

Modular Camera Mount for Mobile Security Robots

Team 10: Ishika K. Kanakath and Austin Wilson
ECSE 488



CASE WESTERN RESERVE
UNIVERSITY
Case School of Engineering



Why we pivoted

Existing HRI research using the NAO v6 Robot with custom hardware

NAO v6 lacks compute

Poor tracking

Lack of power supplies

Low power SBC

Addresses similar problems found with roaming security robots

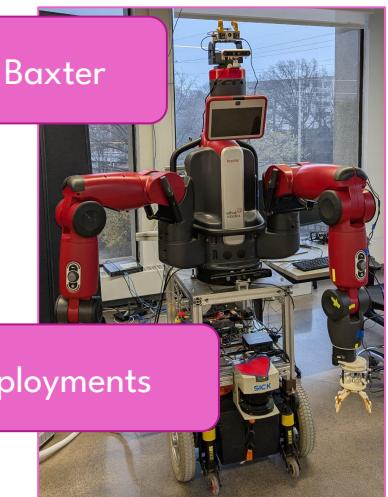


AstroPsych

Turtle Bot



Baxter



Future deployments



Costly mobile security systems are already deployed

Knightscope K5 Roaming Robot

\$5,000 / month leasing

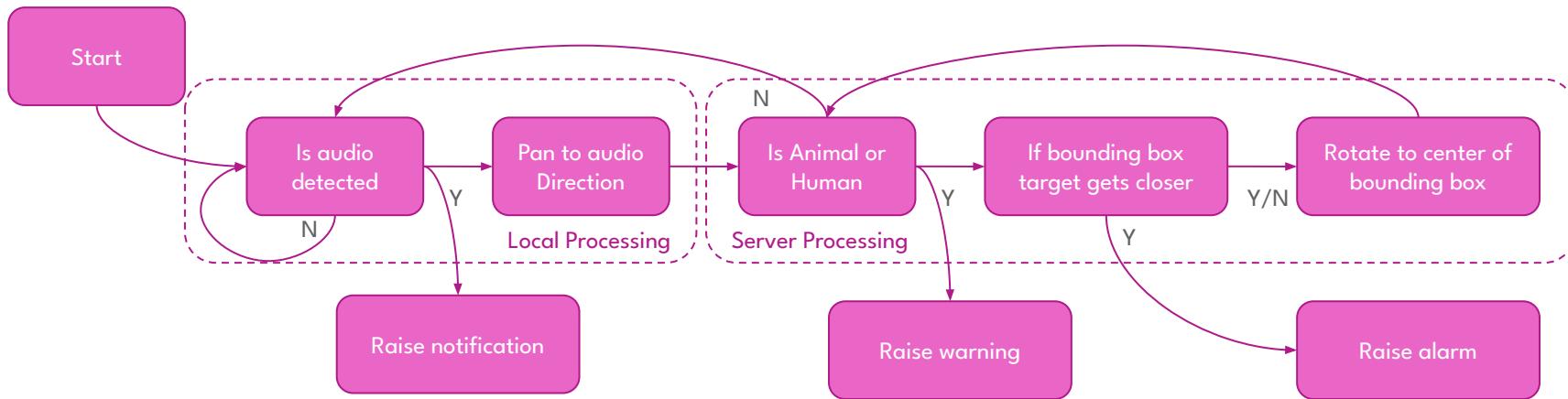


SMP Robotics S5.2 PTZ AI Security Robot

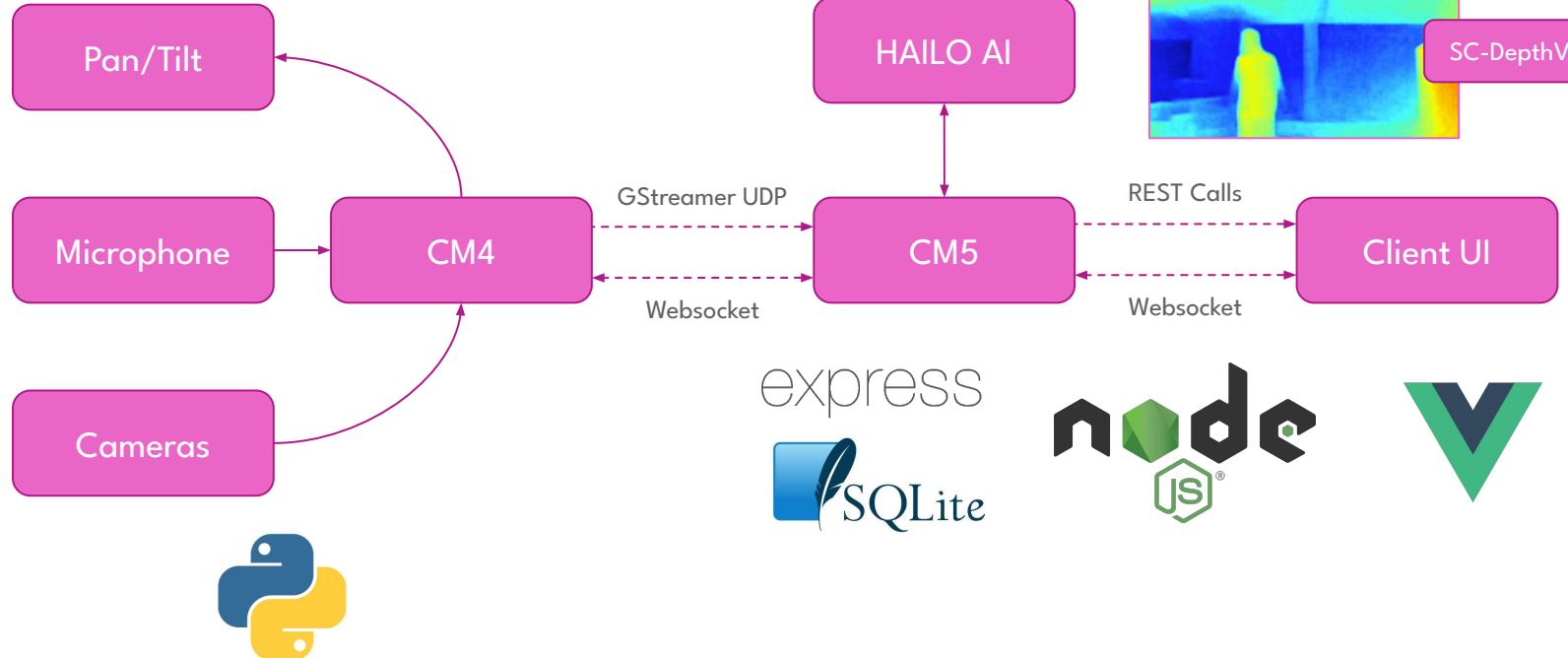
\$1,500 / month leasing



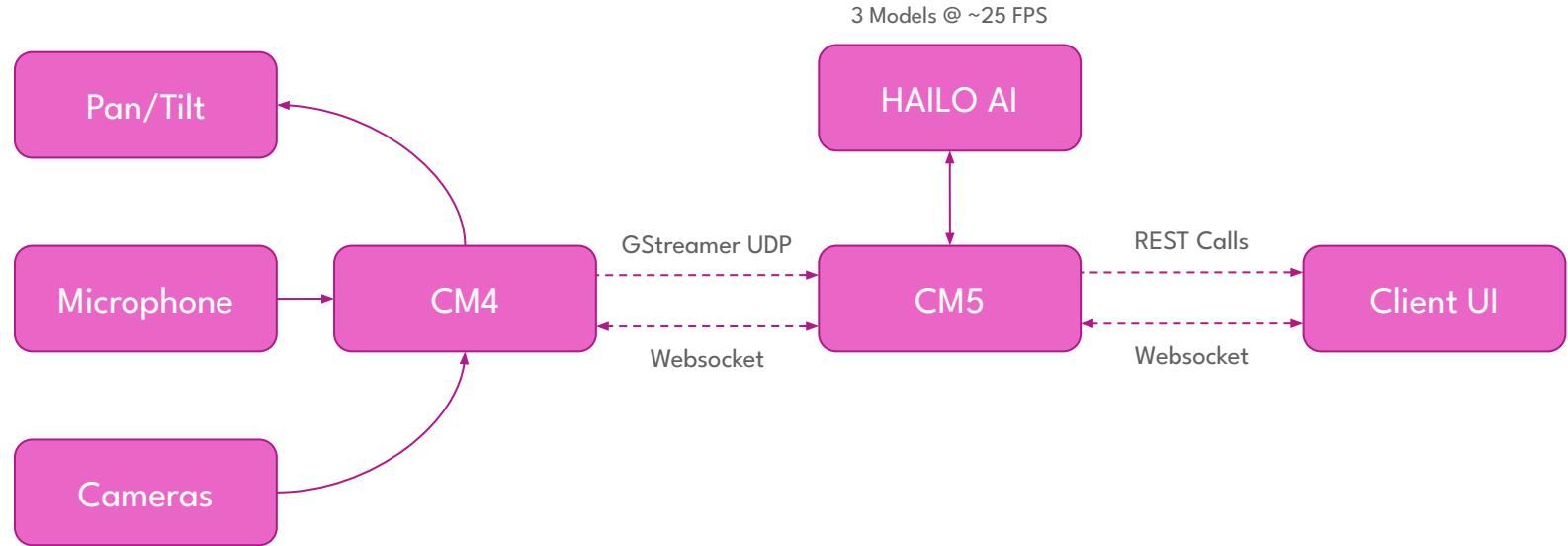
State propagation



Architecting our solution

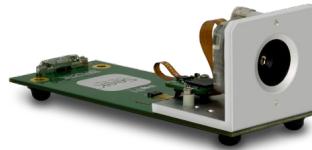


Architecting our solution



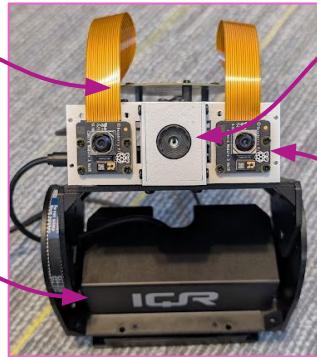
Building our pan/tilt base

Respeaker
2.0 Mic Array



Seek Thermal
Camera

IQR Pan/Tilt



2x RPI NoIR
Cameras

RPI CM4



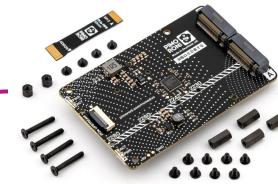
Custom CM4 Carrier
Boards

Building our server

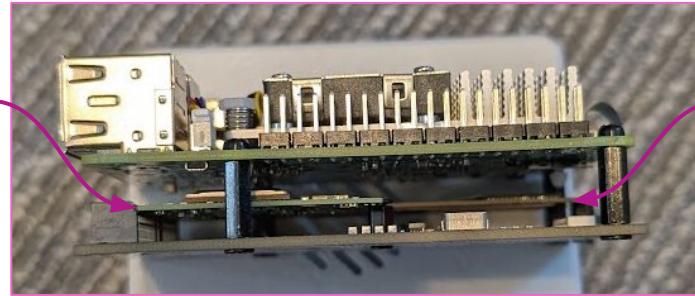
