
Deep Work Guardian

A Multi-Agent AI System for Protecting Focus, Health & Privacy

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Python | OpenCV | PyAudio | Pygame | psutil | Tkinter | Multi-Threading


The Problem

- 😓 Students sit too close to the screen → eye strain & back pain
- 👁️ Someone looks at your screen → privacy breach
- 🔊 Noisy study environment → loss of concentration
- 🔋 Laptop unplugged → battery drains fast, dies mid-session
- 📱 Social media & distracting apps → hours of wasted time

✅ **Our Solution: 5 AI agents that monitor sensors and automatically protect you in real-time.**

System Architecture

SENSORS:  Webcam |  Microphone |  Battery (psutil) |  Window API

 **SHARED STATE** — Thread-Safe Dict + Mutex Lock
All agents read/write here. No direct agent-to-agent messages.






 **Ergonomics**

 **Privacy**

 **Atmosphere**

 **Power**

 **Distraction**

ACTUATORS:  Notifications |  Screen Blur |  White Noise |  Dark Mode |
 Minimize Window

The 5 Agent Subsystems

Agent 1 — Ergonomics Monitor

- Sensor: Webcam (shared frame)
- Algo: Haar Cascade + Pinhole Model
- Rule: If face < 50 cm → Notify
- Cooldown: 2 min between warnings
- Owner: Muhammad

Agent 2 — Privacy Shield

- Sensor: Webcam (shared frame)
- Algo: Haar Cascade face count
- Rule: If faces > 1 → Blur + Minimize
- Actuator: Tkinter overlay + PyGetWindow
- Owner: Abdulla

Agent 3 — Atmosphere Controller

- Sensor: Microphone (PyAudio)
- Algo: RMS → Decibel conversion
- Rule: If noise > 60 dB → White Noise
- Actuator: Pygame mixer (NumPy buffer)
- Owner: Shabaz

Agent 4 — Power Optimizer

- Sensor: psutil battery API
- Algo: State transition tracking
- Rule: Unplugged → Dark Mode + 30% brightness
- Actuator: PowerShell registry + WMI
- Owner: Peshawa

Agent 5 — Distraction Blocker

- Sensor: Active window title (PyGetWindow)
- Algo: Blocklist keyword matching
- Rule: 5 min on distraction → Minimize + Notify
- Blocklist: YouTube, Instagram, TikTok...
- Owner: Rasyar

Inter-Agent Communication — Shared State

All agents communicate through a single SharedState object — a Python dictionary protected by a threading.Lock (Mutex). No agent calls another agent directly.

Ergonomics →

face_distance_cm, posture_warning_active

Privacy →

background_face_detected, screen_blurred

Atmosphere →

noise_level_db, white_noise_playing

Power →

battery_percent, is_charging, dark_mode_enabled

Distraction →

active_window, distraction_timer, app_blocked

Methods: `get(key)` → read with lock | `set(key, value)` → write with lock | `get_all()` → copy entire state

Live Dashboard Output

main.py prints a real-time status line every 5 seconds showing all agent data:

```
C:\> python main.py
```

```
=====
🚀 DEEP WORK GUARDIAN – Starting Up...
=====
```

```
✅ All 5 subsystems running!
Press Ctrl+C to stop
-----
```

```
Face: 72.3cm | Noise: 42.5dB | Battery: 85% 🔌 🌞 | Privacy: ✓ | Window: VS Code
Face: 38.1cm | Noise: 65.2dB | Battery: 84% 🔌 🌙 | Privacy: ✓ | Window: YouTube
Face: 71.0cm | Noise: 31.8dB | Battery: 83% 🔌 🌙 | Privacy: 🔒 | Window: [BLURRED]
```

How to Run:

1. `pip install opencv-python numpy psutil pygetwindow ptyer pyaudio pygame`
2. `python main.py`
3. The dashboard updates every 5 seconds. Press Ctrl+C to stop.

Thank You!

Deep Work Guardian — Protecting Focus, Health & Privacy

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Any Questions?