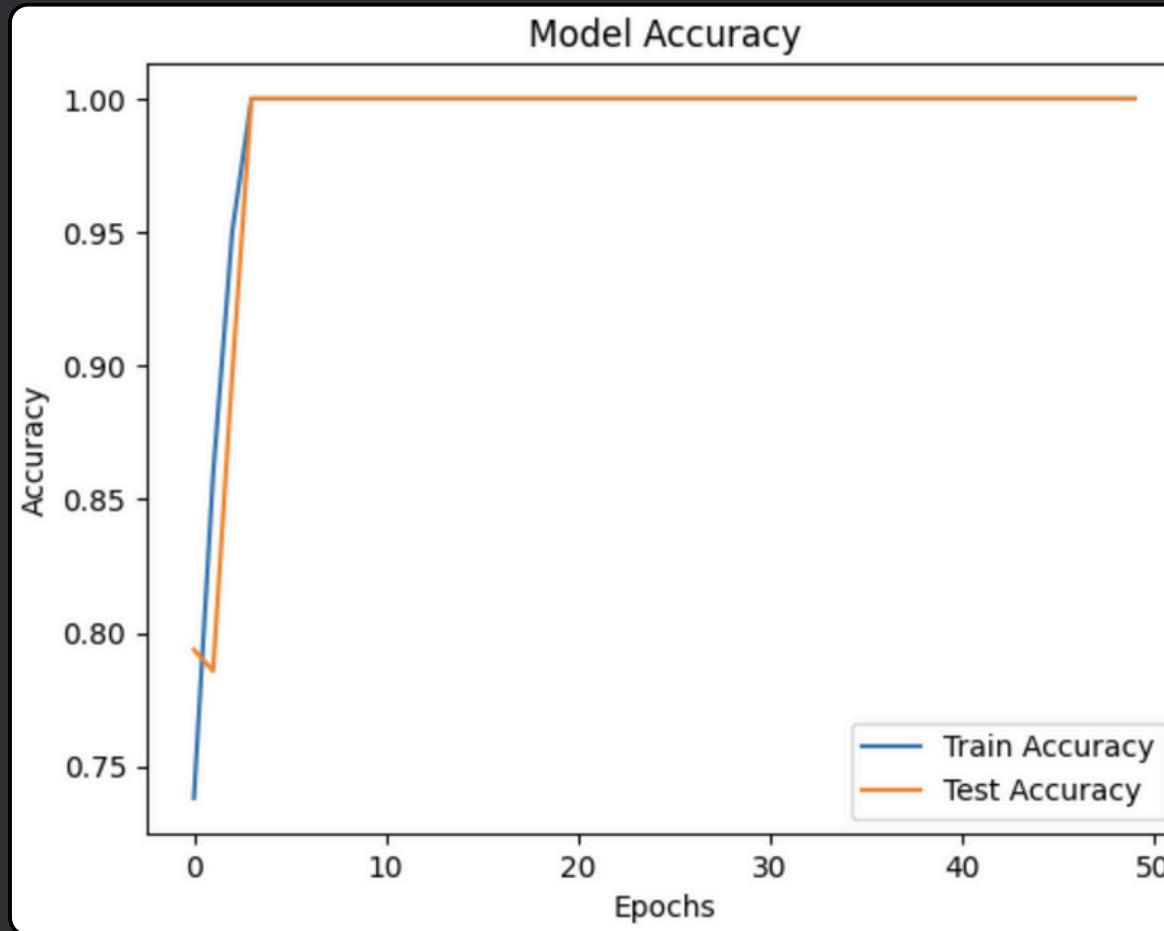


Presenter

(Naga Sai Ganesh)

Training and Evaluation with Visualization

```
# Training The Model  
history = model.fit(X_train_Scaled, y_train, epochs=50, batch_size=32, validation_data=(X_test_Scaled, y_test))
```



```
4/4 ━━━━━━━━ 0s 3ms/step - accuracy: 1.0000 - loss: 9.7250e-04  
Test Accuracy: 100.00  
Test Loss: 0.09
```

This was where the model truly came to life. We trained the ANN on a labeled dataset, fine-tuning hyperparameters to achieve the best results.