RPI 5



2x NVMe Base



HAILO 8L



NVMe SSD

Our system costs



iRobot
Create

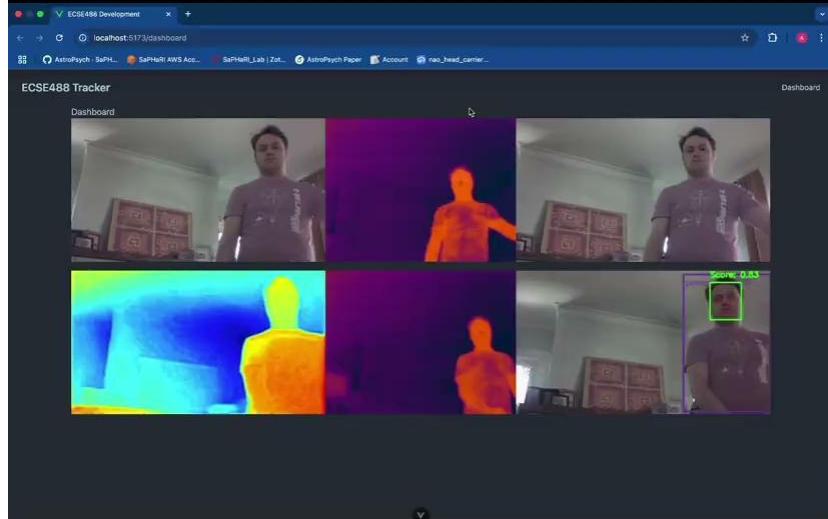
~\$449.99



Clearpath
Robotics
TurtleBot 4

~2,199.99

Product	Cost
Raspberry Pi 5	\$80.00
NVMe Base Duo	\$33.00
HAILO AI Module	\$70.00
Samsung NVMe SSD (1TB)	\$99.00
Raspberry Pi CM4	\$80.00
Custom RPI Carrier Board PCB (JLCPCB)	\$100.00
2x Raspberry Pi Camera Module 3	\$50.00
Iquotient Robotics Pan/Tilt Unit 2	\$355.00
Seek Thermal Camera	\$599.00
ReSpeaker Mic Array v2.0	\$64.00
Assorted Connectors, Plastic, Nylon Screws	\$50.00
Total**	~\$1,580.00



