**Algorithms**

**WEBSITE + CHATBOT:**

**INDEX.HTML:**

BEGIN HTML\_DOCUMENT

BEGIN HEAD

SET document\_title TO "MART-B"

SET character\_encoding TO UTF-8

SET viewport TO width=device-width, initial-scale=1, user-scalable=no

LINK stylesheet "assets/css/main.css"

IF javascript\_disabled THEN

LINK stylesheet "assets/css/noscript.css"

END IF

END HEAD

BEGIN BODY with class "is-preload"

BEGIN SECTION id="sidebar"

BEGIN DIV class="inner"

BEGIN NAVIGATION

CREATE unordered\_list

ADD list\_item with link TO "#intro" AND text "Welcome"

ADD list\_item with link TO "#one" AND text "What We Do"

END NAVIGATION

END DIV

END SECTION

BEGIN DIV id="wrapper"

BEGIN SECTION id="intro" class="wrapper style1 fullscreen fade-up"

BEGIN DIV class="inner"

CREATE heading1 with text "MART-B"

CREATE paragraph with welcome\_text

CREATE unordered\_list class="actions"

ADD list\_item with button\_link TO "#one" AND text "Learn more"

END DIV

END SECTION

BEGIN SECTION id="one" class="wrapper style2 spotlights"

BEGIN SECTION

CREATE image\_link with source "images/pic01.jpg" AND alt\_text ""

BEGIN DIV class="content"

BEGIN DIV class="inner"

CREATE heading2 with text "Why?"

CREATE paragraph with explanation\_text

CREATE unordered\_list class="actions"

ADD list\_item with button\_link TO "info.html" AND text "Learn more"

END DIV

END DIV

END SECTION

BEGIN SECTION

CREATE image\_link with source "images/pic02.jpg" AND alt\_text ""

BEGIN DIV class="content"

BEGIN DIV class="inner"

CREATE heading2 with text "Our Solution"

CREATE paragraph with solution\_text

CREATE unordered\_list class="actions"

ADD list\_item with button\_link TO "generic.html" AND text "Learn more"

END DIV

END DIV

END SECTION

BEGIN SECTION

CREATE image\_link with source "images/pic03.jpg" AND alt\_text ""

BEGIN DIV class="content"

BEGIN DIV class="inner"

CREATE heading2 with text "Your Meditation Guide"

CREATE paragraph with guide\_text

CREATE paragraph with disclaimer\_text

CREATE unordered\_list class="actions"

ADD list\_item with button\_link TO chatbot\_url AND text "Learn more"

END DIV

END DIV

END SECTION

END SECTION

END DIV

BEGIN FOOTER id="footer" class="wrapper style1-alt"

BEGIN DIV class="inner"

CREATE unordered\_list class="menu"

ADD list\_item with text "MART-B"

END DIV

END FOOTER

LOAD\_SCRIPT "assets/js/jquery.min.js"

LOAD\_SCRIPT "assets/js/jquery.scrollex.min.js"

LOAD\_SCRIPT "assets/js/jquery.scrolly.min.js"

LOAD\_SCRIPT "assets/js/browser.min.js"

LOAD\_SCRIPT "assets/js/breakpoints.min.js"

LOAD\_SCRIPT "assets/js/util.js"

LOAD\_SCRIPT "assets/js/main.js"

END BODY

END HTML\_DOCUMENT

**GENERIC.HTML:**

BEGIN HTML\_DOCUMENT

BEGIN HEAD

SET document\_title TO "STRESS MONITOR"

SET character\_encoding TO UTF-8

SET viewport TO width=device-width, initial-scale=1, user-scalable=no

LINK stylesheet "assets/css/main.css"

IF javascript\_disabled THEN

LINK stylesheet "assets/css/noscript.css"

END IF

END HEAD

BEGIN BODY with class "is-preload"

BEGIN HEADER id="header"

CREATE link TO "index.html" with class "title" AND text "Back to Home"

BEGIN NAVIGATION

CREATE unordered\_list

ADD list\_item with link TO "index.html" AND text "Home"

ADD list\_item with link TO "generic.html" AND text "Monitor Stress" AND class "active"

ADD list\_item with link TO chatbot\_url AND text "Chatbot"