" The ANN model is trained using the training data. The model runs for a defined number of epochs:

- During training, I monitored metrics like accuracy and loss.
- Visualizations, such as training progress graphs, helped track improvements over each epoch.
- Once trained, the model achieved impressive performance metrics, including high precision."



Milestone - 04
Model Deployment



Presenter
(Anand Panda)

Model Deployment : Django

• Framework : Django

"Finally, We deployed the trained model into a Django-based web application. The web app offers a seamless user experience where individuals can:

1. Log in securely.
2. Input their physiological data.
3. Instantly receive their stress prediction, along with insights into contributing factors.

This step made the project accessible and actionable, bridging the gap between technology and real-world application."

• Why Django?

Django is a high-level Python web framework.

Rapid Development: Django allows quick development of web applications with its out-of-the-box features.

Scalability: Designed to scale seamlessly with growing application demands.

Built-in Features:

- User authentication system.

- Admin interface for database management.

- Middleware for security, such as CSRF and XSS protection.

ORM Support: Simplifies database queries with an object-relational mapper.



Model Deployment : Django

Working: API Endpoints and Data Flow

1. Login/Registration API:

User credentials are submitted and matched or registered in the database.
Upon successful authentication, a user session and CSRF token are created.

2. Data Entry and Submission API:

Accepts user inputs for prediction.
Validates and stores the data in the database.

3. Prediction API:

Processes the submitted data using the trained Artificial Neural Network (ANN) model.
Returns the prediction and redirects to the result page.

• Data Flow

Data Flow:

User -> Login/Register API -> Data Entry API -> Processing (ANN Model) -> Predict API -> Result Page



Database: SQL Implementation



Presenter

(Meera Iswar)

Database: SQL Implementation

• Database : SQL

Database Overview:

- MySQL is used as the database management system for structured data storage and efficient retrieval.

For database, We implemented MySQL. Which Store User Data Like:

1. Sign Up
2. Login
3. User Information
4. Stress Prediction Inputs
5. Stress Prediction Result

	id	username	fullname	email	password	Cpassword
*	2	Max100	Max M	alex123@gmail.com	1234	1234
	3	Max100	Max M	max123@gmail.com	100	100
	4	Max100	Max M	max123@gmail.com	100	100
	5	Max100	Max M	alex123@gmail.com	100	100
	6	Max100	Max M	alex123@gmail.com	100	100
	7	Max100	Max M	alex123@gmail.com	100	100
	8	Max100	Max M	alex123@gmail.com	pbkdf2_sha256\$870000\$vH8YnEKnJZNREvAFjlj...	pbkdf2_sha256\$870000\$vH8YnEKnJZNREvAF]
	9	Max100	Max M	alex1234@gmail.com	pbkdf2_sha256\$870000\$cT2i5DGszCBn1XsT65...	pbkdf2_sha256\$870000\$cT2i5DGszCBn1XsT65:
	10	tom1	tom m	tom123@gmail.com	tom	tom
	11	Ankit K	Ankit K...	ankit123@gmail.com	ankit123	ankit123
*	HULL	NULL	HULL	HULL	NULL	NULL

Signup Database



	id	name	age	gender	location	username	password
	1	Elon	34	Male	USA	alex95	12345
	2	Elon	34	Male	USA	alex95	12345
	3	Alex	24	Male	UAE	alex98	1234
	4	Alex	23	Male	UAE	alex98	1234
	5	Alex	23	Male	USA	alex98	1234
	6	elon	34	Male	USA	alex95	12345
	7	elon	34	Male	UAE	alex98	1234
	8	Alex	40	Male	USA	alex98	1234
	9	Alex	40	Male	USA	alex98	1234
	10	Alex	34	Male	UAE	alex98	1234
	11	Alex	34	Male	UAE	alex98	1234
	12	Tom M	28	Male	New York	tom1	tom

Login Database

Database: SQL Implementation

• Database : SQL

Integration:

- The application interacts with the MySQL database using SQL queries for data insertion, retrieval, and update operations.
- Seamless integration ensures real-time data flow between the web app and the database.
- User Authentication: Handles Sign Up and Login operations securely.
- User Information: Stores personal details such as name, age, gender, and location.
- Stress Prediction Inputs & Results : Records the health parameters provided by users for stress level prediction.