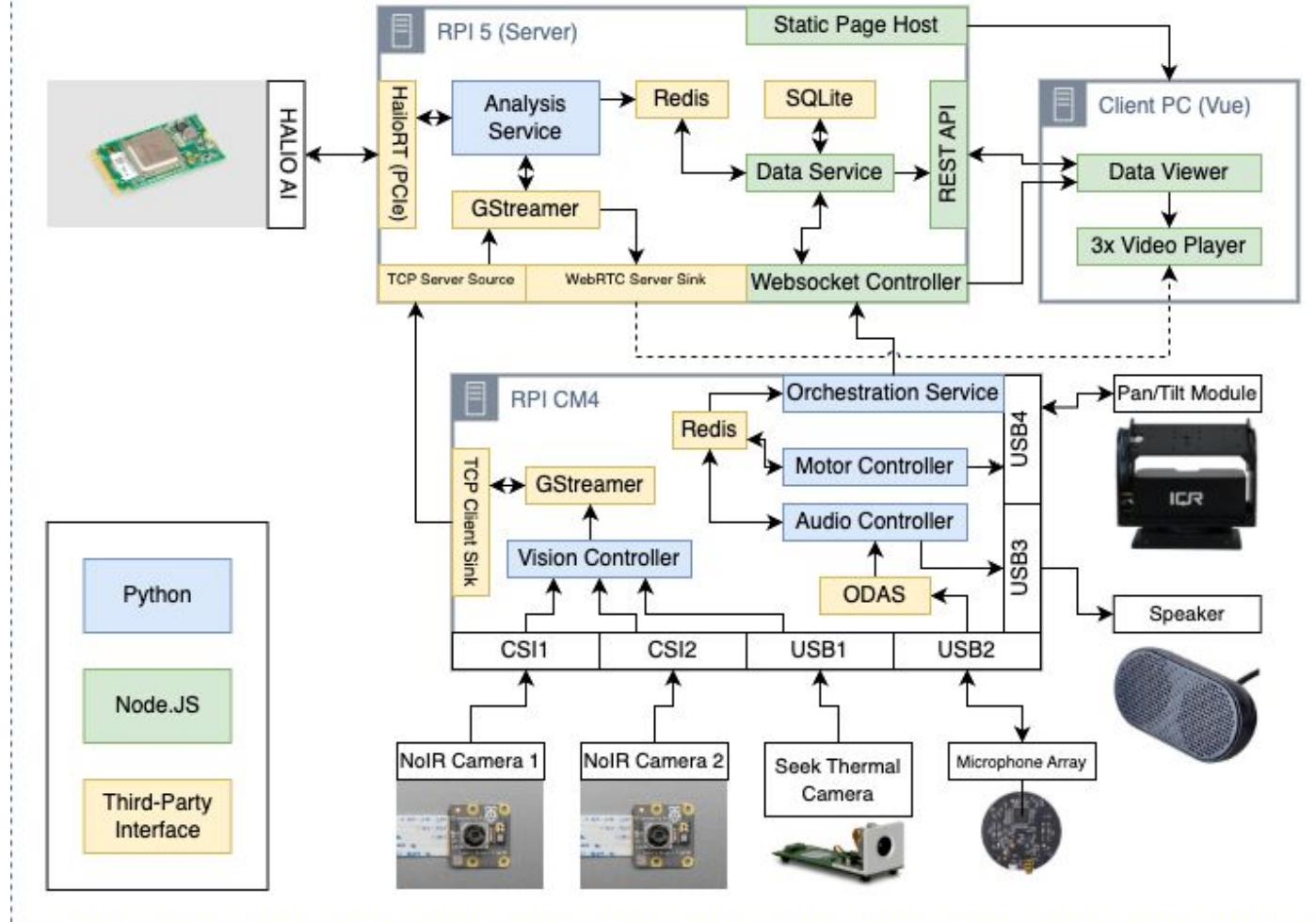
Where we are now

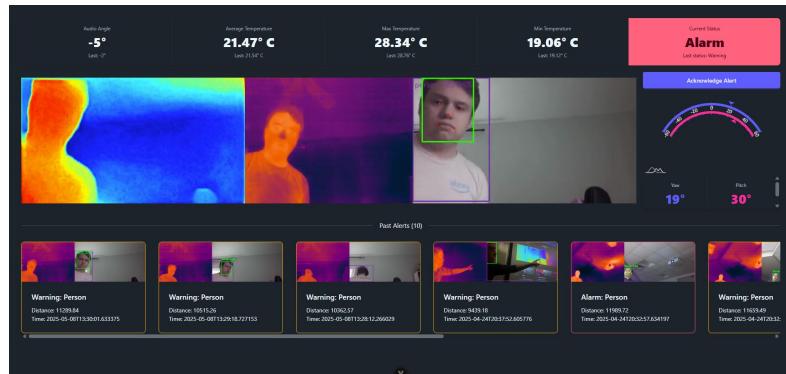
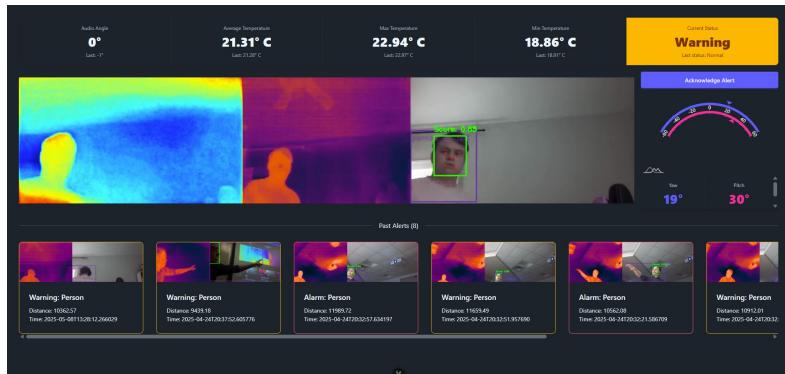
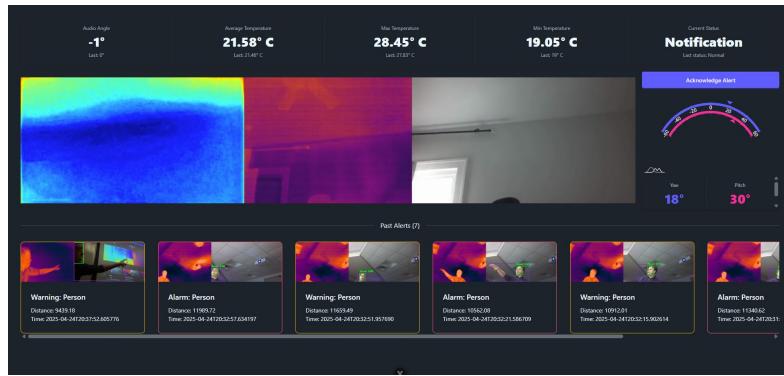
Device	
GStreamer Producer (UDP video streams)	Done
Pan/Tilt Driver	In Progress (Bounding box tracking)
Audio Consumer (Direction of Arrival)	Done
Server	
UI	

