Visual Control System

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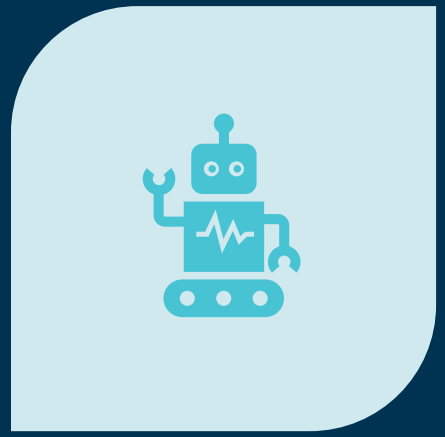
What is Visual Control System

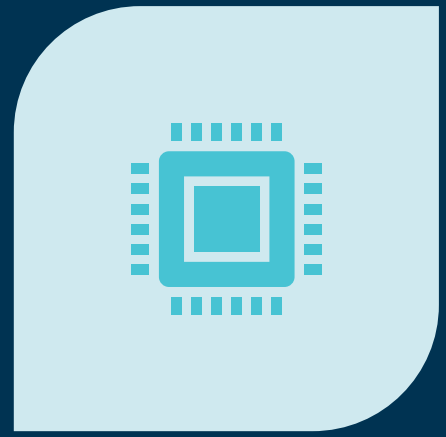
SOFTWARE BRIDGE:

CONNECTS AI (PYTHON) MODULES (ML) WITH HARDWARE (ARDUINO)



AI-DRIVEN CONTROL:

USES ARTIFICIAL INTELLIGENCE INPUT (HAND/FACE TRACKING) TO GENERATE EXECUTABLE COMMANDS.



REAL-WORLD UTILITY:

TRANSLATES VISUAL DATA AND COMPLEX ANALYSIS INTO PHYSICAL ACTIONS

The purpose

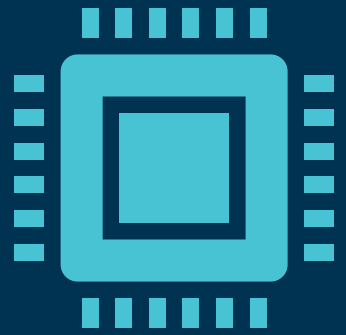
- Develop a Functional Software Bridge
- Achieve Stable, Low-Latency Control
- Validate Open-Source AI Utility

Significance & Benefits

- **Enhanced Accessibility & Control:**
- **Cost-Effective, Open-Source Utility**
- **Prototyping Platform for Automation**

Used Programming Languages

Python



C/C++(Arduino)

Hardware components

Arduino uno

Red Led

resistor 220 ohm

How does it work ?

OpenCV/Camera Input:
For real-time video stream acquisition

ML Module (MediaPipe):
Hand/Face Landmark Detection and coordinate extraction

PySerial:
The Serial Bridge. Responsible for **Encoding/Decoding** the stable command

Hardware components

Note:
This loop continuous until the connection is closed between Arduino & python

Challenges

- Switching and setting old versions of python
- False Positives
- Latency
- Connecting between python & Arduino

Conclusion

Summary & Results:

- Built a reliable Gestural Command Bridge (GCB).
- Key Outcome: Confirmed the stability and low-latency of the system through Temporal Filtering.

Value & Impact:

- Demonstrated the viability of open-source AI as a dependable physical control tool.
- Cost-Effective Solution: Provides a low-cost, high-performance alternative to proprietary systems

Future Enhancements

- Scalability
- Expansion
- Deployment (Develop a GUI)

Thanks for listening