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- **Problem Statement ID**: SIH25175
- **Problem Statement Title**:

  MAITRI: An AI Assistant for Psychological And Mental Well-Being of Astronauts
- **Theme**: Space Technology
- **PS Category**: Software
- **Team ID**:
- **Team Name**: Visioneers

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MAITRI: The Emotional Co-Pilot

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Proposed Solution:

- An **AI companion** that observes astronauts' face and voice.
- It notes **changes in mood** or **stress levels**.
- Offers short **supportive conversations** and **simple activities**.
- Sends **alerts** to ground team if it detects serious issues.

How It Addresses the Problem:

- Reduces **loneliness** by acting like a friendly presence.
- Helps astronauts **manage stress and tiredness** in real time.
- Ensures **safety** by warning about health risks early.
- Supports **focus and productivity** during missions.

Innovation and Uniqueness :

- Not just a chatbot — it can **see, listen, and understand emotions**.
- **Keeps a memory of emotional trends** over time
- Works **independently without internet**, ideal for space missions.
- **Adaptive** — the suggestions change based on each astronaut's state and daily routine.
- combines **human-like empathy with scientific evidence** (breathing exercises, positive talk, reminders).

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TECHNICAL APPROACH

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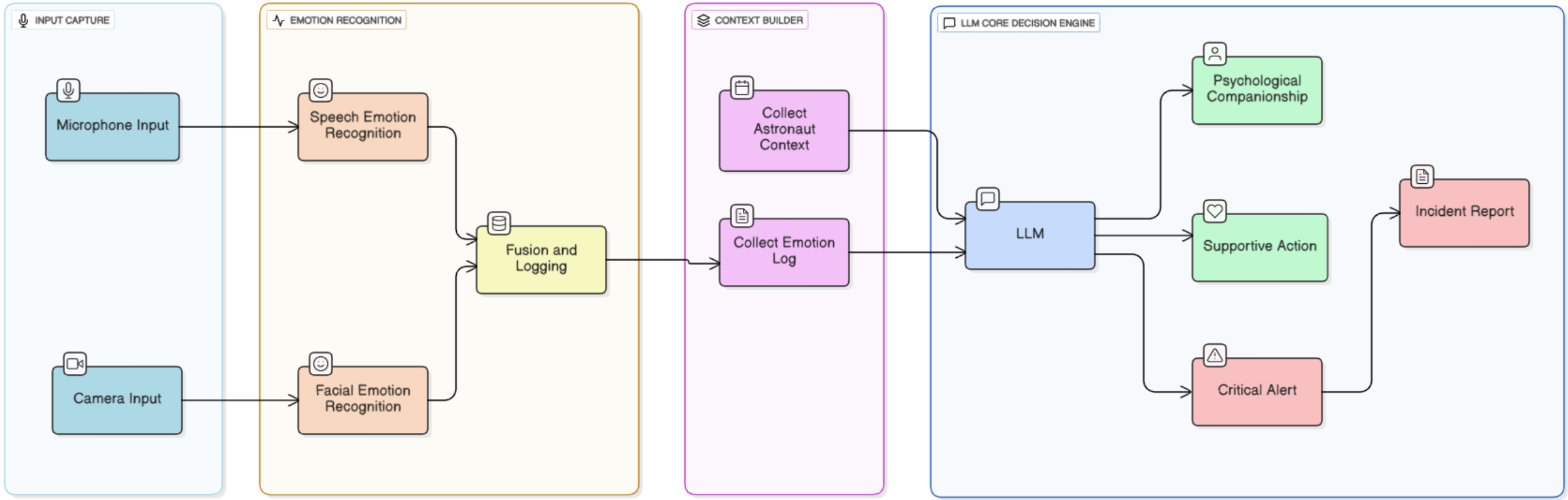

Tech Stack:

SQLite

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FEASIBILITY AND VIABILITY

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Feasibility:

- **Emotion detection** from face and voice is already proven on Earth.
- Compact AI models can run **offline on local systems**, suitable for space stations.
- The assistant only needs short interactions, keeping it **lightweight and practical**.
- Can be built step-by-step: emotion logging → basic conversations → advanced support.

Potential Challenges and Risks:

- **Accuracy issues**: AI may misread emotions due to lighting, noise, or fatigue.
- **Trust factor**: astronauts may hesitate to rely on AI for emotional support.
- **Privacy concerns**: constant monitoring may feel intrusive.
- **Hardware limits**: space systems have restricted computing power.

Strategies to Overcome these Challenges:

- Use **combined signals** (face + voice) to improve accuracy.
- Keep **human-in-the-loop**: serious cases always flagged to ground crew.
- Allow **transparent controls** so astronauts can pause or manage monitoring.
- Optimize AI models to run efficiently on **low-resource hardware**.

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IMPACT AND BENEFITS

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Potential impact on Astronauts:

- **Enhanced Mental Well-Being :** Provides real-time emotional support, stress management, and personalized counselling for astronauts during long-duration missions.
- **Reduced Isolation & Loneliness:** Acts as a digital companion, reducing the psychological burden of long-term space missions away from family and Earth.
- **Decision Support in Emergencies:** AI-driven recommendations during medical or psychological crisis when immediate ground communication is delayed.
- **Boost in Productivity & Focus:** By ensuring astronauts remain mentally balanced and physically fit, overall mission performance and efficiency increase.

Benefits of the solution:

- **Improved Mental Quality of Astronaut in Space:** Helps astronauts maintain emotional resilience and motivation.
- **Promotes Human-Centric Space Exploration:** Prioritizes astronauts' health, showing commitment to ethical and safe space travel.
- **Medical Cost Savings for Space Agencies:** Prevents costly medical evacuations, mission failures, or downtime caused by astronaut health issues.
- **Efficient Lifestyle of Astronaut :** Optimizes exercise, nutrition, and sleep schedules, reducing unnecessary resource consumption in space.

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RESEARCH AND REFERENCES

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- **Wave2Vec2**: A Framework for Self-Supervised Learning of Speech Representations. [Click Here 🔗]
- Unsupervised Cross-lingual Representation Learning for Speech Recognition. [Click Here 🔗]
- Deep Facial Emotion Recognition: A Survey, Shan Li and Weihong Deng. [Click Here 🔗]
- AI Chatbots for Mental Health: Values and Harms from Lived Experiences of Depression. [Click Here 🔗]
- The Typing Cure: Experiences with Large Language Model Chatbots for Mental Health Support. [Click Here 🔗]
- The Burden of Space Exploration on the Mental Health of Astronauts: A Narrative Review. [National Institue of Health (NIH)] [Click Here 🔗]
- Mental Well-Being in Space. [NASA] [Click Here 🔗]
- Supporting the Mind in Space: Psychological Tools for Long-Duration Missions. [Click Here 🔗]

IMPORTANT INSTRUCTIONS

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Please ensure below pointers are met while submitting the Idea PPT:

1. **Kindly keep the maximum slides limit up to six (6). (Including the title slide)**
2. **Try to avoid paragraphs and post your idea in points /diagrams / Infographics /pictures**
3. **Keep your explanation precise and easy to understand**
4. **Idea should be unique and novel.**
5. **You can only use provided template for making the PPT without changing the idea details pointers (mentioned in previous slides).**
6. **You need to save the file in PDF and upload the same on portal. No PPT, Word Doc or any other format will be supported.**

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