

Project Title: **CognitiveSense AI – Multi-Modal Cognitive State Prediction System**

★ 1. What this Project Does (Simple Summary)

CognitiveSense AI ek advanced system hai jo **human stress, distraction**, aur **thought-shift** (attention drift) ko detect karta hai.

Ye system **4 behavioral signals** ko observe karta hai:

1. **Keystroke Behavior** – typing speed, pressure, errors
2. **Mouse Dynamics** – movement smoothness, acceleration, hesitation

3. **Screen Activity** – tab switching, application changes
4. **Facial Micro-Expressions** – blink rate, eye focus, micro-gestures

AI model in sab signals ko analyze karke batata hai:

- . User focused hai ya distracted
 - . Stress level kya hai
 - . Attention shift hone wala hai ya nahi
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2. Why This Project Is Needed (Problem Statement)

Aaj ke digital world me hum computer use karte waqt:

- ✓ Stress me aa jate hain
- ✓ Attention break hota hai

- ✓ Mind drift hota hai
- ✓ Distraction badh jati hai

But **computers ko ye kabhi pata nahi chalta.**

Jab tak user ka behavior bigad jaye, tab tak koi alert nahi hota.

Existing solutions:

- ✗ Sirf emotion detection
- ✗ Sirf keystroke analysis
- ✗ Sirf productivity timers

But koi bhi multi-modal cognitive prediction system exist nahi karta.

★ 3. What Makes Our Project Unique (Novelty)

Yeh project itna unique hai ki:

- ✓ 4 behavioral inputs ek saath analyze karta hai
 - ✓ Real-time cognitive state prediction deta hai
 - ✓ Thought-shift (mind drift) detect karta hai → *rare research topic*
 - ✓ Fully software-based hai, **koi sensor nahi chahiye**
 - ✓ Multi-modal fusion model (keystroke + mouse + screen + face)
 - ✓ Research publication ready
- Is combination ka koi open-source ya existing research model nahi hai.
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★ 4. System Architecture (Process Flow)

◆ Data Collection

Background me ek agent user ke behavior ko record karta hai:

- keystrokes.csv
- mouse.csv
- screen.csv
- face.json

◆ **Feature Extraction**

Raw data → features:

- Typing rhythm
- Mouse trajectory stats
- Screen switching entropy
- Blink frequency

◆ **ML Models**

- RandomForest → baseline
- LSTM → sequence learning

- . TCN → cognitive drift prediction
- . GRU → efficient time-series

◆ **Real-time Prediction Engine**

FastAPI live server:

- . Every few seconds data process
- . Cognitive state calculate
- . Dashboard ko live update

◆ **Dashboard**

Streamlit UI:

- . Stress meter
- . Distraction probability
- . Focus timeline
- . Thought drift graph

★ **5. Expected Outputs**

Our system end-user ko ye provide karega:

- **Stress Level** (Low / Medium / High)
- **Distraction Probability (%)**
- **Thought-Shift Index**
- Real-time alerts
- Weekly cognitive pattern graphs

Accuracy expectation:

- **Stress Prediction:** 70–85%
- **Drift Detection:** High sequence accuracy
- **Dashboard Latency:** <300 ms

★ 6. Real-World Applications

- Students → study focus improvement

- . IT companies → employee well-being monitoring
 - . Online learning platforms
 - . Safety-critical jobs (pilots, drivers)
 - . ADHD support tools
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7. Why This Project Is Perfect for Major Project

- . ML + Deep Learning + HCI combination
- . Real-time system
- . Multi-modal behavioral analysis (rare topic)
- . Research paper-ready
- . Practical + impactful
- . Demo-friendly with dashboard

★ 8. Final One-Line Summary (Best for Presentation)

“CognitiveSense AI is a real-time multi-modal system that predicts a user’s stress, distraction, and thought-shift using behavioral biometrics — creating a futuristic human–computer interaction model.”