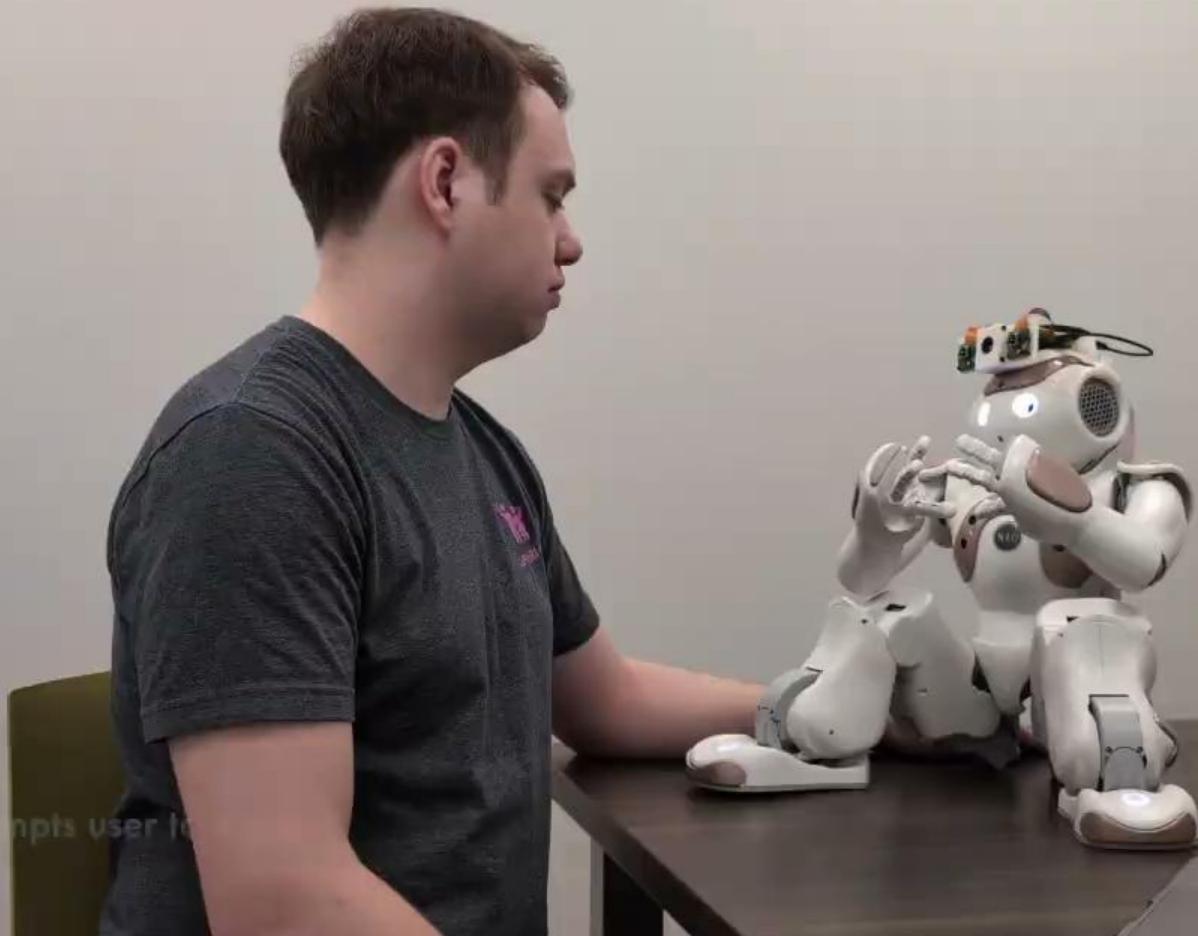
Questions and comments?



