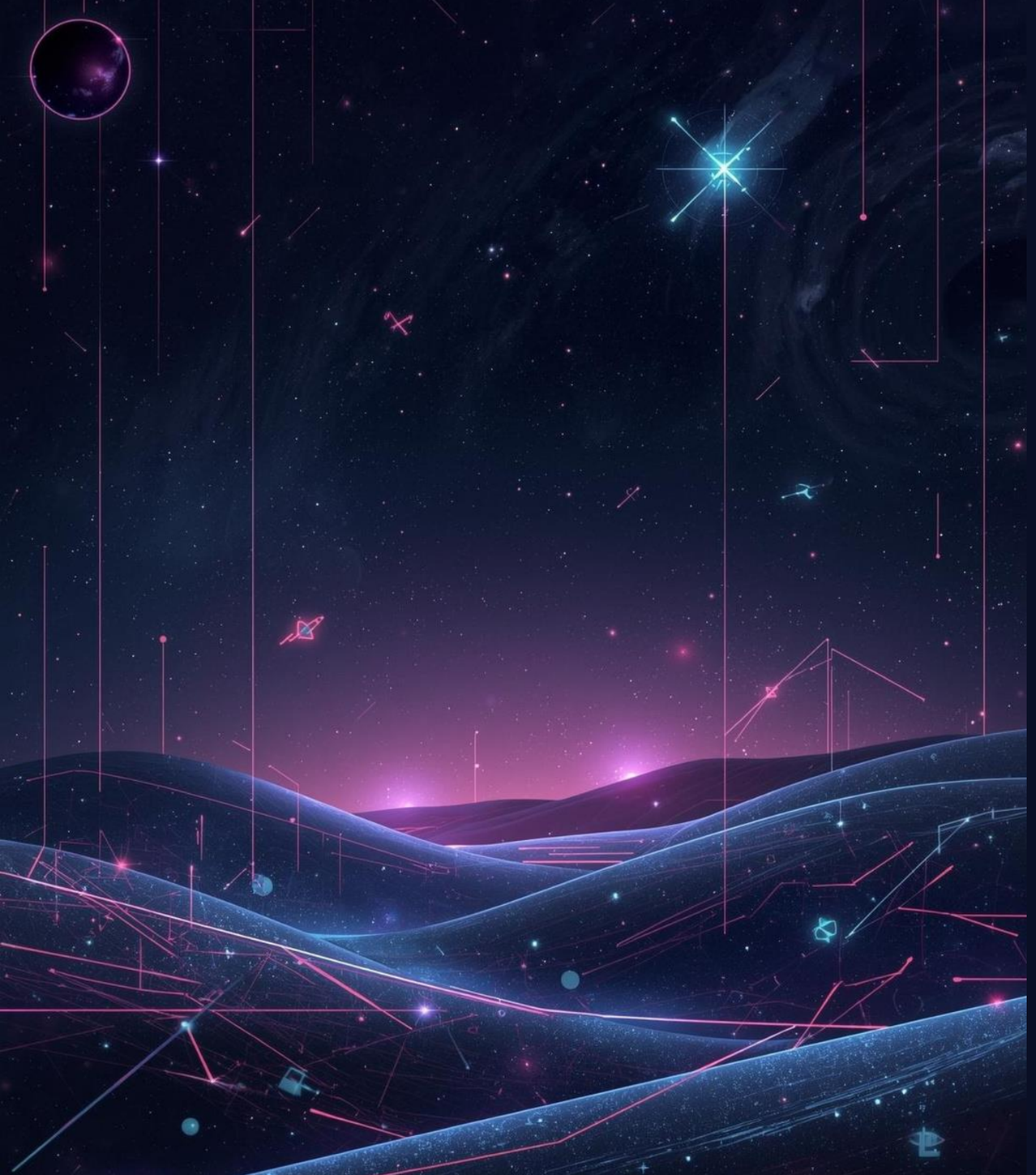


Human-Centric Debt Recovery using Emotion AI, Explainable AI and Gamification

A Futuristic AI – Driven Approach

Team Name : Empathix (Meaning:

