BLINK OS

"OPERATING YOUR COMPUTER HANDS-FREE WITH JUST YOUR EYES & HEAD"

PROBLEM STATEMENT

Current accessibility tools are either:
Expensive (hardware-based eye trackers)
Limited (basic screen readers or speech control)
People with disabilities face barriers in digital usage.
Need: Affordable, software-only accessibility OS layer.

OUR SOLUTION

- Iris Tracking → Cursor Control
- Move the cursor with eyes
- Blink to click/select
- Head Tracking → Scrolling Control
- Tilt head = Scroll up/down
- Turn head = Scroll left/right
- No external hardware (just webcam).

CORE FEATURES

- **Iris Tracking (Cursor Mode)**

Eye gaze detection using OpenCV + Mediapipe

Blink detection for click

Calibration (3x3 grid, stores JSON)

- **Head Tracking (Navigation Mode)**

Scroll pages by head tilt

Works alongside iris tracking

Adjustable sensitivity

- **Accessibility-First Design**

Works with normal webcams

Low latency (optimized with smoothing filters)

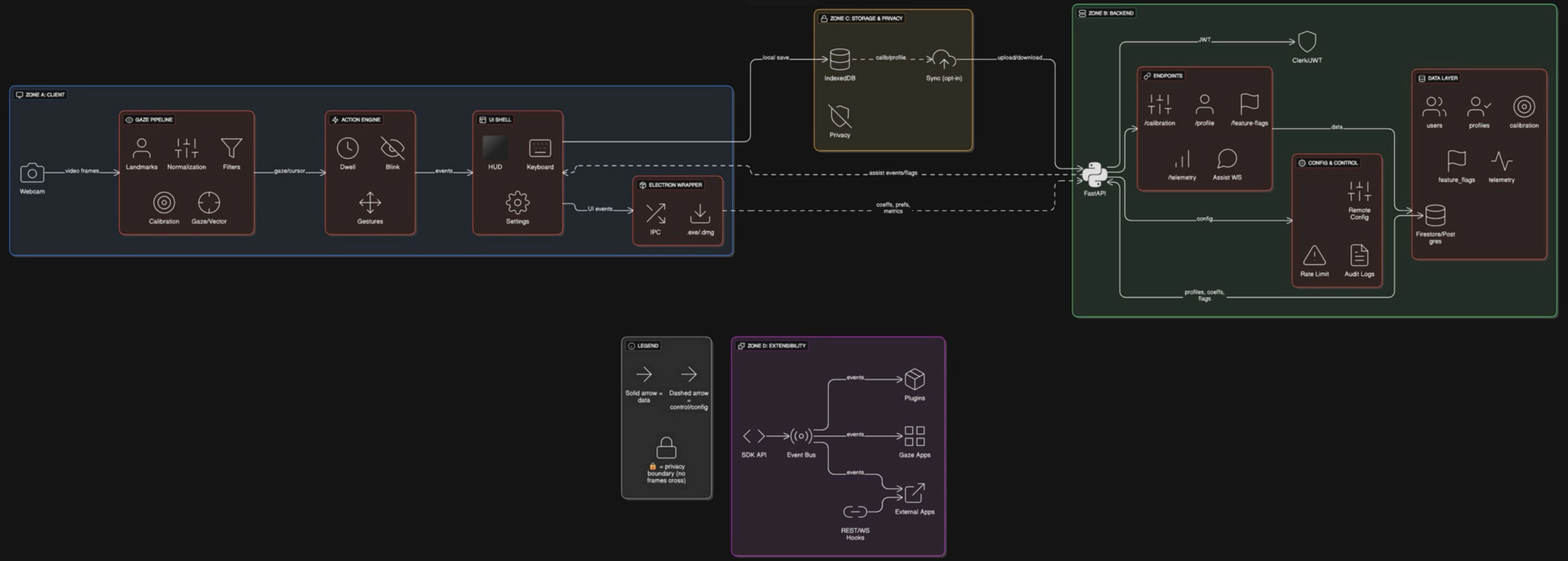
Keyboard overlay for typing with eyes

TECH STACKS

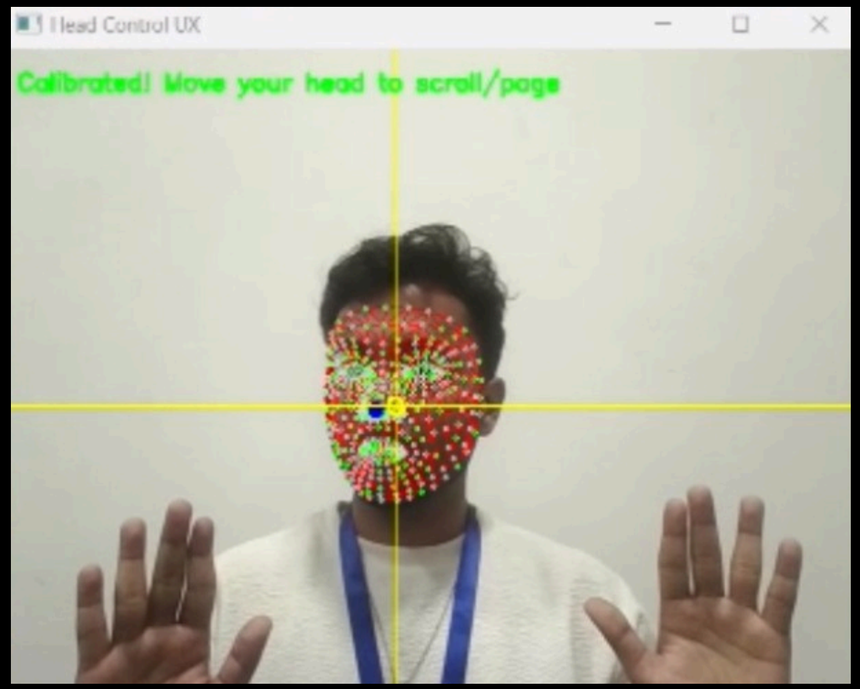
Python3.10+– stable,bestlibrary support.
OpenCV(cv2) – camera capture, image ops, drawingoverlays, basic smoothing/preprocessing.