	Snoring_Rate	Respiratory_Rate	Body_Temperature	Limb_Movement	Blood_Oxygen	Eye_Movement	Sleep_Hours	Heart_Rate	Prediction
▶	55	20	88	12	88	90	5	66	Stressed
	55	20	88	12	88	90	5	66	Stressed
	45	14	80	10	88	55	9	66	Not Stressed
	45	14	80	10	88	55	9	66	Not Stressed
	55	20	89	11	88	70	5	80	Not Stressed
	77	34	88	20	98	80	5	88	Stressed
	45	15	98	10	90	66	9	72	Not Stressed
	45	34	88	19	98	99	4	80	Stressed
	55	20	98	20	99	80	5	72	Stressed
	55	25	88	20	88	77	6	60	Stressed
	45	20	88	10	88	77	9	75	Not Stressed

Stress Data Input & Result Database

	id	Full_Name	Age	Gender	Location	Username	Prediction
▶	1	Alex	34	Male	USA	tom1	Not Stressed
	2	Elon	45	Male	USA	tom1	Stressed
	3	Elon	45	Male	USA	tom1	Stressed
	4	Elon	45	Male	USA	tom1	Stressed
	5	Elon	45	Male	USA	tom1	Stressed
	6	Elon	45	Male	USA	tom1	Stressed
	7	Elon	45	Male	USA	tom1	Stressed
	8	Elon	45	Male	USA	tom1	Stressed
	9	Elon	45	Male	USA	tom1	Stressed
	10	Elon	45	Male	USA	tom1	Stressed
	11	Elon	45	Male	USA	tom1	Stressed
	12	Elon	45	Male	USA	tom1	Stressed

User Info & Stress Result Database

User Interface & Tour



Presenter

(Ankit Kumar - Team Leader)

Home Page

STRESSOGNOSTIC

HOME ABOUT HELP CONTACT

Sign Up Log In

CHECK YOUR STRESS NOW

EASY TO CHECK YOUR STRESS USING ANN

LOGIN & CHECK

© 2024 Stressognostic. All rights reserved.
Designed & Developed By Ankit Kumar

This is the Home or Landing page of my Website. Here Explore different sections Like: About, Help & Contact. You Can Directly Login and Sign Up from the Home.

About Page

STRESSOGNOSTIC

HOME ABOUT HELP CONTACT Sign Up Log In

Understanding Stress and Our Mission

What is Stress?

Stress is a natural response of the body and mind to challenges or demands. It can arise from daily responsibilities, unexpected challenges, or even exciting opportunities. While stress is a normal part of life, chronic stress can significantly impact physical, emotional, and mental well-being. Factors such as workload, financial concerns, relationships, or environmental pressures can trigger stress, affecting people differently.



Our Mission STRESSOGNOSTIC

Insomnia Leading cause of Stress	75% Adults Experiencing High Levels of Stress	1 in 5 Adults Globally Experience Mental Health Challenges	7-9 hrs Sleep Can Reduce Stress Levels
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Why Predict Stress?

This "About Page" of "Stressognostic" website introduces its mission to help users understand stress and its impacts. It defines stress as a natural response to challenges and highlights how chronic stress can affect mental, emotional, and physical well-being.