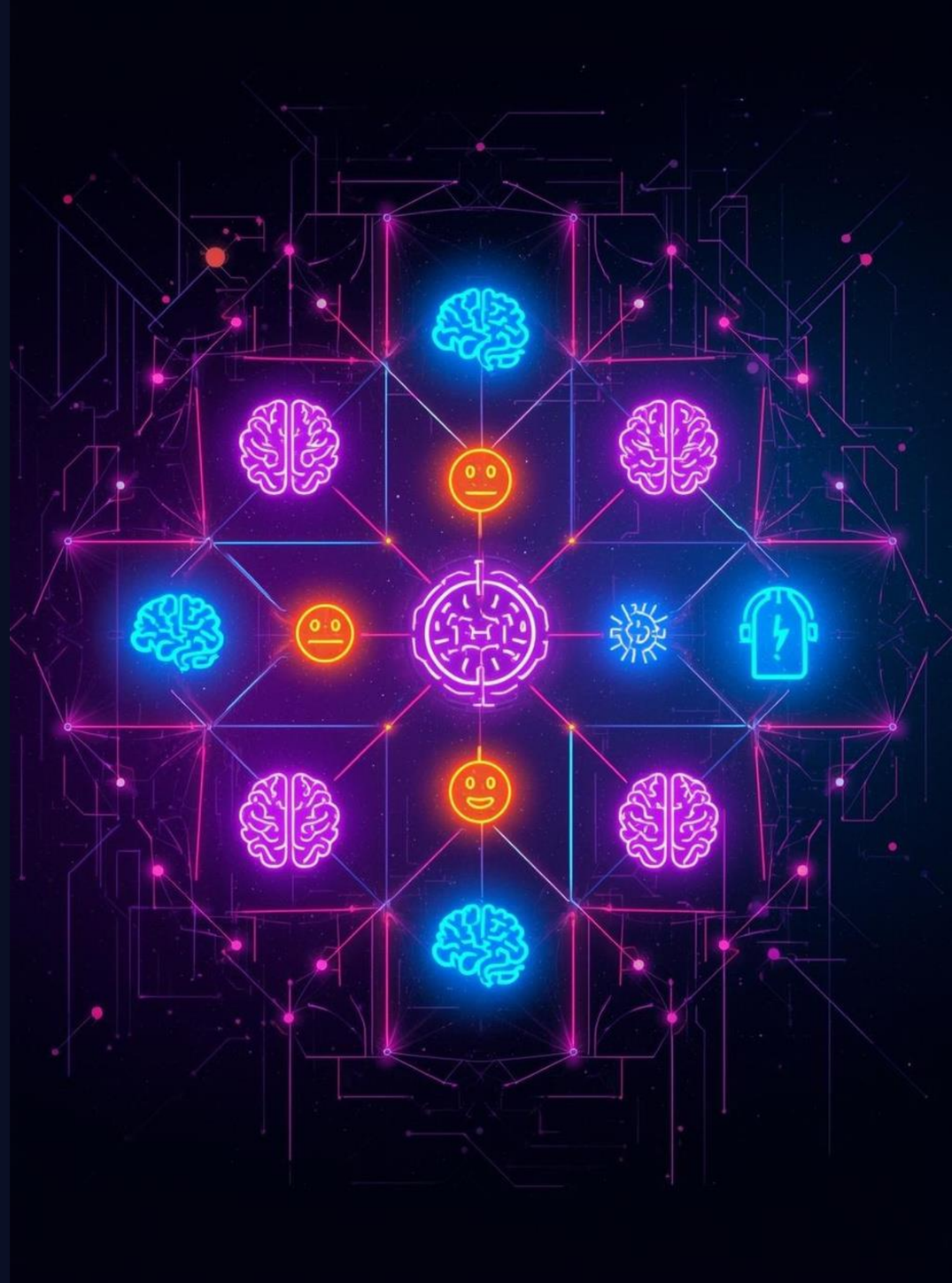
"Empathy through AI – bridging human

emotions with Intelligent systems")

"Team Members"

- S.Thanisha – First year , ECE Department
- N.Anjanaa Shri Paramesh – First year , ECE Department
- A.Jessica Infanta Blessy – First year , ECE Department

- *EMPATHIX – Where Empathy Meets Explainable Intelligence*



Problem Statement

- FedEx manages a large volume of overdue customer accounts through external Debt Collection Agencies (DCAs).