ADD list\_item with link TO "info.html" AND text "Info"

END NAVIGATION

END HEADER

BEGIN DIV id="wrapper"

BEGIN SECTION id="main" class="wrapper"

BEGIN DIV class="inner"

CREATE heading1 with class "major" AND text "User Guide"

CREATE heading2 with text "Please read the guide below to operate the device:"

CREATE paragraph

ADD welcome\_text

CREATE ordered\_list

ADD list\_item with text "Stress Monitor:"

CREATE unordered\_list

ADD list\_item with text about visual mode

ADD list\_item with text about audio mode

ADD list\_item with text "Meditation Assistance:"

CREATE unordered\_list

ADD list\_item with text about visual mode

ADD list\_item with text about audio mode

ADD instructions\_text

END DIV

END SECTION

END DIV

BEGIN FOOTER id="footer" class="wrapper alt"

BEGIN DIV class="inner"

CREATE unordered\_list class="menu"

ADD list\_item with text "MART-B"

END DIV

END FOOTER

LOAD\_SCRIPT "assets/js/jquery.min.js"

LOAD\_SCRIPT "assets/js/jquery.scrollex.min.js"

LOAD\_SCRIPT "assets/js/jquery.scrolly.min.js"

LOAD\_SCRIPT "assets/js/browser.min.js"

LOAD\_SCRIPT "assets/js/breakpoints.min.js"

LOAD\_SCRIPT "assets/js/util.js"

LOAD\_SCRIPT "assets/js/main.js"

END BODY

END HTML\_DOCUMENT

**INFO.HTML:**BEGIN HTML\_DOCUMENT

BEGIN HEAD

SET document\_title TO "Deep Dive"

SET character\_encoding TO UTF-8

SET viewport TO width=device-width, initial-scale=1, user-scalable=no

LINK stylesheet "assets/css/main.css"

IF javascript\_disabled THEN

LINK stylesheet "assets/css/noscript.css"

END IF

END HEAD

BEGIN BODY with class "is-preload"

BEGIN HEADER id="header"

CREATE link TO "index.html" with class "title" AND text "Back to Home"

BEGIN NAVIGATION

CREATE unordered\_list

ADD list\_item with link TO "index.html" AND text "Home"

ADD list\_item with link TO "info.html" AND text "Info" AND class "active"

ADD list\_item with link TO "generic.html" AND text "Monitor Stress"

ADD list\_item with link TO chatbot\_url AND text "Chatbot"

END NAVIGATION

END HEADER

BEGIN DIV id="wrapper"

BEGIN SECTION id="main" class="wrapper"

BEGIN DIV class="inner"

CREATE heading1 with class "major" AND text "Deep Dive"

CREATE paragraph with stress\_overview\_text

CREATE paragraph with text "The following statistics highlight how widespread high-stress levels have become:"

CREATE ordered\_list

ADD list\_item with text about K-12 students stress

ADD list\_item with text about college students psychological distress

ADD list\_item with text about mental health impact

ADD list\_item with text about stressful life events

ADD list\_item with text about sleep and stress

ADD list\_item with text about financial stress

ADD list\_item with text about loneliness

ADD list\_item with text about suicidal behavior

ADD list\_item with text about anxiety and depression

END DIV

END SECTION

END DIV

BEGIN FOOTER id="footer" class="wrapper alt"

BEGIN DIV class="inner"

CREATE unordered\_list class="menu"

ADD list\_item with text "MART-B"

END DIV

END FOOTER

LOAD\_SCRIPT "assets/js/jquery.min.js"

LOAD\_SCRIPT "assets/js/jquery.scrollex.min.js"

LOAD\_SCRIPT "assets/js/jquery.scrolly.min.js"

LOAD\_SCRIPT "assets/js/browser.min.js"

LOAD\_SCRIPT "assets/js/breakpoints.min.js"

LOAD\_SCRIPT "assets/js/util.js"

LOAD\_SCRIPT "assets/js/main.js"

END BODY

END HTML\_DOCUMENT

**GEMBOT.PY:**IMPORT streamlit library

IMPORT vertexai library

IMPORT GenerativeModel from vertexai.generative\_models

SET PROJECT\_ID TO "unified-atom-441618-q6"

INITIALIZE vertexai with PROJECT\_ID and location "us-central1"

CREATE GenerativeModel named model with parameters:

SET model\_name TO "gemini-1.5-flash-002"

SET system\_instruction TO "You are an empathetic friend and a calming meditation instructor."