Help Page

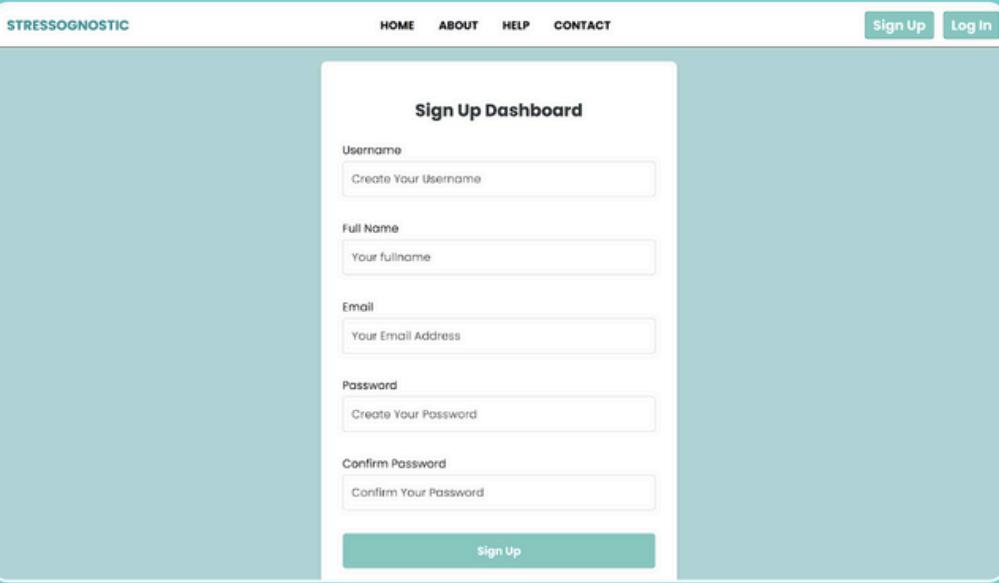
STRESSOGNOSTIC

HOME ABOUT HELP CONTACT Sign Up Log In

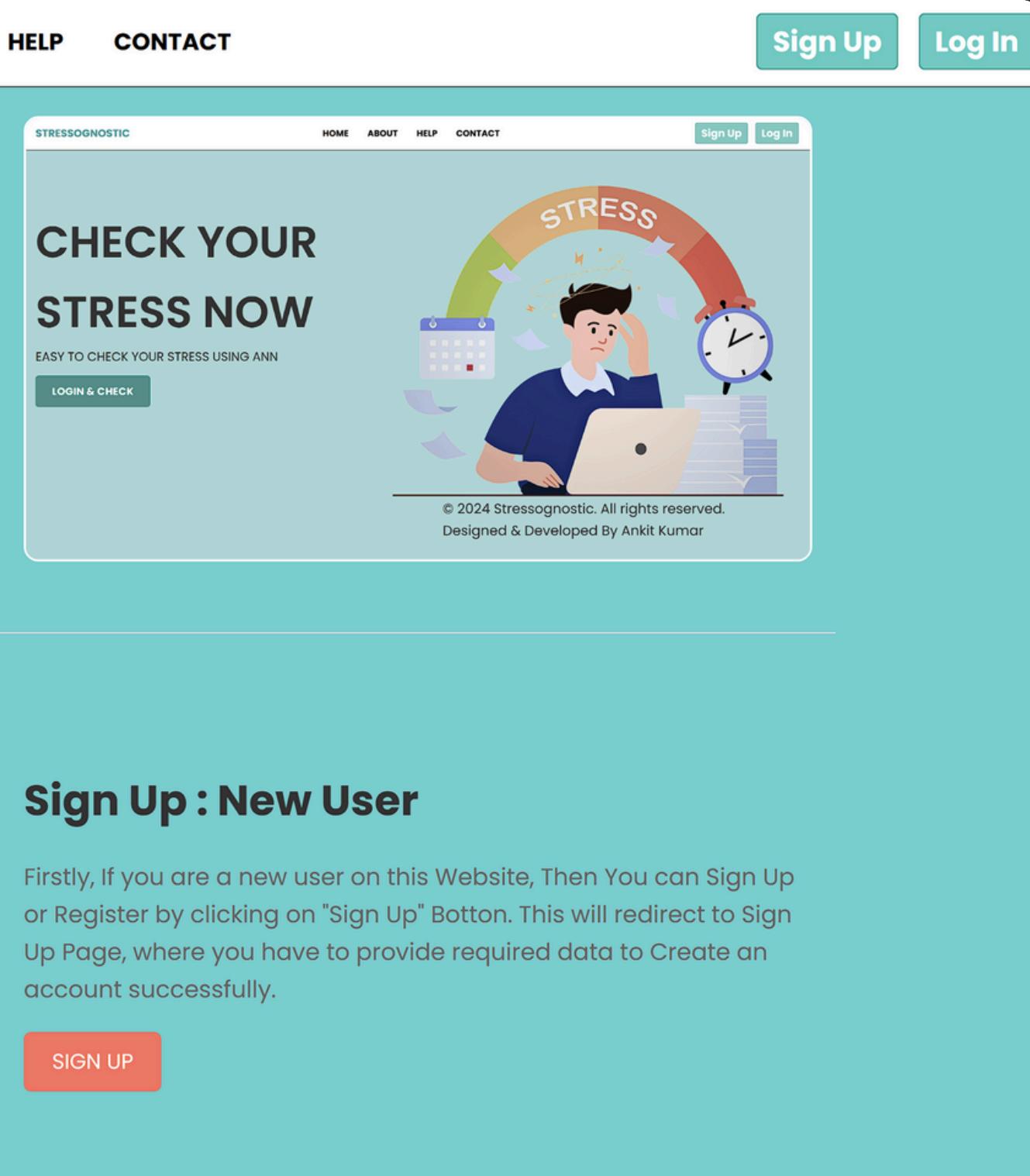
Home : STRESSOGNOSTIC

This is the Home or Landing page of my Website. Here Explore different sections Like: About, Help & Contact. You Can Directly Login and Sign Up from the Home.

[HOME](#)



The screenshot shows the Stressognostic home page. At the top, there's a navigation bar with links for HOME, ABOUT, HELP, CONTACT, Sign Up, and Log In. Below the navigation is a large teal header section with the text "Home : STRESSOGNOSTIC". Underneath, there's a paragraph of descriptive text. At the bottom of the teal section is a red "HOME" button. The main content area has a light blue background with a central graphic. The graphic features a stylized illustration of a person sitting at a desk with a laptop, looking stressed. Above the person is a circular meter-like graphic divided into three segments: green, yellow, and red. The word "STRESS" is written across the red segment. To the left of the meter, there's text that reads "EASY TO CHECK YOUR STRESS USING ANN" and a "LOGIN & CHECK" button. At the bottom right of the graphic, it says "© 2024 Stressognostic. All rights reserved. Designed & Developed By Ankit Kumar".



The screenshot shows the Stressognostic sign-up page. At the top, there's a navigation bar with links for HOME, ABOUT, HELP, CONTACT, Sign Up, and Log In. Below the navigation is a form titled "Sign Up Dashboard". The form contains five input fields: "Username" (placeholder: "Create Your Username"), "Full Name" (placeholder: "Your fullname"), "Email" (placeholder: "Your Email Address"), "Password" (placeholder: "Create Your Password"), and "Confirm Password" (placeholder: "Confirm Your Password"). At the bottom of the form is a green "Sign Up" button.

Sign Up : New User

Firstly, If you are a new user on this Website, Then You can Sign Up or Register by clicking on "Sign Up" Botton. This will redirect to Sign Up Page, where you have to provide required data to Create an account successfully.

[SIGN UP](#)

This "Help Page" of the Stressognostic WebApp provides a user-friendly guide for navigating and utilizing the platform, enabling users to evaluate their stress levels easily. Additionally, it includes a step-by-step guide for new users to create an account through the Sign-Up Dashboard, ensuring a seamless onboarding process.