The current DCA management process is :

- Highly manual and spreadsheet – driven
- Fragmented across emails and individual follow-ups
- Lacking transparency , audit trails , and clear accountability
- Limited in performance visibility and recovery analytics.

- This results in delayed recoveries , frequent escalations , weak governance , and poor decision making.

- Hence need for a scalable , intelligent , and transparent digital recovery system.

Limitations of the Current System

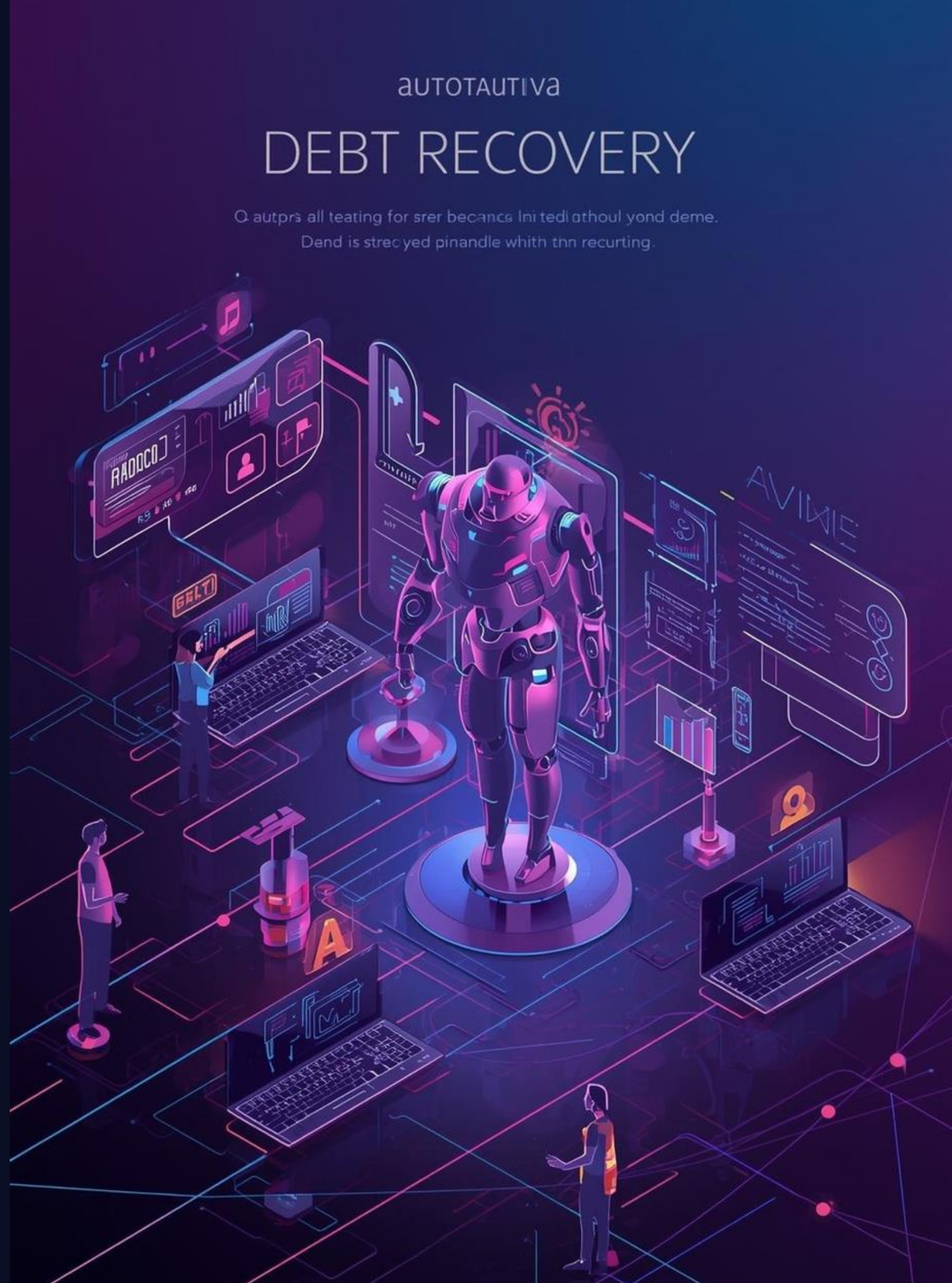
- Heavy reliance on manual spreadsheets and email – based coordination leads to data duplication , errors, and operational delays.
- Fragmented workflows across multiple DCAs reduce real – time visibility into account status , recovery progress , and agent performance.
- Lack of centralized dashboards limits transparency, auditability, and governance at an enterprise scale.
- Static, rule – based processes fail to adapt to varying customer behavior, intent, and emotional context.
- No explainability or reasoning behind prioritization decisions, reducing trust and accountability in recovery actions.
- Low engagement causes delayed responses and inefficiencies as accounts scale.

