Project Specification

The Mindfulness Coach

"A Virtual Furhat Mindfulness Coach Assistant"

Authors

Group 25

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Context

- **Elevator Pitch**: This project develops a Furhat virtual robot that serves as a mindfulness coach, capable of detecting users' emotional states and guiding them through adaptive mindfulness and breathing exercises to promote emotional well-being.
- **Objectives**: To build a Virtual Mindfulness Coach Assistant that addresses one or more of the following measurable objectives:
    - **Accessibility**:
        - Provide users with a virtual mindfulness coach to substitute for a human coach whose function is limited to a knowledgeable receptionist during off-hours or unavailability.
    - **Exercise Guidance**:
        - Offer immediate assistance during moments of mild anxiousness by guiding users through calming breathing exercises.
    - **Preliminary Assessments**:
        - Conduct preliminary evaluations of the user's emotional state, including levels of anxiousness, which can serve as valuable input for the human coach when needed.
    - **Record Conversations**

        - Make the users feel heard.
        - Provide the recording to the doctor.

- **Deliverables:**

    1. Functional System

    - **User Perception Sub-system**:
        - A real-time emotion detection module using Py-Feat to extract facial features and classify emotional states.
        - A trained ML model capable of detecting anxiousness levels with appropriate accuracy metrics.
    - **Interaction Sub-system**:
        - Engages in supportive conversations to address a human coach.
        - Guides users through adaptive breathing exercises tailored to their emotional state.
        - Record the longer answers to specific questions and provide the recording to the designated doctors.

    2. Supporting Documentation

    - **Project Report**:
        - Detailed documentation of the design, development, testing, and results of the system.
        - Insights into the challenges faced, solutions implemented, and the system's limitations.
    - **User Manual**:
        - Instructions on how to set up and use the mindfulness coach assistant.

    3. Presentations

    - **Feedback Session Presentations**:
        - Presentations for each feedback session (Week 48, Week 50, Week 51) that summarize progress, current results, and remaining challenges.
    - **Final Presentation**:
        - Presentation for the final evaluation session (Week 3) that includes:
            - Demonstrations of the system in action.
            - Results from testing and evaluation metrics.
            - An overview of the project's impact and future potential.
- **Success Metrics**
    1. Accuracy of emotion detection (e.g., precision and recall using validation sets).
    2. User feedback on the perceived helpfulness and engagement of Furhat’s mindfulness exercises.
    3. System stability during real-time interaction.

4. Completion of project milestones and deliverables on schedule.

- **Potential Issues**
    1. **Dataset Limitations**: Challenges in extracting features from DiffusionFER and translating them into mindfulness-relevant emotional states.
    2. **Behavior Complexity**: Difficulty in designing mindfulness exercises that feel natural and adaptive.
    3. **Real-Time Interaction**: Ensuring smooth operation of the two subsystems without significant delays.
    4. **Limited Time**: Managing the complexity of features within the available project timeline.
    5. **User Trust**: Getting users to trust the system, ensuring they feel comfortable interacting with the virtual coach without doubt or skepticism. This is crucial for user engagement and effectiveness.
    6. **Privacy Issues**: Educating users that their data will not be shared and ensuring strong measures are in place to protect their privacy, which is critical for user confidence in the system.
    7. **Overperformance and Addiction**: If the system overperforms or becomes too reliable, users may become addicted or overly reliant on it, potentially impacting their emotional independence or social interactions.
    8. **Camera Angle and Quality**: Camera angle and quality can significantly affect the accuracy of emotion detection. Variations in lighting, resolution, or positioning may make it challenging for the system to detect facial expressions correctly.
    9. **Accents of Users**: The accents or speech patterns of the users may impact the speech recognition system's effectiveness, leading to challenges in detecting emotional states or responding appropriately.
    10. **User Breathing Cues**: Users may need to explicitly tell the system when they are breathing in or out during breathing exercises, as some may forget to follow the instructions or may not know when to start and stop their breaths.
    11. **Stoic Faces**: Users with a stoic face or those who naturally mask emotions may have difficulty in detecting their emotional state, leading to inaccurate assessments of their emotional well-being.

Project Breakdown

Week	Date	Task	Deliverable	Responsible Member(s)
Week 47	**20 Nov**	Confirm project selection and notify team members.	Project confirmation.	Entire Team

Week 48	**27 Nov**	Complete and submit the project proposal, covering all required sections (context, objectives, etc.).	Project proposal document.	All members
	29 Nov	Present the project plan to the supervising TA for feedback.	Initial feedback report.	Rohit presents, Biash documents.
Week 48-50	**30 Nov - 8 Dec**	Set up the project environment (Py-Feat, ML libraries, Furhat SDK).	Working development environment.	Sheila
		Define evaluation metrics for ML models and breathing exercises.	Documented evaluation metrics.	Biash
Week 50	**9 Dec**	Present progress, including initial emotion detection and interaction framework.	Prototype demo with partial functionality.	Rohit presents, Sheila demos.
Week 50-51	**10-17 Dec**	Develop and test ML models using DiffusionFER dataset for anxiousness detection.	ML model accuracy metrics.	Sheila
		Design rule-based behavior for breathing exercises and record-keeping.	Draft of interaction logic.	Biash
		Integrate subsystems (User Perception and Interaction) and perform latency testing.	Integrated system prototype.	Rohit
Week 51	**18 Dec**	Present the updated prototype and gather TA feedback.	Updated prototype with feedback integration.	All members
Week 3	**15 Jan**	Deliver the final project presentation, including live demo and testing results.	Final presentation and system demo.	All members
Week 3	**17 Jan**	Submit final project report, user manual, and optional blog showcasing progress.	Final report, user manual.	All members