Contact Page

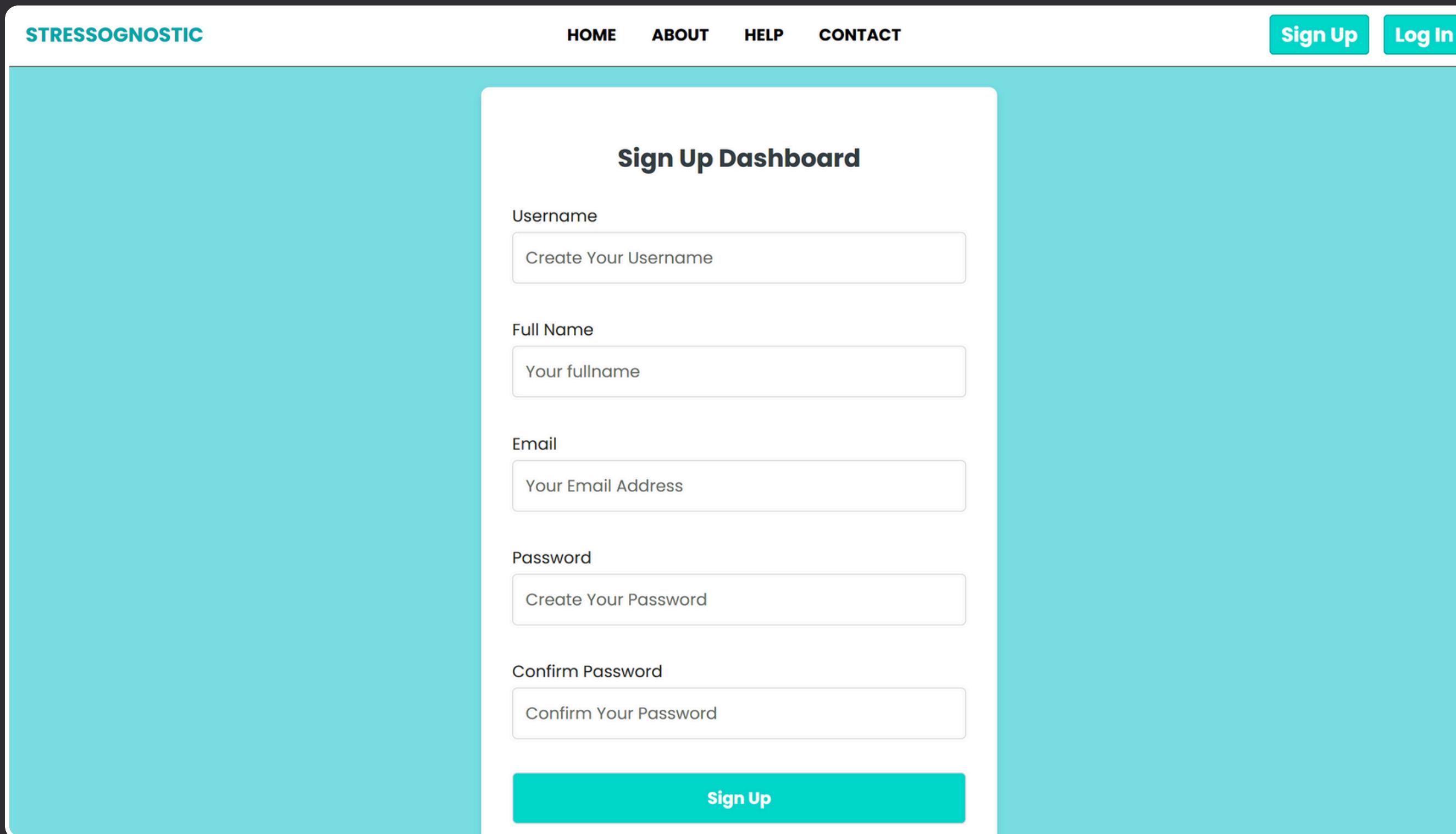
The screenshot shows the "Contact Me" section of the Stressognostic website. At the top, there's a teal header with the title "Contact Me". Below it, a sub-header says: "There are lots of ways to contact STRESSOGNOSTIC – please read the options below to make sure you're using the best one." Three main contact methods are listed in boxes:

- Send Mail**: Includes an email icon and the address "ankitkumar6060@gmail.com". A "Send Mail" button is present.
- Connect On LinkedIn**: Includes a LinkedIn icon and the profile "ANKIT KUMAR ankitkumar6060". A "LinkedIn" button is present.
- Follow On Instagram**: Includes an Instagram icon and the handle "pixel.lens_____". An "Instagram" button is present.

Below these boxes, under the heading "General Inquiries", it says: "For other inquiries, use the form below and we'll direct your message to the right place." A "Name" input field is shown at the bottom of the form area.

The "Contact Page" of the Stressognostic WebApp offers multiple ways to connect for support or inquiries. Users can reach out via email, LinkedIn, or Instagram for updates. Additionally, a general inquiry form is available for personalized messages. This page makes it simple for users to interact with the developer or seek help directly.

Sign Up Page



Firstly, If you are a new user on this Website, Then You can Sign Up or Register by clicking on "Sign Up" Botton. This will redirect to Sign Up Page, where you have to provide required data to Create an account successfully.

Login Page

The screenshot shows the Stressognostic login page. At the top, there is a navigation bar with links for HOME, ABOUT, HELP, and CONTACT. On the right side of the navigation bar are two buttons: "Sign Up" and "Log In". The main content area contains several input fields:

- A "Age" input field.
- A "Gender:" section with radio buttons for "Male" and "Female".
- A "Location" input field.
- A "Login Details" section containing "Username" and "Password" fields, both labeled "Enter Your [Field]".
- A large teal "Login" button at the bottom.

