Project Specification

Project Title : Adaptive Bartender Interaction System using Furhat Robot

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Context :

Human-Robot Interaction: This project focuses on creating a system where the robot acts as a bartender, responding to users emotions to make interactions more engaging.

Understanding Emotions: We'll use facial feature analysis and machine learning to figure out how users are feeling e.g., happy, neutral, or stressed from a webcam feed.

Personalized Responses: The robot will adapt its behavior based on users' emotions, making the interaction feel more natural and fun.

Real-Life Use: This system could be used in virtual environments, hospitality training, or just for entertainment.

Elevator Pitch:

We are building an adaptive bartender system where a robot detects emotions from users facial expressions and engages them with tailored conversations to create a fun and welcoming experience.

Objectives:

User Perception Sub-system:

- Capture facial features from a webcam in real-time.
- Use machine learning to analyze these features and determine emotional states like happiness, stress, or neutrality.
- Handle one or multiple users at a time.

Interaction Sub-system:

- Create a system that generates robot responses based on detected emotions.
- Enable robot to have simple conversations, take drink orders, and engage users in small talk.
- Combine emotion detection and user speech to guide responses.

Integration:

- Ensure the two systems work smoothly together in real time.

Deliverables:

User Perception Sub-system:

- A program to analyze facial features and detect emotions.
- A trained machine learning model for emotion detection.
- Interaction with user either through text (or voice commands if time permits)
- Clear documentation for how the system works.

Interaction Sub-system:

- A set of rules for robot adaptive responses.
- Scripts for different types of conversations.
- A video showing robot interaction as a bartender.

Final Outputs:

- A detailed project report.
- A presentation summarizing the work.

Success Metrics:

We have created a project in trello (https://trello.com/use-cases/task-management)

Here is the link to our Kanban Board:
https://trello.com/invite/b/6745ccb9cc5c6770d1186162/ATTI3729e276bd54c67e8aa2dfa5a1c7835e59F05194/intelligent-interactive-project

Based on the task completion and deadlines , we can measure the progress and evaluate the state of the project until completion.

Potential Issues:

- Real-Time Performance: The system might be slow when processing emotions and generating responses.
- Data Challenges: The datasets we use may not have enough examples for accurate training.
- Behavior Complexity: Designing varied responses that don't feel repetitive could be tricky.
- System Integration: Making sure the perception and interaction systems work together without problems.
- Teamwork: Keeping everyone on track and meeting deadlines.

Project Breakdown

(Trello kanban board will be used to create tasks and deadline , below are the overall project deadline , detailed tasks will be added to trello board)

Task List :

Week 48 : Initial Setup

- Project specification: Wed 27 Nov - Aditya
- Install and set up tools like Py-Feat
- Setup github repo and create a working directory and file structure - Amrith
- Assign roles and plan responsibility in trello

Week 50-51 : User perception Sub-system - Aditya, Amrith

- Extract facial features from dataset
- Train a machine learning model to recognize emotions
- Test real time emotion detection using webcam

Week 52,1 : Interaction Sub-system - Naresh, Amrith

- Build a rule-based system for adaptive responses

- Write a conversational script for different emotions.
- Add support for combining user speech and emotion detection.

Week 2 : Integration and Testing - Aditya, Naresh

- Connect the emotion detection and response systems
- Test the entire system in real-time scenario
- Fix bugs

Week 3 , Jan 13: Finalization and Documentation - Aditya, Amrith, Naresh

- Record a video demo showing how the system works.
- Complete the project report and presentation slides.

Week 3 ,Wed Jan 15 8:15-12:00: Final project presentation

Week 3, Fri 17 Jan 17:00 : Deadline for submission of project reports