Proposed Solution: Human – Centric Debt Recovery

- Introduces a human-centric debt recovery system that incorporates Emotion AI, Explainable AI, and Gamification.
- Emotion AI detects and adapts, to borrower emotional cues to improve engagement.
- Explainable AI ensures transparency and trust in prioritization and recovery decisions.
- Gamification motivates DCA agents through achievement tracking, performance dashboards and reward mechanisms.
- Centralized , intelligent dashboard integrates data from multiple DCAs , reducing manual effort and improving decision-making efficiency.

Transforming Debt Recovery

- From reactive to proactive: Systems that anticipate borrower needs and engagement patterns.
- Human-Centric automation: Balances AI insights with empathetic interventions for better recovery experiences.
- Emotion-aware prioritization: Accounts are dynamically prioritized based on borrower stress, willingness, and engagement signals.
- Continuous learning loop: Every interaction feeds back to improve strategy , making the system smarter over time.
- Data-driven transparency: Recovery actions are visible , accountable , and explainable to both DCAs and managers.

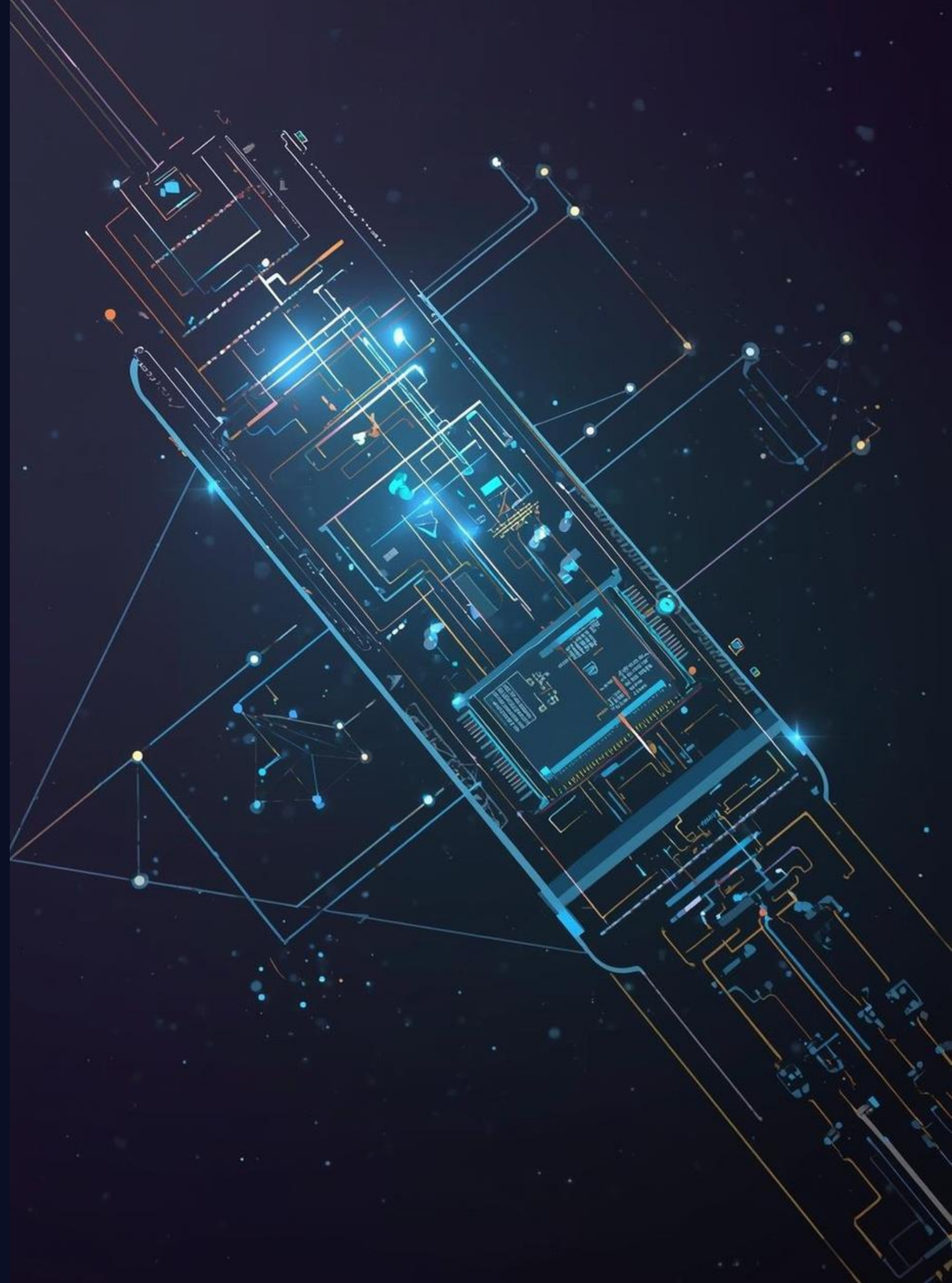


Emotion AI – Understanding Borrower Emotions

- Multi-modal emotion detection: Analyzes voice, text, and behavior to classify borrower emotions such as stress or willingness to pay.
- Adaptive recovery strategies : AI dynamically adjusts follow-ups and communication style based on emotional cues.
- Real -time insights for agents : DCAs receive actionable guidance to improve human- centric interactions and engagement

Explainable AI – Transparent and Trustworthy Decisions

- Reasoning : AI decisions are accompanied by human – readable explanations for each recovery recommendation.
- Accountability and governance : Every AI suggestion is traceable , auditable , and aligned with enterprise compliance standards.
- Adaptive insights : Continuous agent feedback and outcome data refine AI explanations , improving trust , interpretability , and actionable guidance.