Mediapipe – face mesh & iris landmarks (fast, accurate, hardware-agnostic).
NumPy – numeric ops, arrays.
SciPy (optional but recommended) – RBFInterpolator, distance routines for mapping/interpolation.

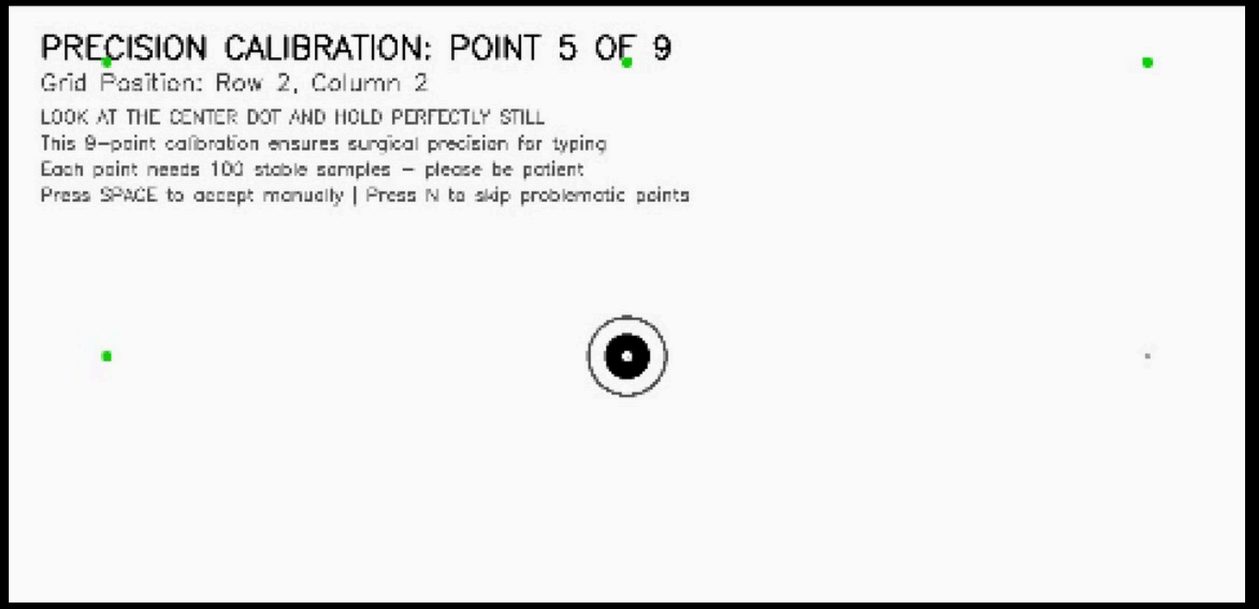
- PyAutoGUI – move mouse / clicks / simple OS control for demos (typing via cursor).
- **Collections / deque / time / math** – builtin for buffering, timing, filters
- **Backend** (for storage): Flask.
- **API** - Gemini API
- **Hosting** - Vultr

SYSTEM ARCHITECTURE



DEMOSTRATIONS





RESEARCH & INNOVATION

Our novelty:

- Software-only solution (no costly hardware)
- Hybrid control system (eye + head)
- Optimized for typing (blink selection + keyboard overlay)

IMPACT

- **Accessibility →** Empower people with motor disabilities.
- **Healthcare →** Patients with limited mobility can communicate.
  EdTech → Hands-free learning environments.
  Future Potential → AR/VR, Gaming, Robotics.

FUTURE SCOPE

- **Multi-user calibration profiles**
- **Eye gesture recognition** (double blink = right click, wink = shortcuts)
  Full OS Integration (Window manager like Eye-OS)
  Cloud training dataset for personalization