FUNCTION generate\_response(prompt)

TRY

SET response TO model.generate\_content(prompt)

RETURN response.text

CATCH Exception as e

DISPLAY error message

RETURN "I'm having trouble understanding. Can you try rephrasing?"

FUNCTION generate\_meditation\_script(type="deep breathing", duration=5, user\_name="friend")

SET prompt TO formatted string with type, duration, and user\_name

RETURN generate\_response(prompt)

FUNCTION provide\_stress\_advice()

SET prompt TO "Provide advice on managing stress and anxiety in a gentle, understanding tone."

RETURN generate\_response(prompt)

FUNCTION generate\_empathetic\_response(emotion)

SET prompt TO formatted string with emotion

RETURN generate\_response(prompt)

DISPLAY title "Meditation & Wellness Chatbot"

DISPLAY welcome message

IF "chat\_history" NOT IN session\_state THEN

INITIALIZE chat\_history as empty list in session\_state

CREATE text input field for user\_input

IF send button is clicked AND user\_input is not empty THEN

IF "meditation" IN lowercase user\_input THEN

IF "meditation\_type" NOT IN session\_state THEN

PROMPT user for meditation\_type and meditation\_duration

ELSE

SET response TO generate\_meditation\_script with session\_state values

ADD user\_input and response to chat\_history

REMOVE meditation\_type and meditation\_duration from session\_state

ELSE IF "stress" IN lowercase user\_input THEN

SET response TO provide\_stress\_advice()

ADD user\_input and response to chat\_history

ELSE IF "feeling" IN lowercase user\_input THEN

EXTRACT emotion from user\_input

IF emotion is not empty THEN

SET response TO generate\_empathetic\_response(emotion)

ADD user\_input and response to chat\_history

ELSE

SET response TO generate\_response(user\_input)

ADD user\_input and response to chat\_history

FOR EACH sender, message IN chat\_history

IF sender is "User" THEN

DISPLAY "You: " + message

ELSE

DISPLAY "Chatbot: " + message

**Adafruit Device:**

INCLUDE Adafruit\_CircuitPlayground library

INCLUDE PulseSensorPlayground library

DEFINE PULSE\_INPUT\_PIN as 7

DEFINE NUM\_PIXELS as 10

DEFINE FIRST\_BREATH\_LED as 1

DEFINE LAST\_BREATH\_LED as 8

DEFINE BRIGHTNESS as 1

DECLARE pulseSensor as PulseSensorPlayground object

SET alive to false

DECLARE lastAlive as unsigned long

DECLARE HRmax, HRrest as double

SET mode to 0

SET mode2 to 0

SET startTime to 0

SET duration to 60000

SET interval to 15000

DECLARE bpm as integer

DECLARE relaxedThreshold as float

DECLARE moderateThreshold as float

DECLARE moderateBPM as double and set to 0

DECLARE freeBPM as double and set to 0

DECLARE highBPM as double and set to 0

SET breathLED to FIRST\_BREATH\_LED

SET prevBreathLED to FIRST\_BREATH\_LED

SET breathToggle to false

SET lastBreath to 0

DECLARE ledTimes as array of unsigned long with 10 elements, all set to 500

DECLARE inhaleTones as array of integers with 8 elements: 262, 294, 330, 349, 392, 440, 494, 523

DECLARE exhaleTones as array of integers with 8 elements: 523, 494, 440, 392, 349, 330, 294, 262

SET programMode to -1

FUNCTION setup()

BEGIN serial communication at 115200 baud

INITIALIZE CircuitPlayground

SET pulseSensor analog input to PULSE\_INPUT\_PIN

SET pulseSensor threshold to 550

BEGIN pulseSensor

CALL lightAnimation()

WHILE NOT (left button AND right button pressed)

CONTINUE

END WHILE

DELAY for 2000 milliseconds

CALL chooseMode()

END FUNCTION

FUNCTION loop()

IF programMode is 1 THEN

CALL stressMonitorLoop()

ELSE IF programMode is 2 THEN

CALL meditationAssistanceLoop()

END IF

IF left button AND right button pressed THEN

DELAY for 2000 milliseconds

SET programMode to -1

SET mode to 0

SET mode2 to 0

CALL setup()

END IF

END FUNCTION

FUNCTION chooseMode()

PRINT "Welcome to Mart-B!"