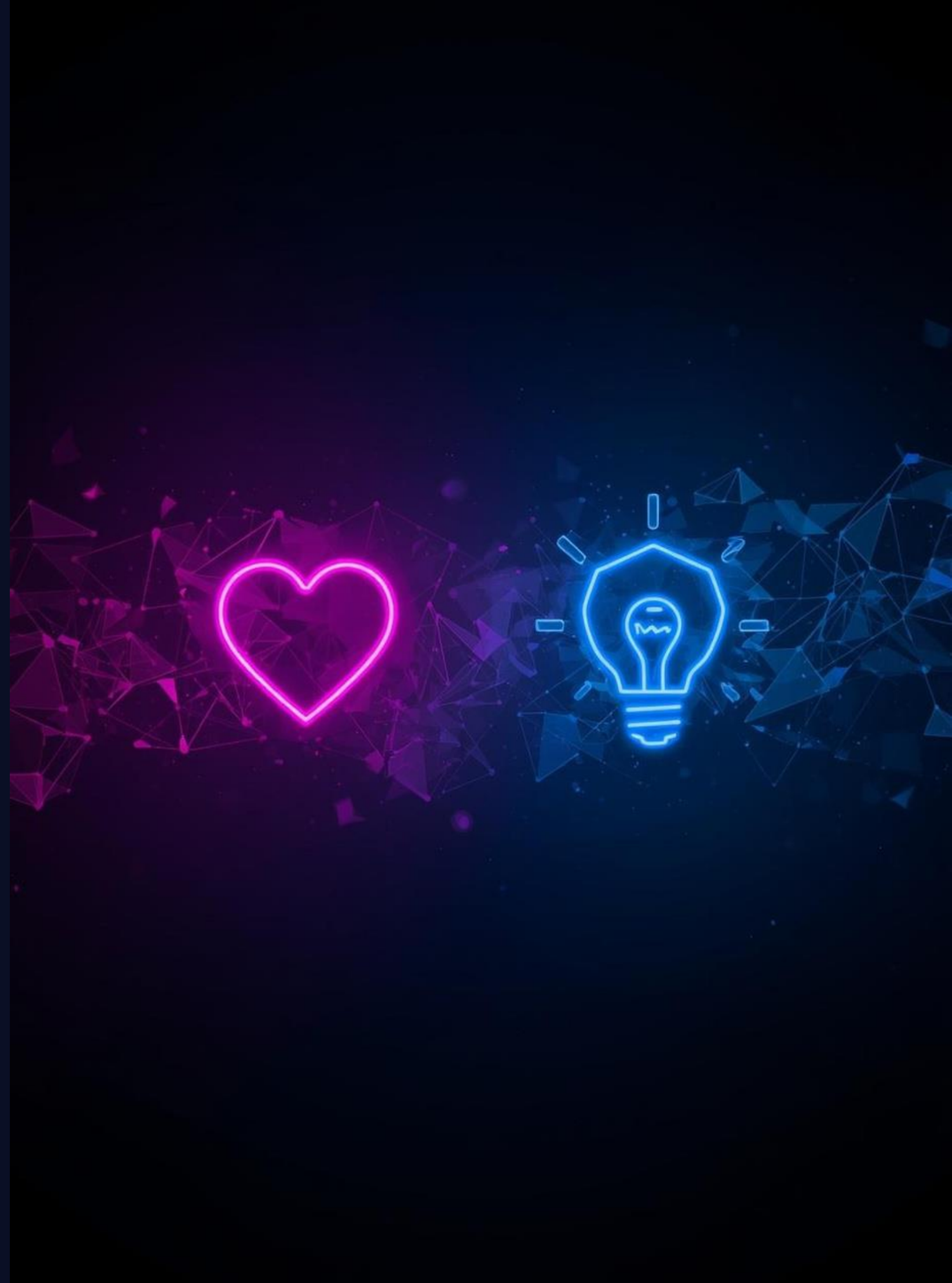


Gamification – Motivating Human-Centric Engagement

- Performance rewards : Agents earn points, badges, and levels for timely and effective recoveries.
- Real-time dashboards and leaderboards : Track progress,
  encourage healthy competition, and improve productivity.
- Scenario-based simulations : Practice handling diverse borrower emotions to enhance empathy and strategy.
- Adaptive feedback and Rewards : Gamification dynamically adjusts based on agent performance and
  recovery outcomes.
- Continuous engagement :
  Boosts motivation and recovery efficiency.

Integrating Emotion AI – Adaptive and Human-centric

- Multi-Modal data integration : Combines borrower account data, interactions, and behavioral signals for emotion analysis.
- Adaptive prioritization : Dynamically ranks accounts based on emotional cues and engagement readiness.
- Transparent recommendations : Provides interpretable AI guidance for agents, improving trust and actionable decisions.
- Feedback-driven refinement : Continuos learning from outcomes enhances detection accuracy and engagement strategy.



Gamification Mechanism – Enhancing Agent Performance and Engagement

Goal-Oriented challenges : Agents complete tiered tasks with measurable KPIs, boosting motivation and accountability.