After SignUp/Existing User Can Login into their account. For Login You have to provide some Personal Information and then Login - Username & Password for Successful Login into your account.

Home Page: After Login

STRESSOGNOSTIC

HOME ABOUT HELP CONTACT

Sign Out Log In

Your are Logged in ✓
»» Ankit K

Message: Your Account Has Been Successfully Created. X
Message: Logged in successfully! X

CHECK YOUR STRESS NOW

EASY TO CHECK YOUR STRESS USING ANN

CHECK STRESS



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Designed & Developed By Ankit Kumar

After Successful Login
You will redirect to
Home Page with
Logged in Home, Where
your Username will
Show and Stress Check
Button will Available &
Click to Check Stress.

Check Stress: Data Input

The screenshot shows a web application titled "Stressognostic" with a teal header bar. The header includes the brand name "STRESSOGNOSTIC" on the left, and navigation links "HOME", "ABOUT", "HELP", and "CONTACT" in the center, along with "Sign Out" and "Log In" buttons on the right.

The main content area is titled "Stress Detection Prediction". It contains a form for inputting stress parameters:

- Predict Stress**: A section header.
- Snoring Rate: [45 - 100]**: An input field containing the value **55**.
- Respiratory Rate: [15 - 35]**: An input field containing the value **25**.
- Body Temperature(°F): [80 - 98]**: An input field containing the value **88**.
- Limb Movement: [05 - 20]**: An input field containing the value **1**.
- Blood Oxygen: [85 - 100]**: An input field containing the value **85**.
- Eye Movement: [64 - 105]**: An input field containing the value **85**.

To Check Your Stress,
Input Your Stress
Parameters data Like:
Respiration, Sleep,
Movement etc. Then
You have to just Click
on "Predict Stress
Level" & You will
redirect to your stress
result Dashboard.

Stress Result: Not Stressed

The screenshot shows the Stressognostic website interface. At the top, there is a navigation bar with links for HOME, ABOUT, HELP, CONTACT, CHECK AGAIN, Sign Out, and Log In. The main content area displays the prediction result "Not Stressed" in a large green button. Below this, there is a section titled "Personal Information" containing five data points: Username (Ankit K), Full Name (Ankit), Age (20), Gender (Male), and Location (New Delhi, Delhi, IND). The background of the main content area is light blue.

Personal Information	Value
Username	Ankit K
Full Name	Ankit
Age	20
Gender	Male
Location	New Delhi, Delhi, IND

After Input data If You are "Not Stressed": Then this interface will show along with Personal Information. You Can Recheck You Stress Using Above "Check Again" Button. You can scroll to get some suggestions to Stay Calm and Stress Free.

Stress Result: Stressed

The screenshot shows a web application interface for 'STRESSOGNOSTIC'. At the top, there is a navigation bar with links for 'HOME', 'ABOUT', 'HELP', 'CONTACT', 'CHECK AGAIN', 'Sign Out', and 'Log In'. The main content area is titled 'YOUR PREDICTION RESULT' and displays a large red button with the word 'Stressed' in white. Below this, under the heading 'Personal Information', there are five data fields: 'Username' (Ankit K), 'Full Name' (Ankit), 'Age' (20), 'Gender' (Male), and 'Location' (New Delhi, Delhi, IND). The entire interface has a light blue background.

STRESSOGNOSTIC

HOME ABOUT HELP CONTACT CHECK AGAIN Sign Out Log In

YOUR PREDICTION RESULT

Stressed

Personal Information

Username: Ankit K

Full Name: Ankit

Age: 20

Gender: Male

Location: New Delhi, Delhi, IND

After Input data If You are "Stressed": Then this interface will show along with Personal Information. You Can Recheck You Stress Using Above "Check Again" Button. You can scroll to get some suggestions to Stay Calm and Stress Free.

Conclusions



This project demonstrates the potential of AI in health management through a predictive model that allows users to monitor their stress levels effectively. With a focus on user accessibility, this tool integrates real-time data processing and prediction, offering valuable insights into individual stress profiles.

Future advancements may include the incorporation of additional health metrics to enhance prediction accuracy and expansion to accommodate larger datasets, making stress monitoring even more comprehensive and precise.

Infosys Springboard

Human Stress Detection & Prediction

Ankit Kumar

Thank You