PRINT "Press Left Button for Stress Monitor, Right Button for Meditation Assistance."

WHILE programMode is -1

IF left button pressed THEN

SET programMode to 1

PRINT "Stress Monitor Selected."

PRINT "Which functionality of Stress Monitor are you going to use today?"

PRINT "Left Button for Visual, Right button for Auditory"

DELAY for 2000 milliseconds

WHILE mode is 0

IF left button pressed THEN

SET mode to 1

PRINT "You selected the visual mode, yay!"

ELSE IF right button pressed THEN

SET mode to 2

PRINT "You selected the audio mode, yay!"

END IF

END WHILE

CALL enterAge()

SET startTime to current time in milliseconds

ELSE IF right button pressed THEN

SET programMode to 2

PRINT "Meditation Assistance Selected. There are 2 modes for Meditation Assistance. Do you want to do it in peace(right button for no music) or beats?(left button for with music)"

DELAY for 2000 milliseconds

WHILE mode2 is 0

IF left button pressed THEN

SET mode2 to 1

PRINT "You selected the audio mode, yay!"

ELSE IF right button pressed THEN

SET mode2 to 2

PRINT "You selected the non-audio mode, Good choice!"

END IF

END WHILE

CALL enterAge()

SET startTime to current time in milliseconds

END IF

END WHILE

END FUNCTION

FUNCTION enterAge()

PRINT "Please enter your age via the Serial Monitor:"

WHILE no serial input available

WAIT

END WHILE

READ age from serial input

PRINT "Age entered: " + age

PRINT "It begins!"

CALCULATE HRmax as 206.9 - (0.67 \* age)

IF age <= 1 THEN

SET HRrest to 120

ELSE IF age <= 3 THEN

SET HRrest to 110

ELSE IF age <= 5 THEN

SET HRrest to 100

ELSE IF age <= 12 THEN

SET HRrest to 90

ELSE IF age <= 19 THEN

SET HRrest to 75

ELSE IF age <= 64 THEN

SET HRrest to 72

ELSE

SET HRrest to 70

END IF

END FUNCTION

FUNCTION stressMonitorLoop()

DECLARE intervalStart as static unsigned long and set to current time in milliseconds

DECLARE monitoringStart as static unsigned long and set to current time in milliseconds

DECLARE readingCount as static integer and set to 0

DECLARE bpmSum as static integer and set to 0

SET currentTime to current time in milliseconds

IF pulseSensor detects start of beat THEN

SET alive to true

SET lastAlive to currentTime

SET bpm to pulseSensor beats per minute

IF bpm is between 40 and 200 THEN

PRINT bpm

ADD bpm to bpmSum

INCREMENT readingCount

END IF

END IF

IF currentTime - intervalStart >= interval THEN

SET intervalStart to currentTime

IF readingCount > 0 THEN

CALCULATE avgBpm as bpmSum divided by readingCount

SET bpmSum to 0

SET readingCount to 0

CALCULATE relaxedThreshold as HRrest + 0.15 \* (HRmax - HRrest)

CALCULATE moderateThreshold as HRrest + 0.35 \* (HRmax - HRrest)

IF mode is 1 THEN

IF avgBpm < relaxedThreshold THEN

CALL lightUpAllLeds with (0, 255 \* BRIGHTNESS, 0)

ELSE IF avgBpm is between relaxedThreshold and moderateThreshold THEN

CALL lightUpAllLeds with (255 \* BRIGHTNESS, 255 \* BRIGHTNESS, 0)

ELSE

CALL lightUpAllLeds with (255 \* BRIGHTNESS, 0, 0)

END IF

ELSE IF mode is 2 THEN

IF avgBpm > moderateThreshold THEN

PLAY tone at 880 Hz for 500 milliseconds

ELSE

PLAY tone at 440 Hz for 500 milliseconds

END IF

END IF

PRINT "Average BPM for this interval: " + avgBpm

END IF

END IF

IF currentTime - monitoringStart >= duration THEN

PRINT "Stress monitoring complete."