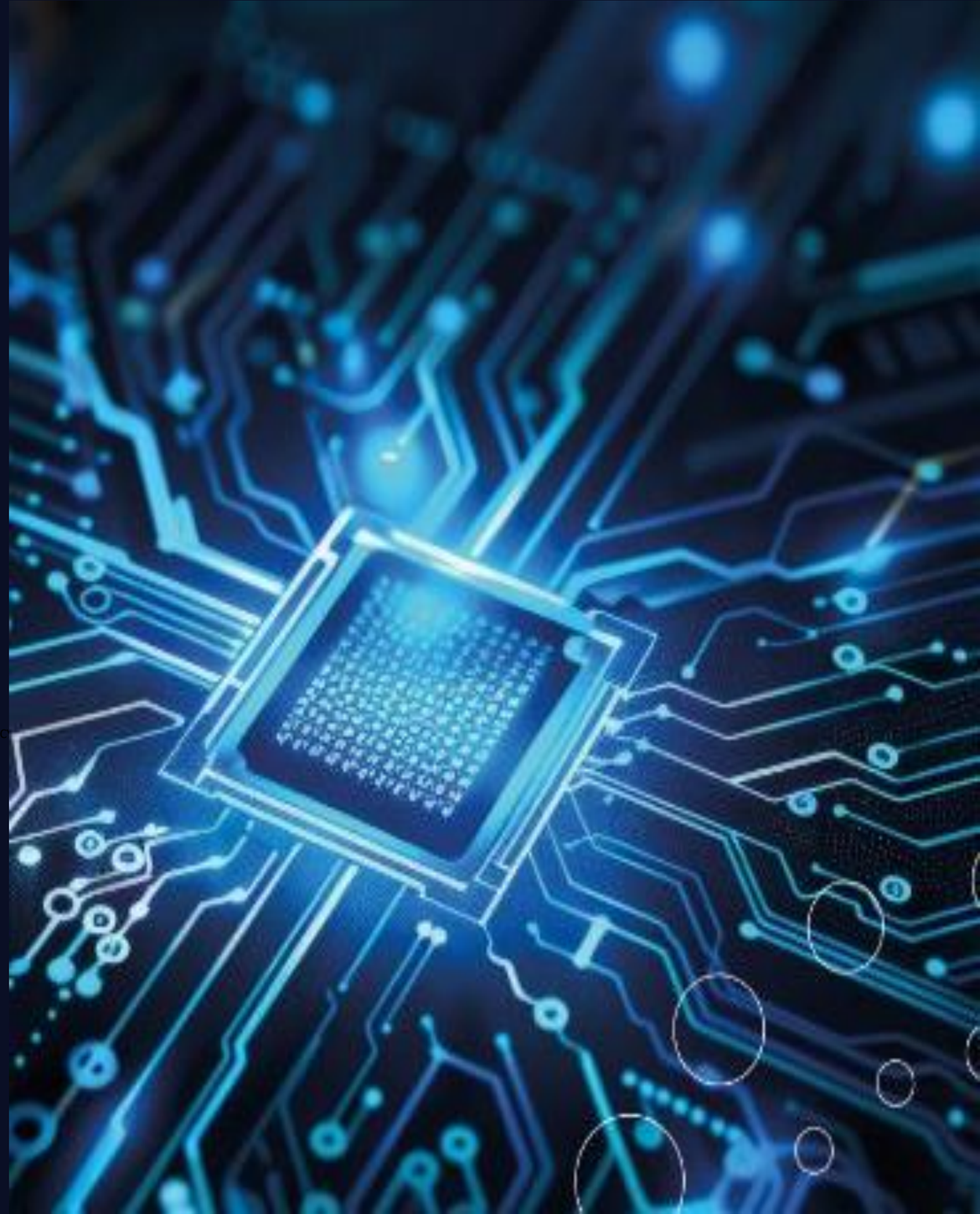
Personalized feedback : Dashboards provide tailored insights on performance, and areas for improvement.

Adaptive reward system : Dynamic points, badges and achievements adjust to agent efficiency and recovery outcomes.

Behavioral reinforcement : Gamified simulations and leaderboards encourage proactive engagement and human-centric interactions.

ECE Perspective – Digital Signal Processing (DSP) Integration

- Signal-based data modeling : Borrower interactions are treated as time-series signals for systematic analysis.
- Preprocessing and noise reduction : DSP filtering techniques remove noise and irrelevant variations to improve signal quality.
- Feature-extraction : Time- and frequency-domain features (energy, pitch variation, temporal patterns) are derived to capture emotional cues.
- DSP-enhanced AI input : Extracted signal features strengthen Emotion AI accuracy and robustness.
- Explainable signal flow : Processed features align with explainable outputs, supporting transparent and interpretable AI decisions.



Limitations of Human-Centric AI-Based Debt Recovery

1. Data Security Risk – Sensitive data prone to cyber threats
2. Emotional Accuracy Drop – Misreads borrower emotions , reducing recovery precision.
3. Algorithmic Bias – Past data may cause unfair outcomes.
4. Privacy Concerns – Continuous monitoring risks consent and ethics.
5. Gamification Backfire – Rewards may trivialize financial stress.

Mitigations of Human-Centric AI based debt Recovery

1.Data security Risk – implement strong encryption and access controls.

2.Emotional Accuracy Drop – Combine AI with human oversight.

3.Algorithmic Bias – Use diverse, representative training datasets.

4.Privacy Concerns – Enforce strict data anonymization and consent

5.Gamification Pitfall – Design ethical, context – aware reward systems.

THANK YOU

- "*Human-Centric AI : Bridging empathy , transparency , and engagemeny*".

Resources and Tools

This section outlines essential resources for participants, including **datasets**, APIs, and development platforms to facilitate innovation during the hackathon and enhance project outcomes.