Supplementary



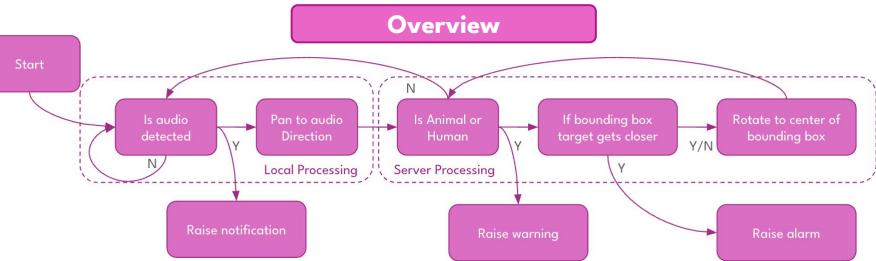




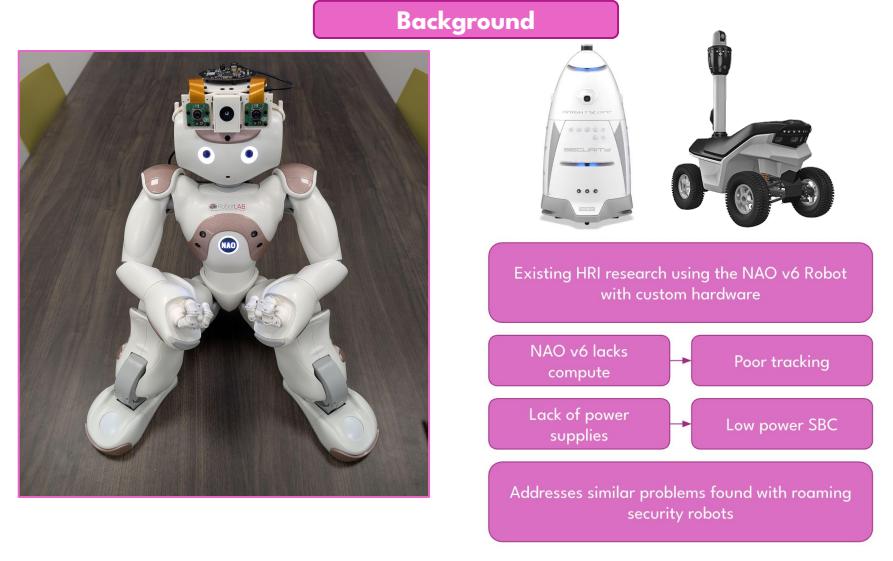
Team 10: Modular Camera Mount for Mobile Security Robots

Ishika K. Kanakath (ikk10@case.edu)

Austin Wilson (amw223@case.edu)



Product	Cost
Raspberry Pi 5	\$80.00
NVMe Base Duo	\$33.00
HAILO AI Module	\$70.00
Samsung NVMe SSD (1TB)	\$99.00
Raspberry Pi CM4	\$80.00
Custom RPI Carrier Board PCB (JLCPBCB)	\$100.00
2x Raspberry Pi Camera Module 3	\$50.00
Iquotient Robotics Pan/Tilt Unit 2	\$355.00
Seek Thermal Camera	\$599.00
ReSpeaker Mic Array v2.0	\$64.00
Assorted Connectors, Plastic, Nylon Screws	\$50.00
Total**	-\$1,580.00



Conclusion

Missing items

BBOX Tracking

Auditory alerts

Stereo depth