DELAY for 7000 milliseconds

CALL turnOffAllLEDs()

SET programMode to -1

SET bpmSum to 0

SET readingCount to 0

END IF

IF currentTime - lastAlive > 5000 AND alive is true THEN

SET alive to false

PRINT "No heartbeat detected last 5 seconds!"

END IF

END FUNCTION

FUNCTION meditationAssistanceLoop()

SET timeNow to current time in milliseconds

CALCULATE relaxedThreshold as HRrest + 0.15 \* (HRmax - HRrest)

CALCULATE moderateThreshold as HRrest + 0.35 \* (HRmax - HRrest)

IF pulseSensor detects start of beat THEN

SET alive to true

SET lastAlive to timeNow

SET bpm to pulseSensor beats per minute

IF bpm >= 200 THEN

PRINT "Erratic value discarded!"

END IF

IF bpm < relaxedThreshold THEN

CALL stressLights with (0, 255, 0)

ELSE IF bpm is between relaxedThreshold and moderateThreshold THEN

CALL stressLights with (0, 0, 255)

ELSE

CALL stressLights with (255, 0, 0)

END IF

PRINT "\*\*\* Heartbeat Detected \*\*\* BPM: " + bpm

CALL updateBreathLED()

END IF

IF timeNow - lastAlive > 5000 AND alive is true THEN

SET alive to false

PRINT "No heartbeat detected in the last five seconds"

END IF

SET timeSince to timeNow - lastBreath

IF timeSince >= ledTimes[breathLED] THEN

SET prevBreathLED to breathLED

IF breathToggle is true THEN

DECREMENT breathLED

ELSE

INCREMENT breathLED

END IF

IF breathLED < FIRST\_BREATH\_LED OR breathLED > LAST\_BREATH\_LED THEN

TOGGLE breathToggle

CONSTRAIN breathLED between FIRST\_BREATH\_LED and LAST\_BREATH\_LED

END IF

SET lastBreath to timeNow

END IF

IF mode2 is 1 AND alive is true THEN

CALL playSoothingBreathMusic()

END IF

END FUNCTION

FUNCTION lightUpAllLeds(red, green, blue)

FOR i from 0 to NUM\_PIXELS - 1

SET pixel color at i to (red, green, blue)

END FOR

UPDATE LED strip

END FUNCTION

FUNCTION turnOffAllLEDs()

FOR i from 0 to NUM\_PIXELS - 1

SET pixel color at i to (0, 0, 0)

END FOR

UPDATE LED strip

END FUNCTION

FUNCTION updateBreathLED()

FOR i from FIRST\_BREATH\_LED to LAST\_BREATH\_LED

IF i equals breathLED THEN

SET pixel color at i to (200, 200, 200)

ELSE IF i equals prevBreathLED THEN

SET pixel color at i to (50, 50, 50)

ELSE

SET pixel color at i to (0, 0, 0)

END IF

END FOR

UPDATE LED strip

END FUNCTION

FUNCTION playSoothingBreathMusic()

SET timeNow to current time in milliseconds

SET timeSince to timeNow - lastBreath

SET toneIndex to breathLED - FIRST\_BREATH\_LED

IF breathToggle is true THEN

SET toneFreq to exhaleTones[toneIndex]

ELSE

SET toneFreq to inhaleTones[toneIndex]

END IF

IF timeSince <= ledTimes[breathLED] THEN

PLAY tone at toneFreq for ledTimes[breathLED] / 10 milliseconds

END IF

END FUNCTION

FUNCTION lightAnimation()

FOR i from 0 to 9

SET pixel color at i to (random(0, 255\*BRIGHTNESS), random(0, 255\*BRIGHTNESS), random(0, 255\*BRIGHTNESS))

END FOR

UPDATE LED strip

DELAY for 1000 milliseconds

END FUNCTION

FUNCTION stressLights(r, g, b)

SET pixel color at 0 to (r / 255\*BRIGHTNESS, g / 255\*BRIGHTNESS, b / 255\*BRIGHTNESS)

SET pixel color at 9 to (r / 255\*BRIGHTNESS, g / 255\*BRIGHTNESS, b / 255\*BRIGHTNESS)

END FUNCTION