

TEAM CO: ACOUSTIKILL



Use Case

WHAT AND WHY ACOUSTIKILL?



Non-invasive

Autonomous

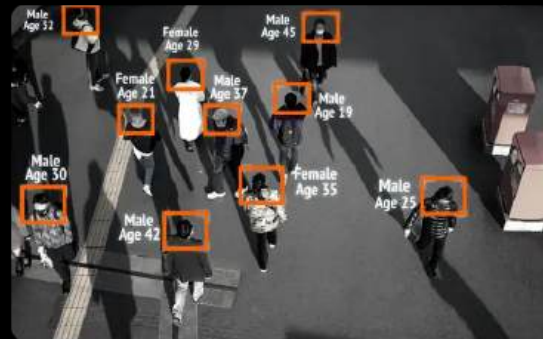
Scope

Use Case Requirements



Speaker

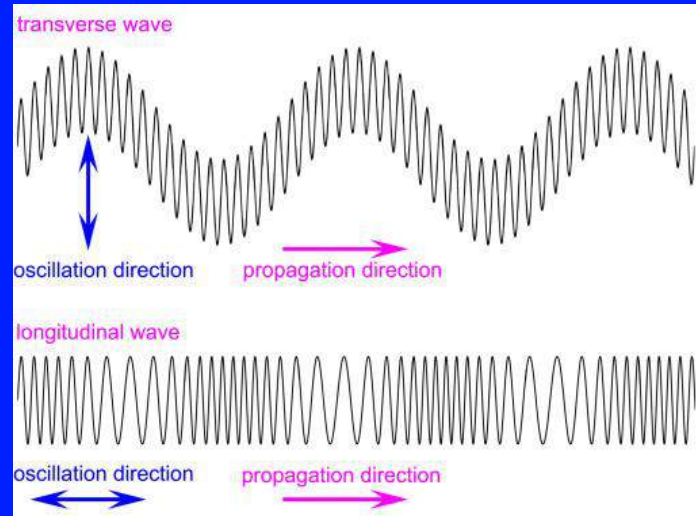
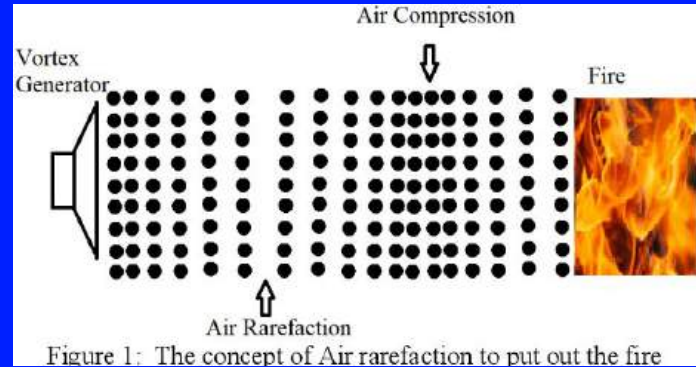
Robot



Detection

Use Case Requirements

Why use acoustic waves to extinguish fires?



Technical Challenges

WHAT ARE KEY CHALLENGES?



Distance

Time

Speed

Consistency

Solution Approach

Speaker

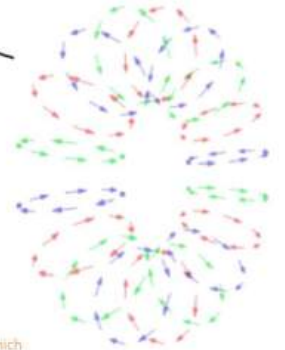
Signal Generator

Subwoofer Magnet

Collimator



VORTEX RING



SUBWOOFER

A speaker which acts as an air pump for low frequency oscillations

COLLIMATOR

Ensures that the air travels in parallel streams (laminar flow)

BAFFLE

Smaller opening through which air is forced

Solution Approach

Robot

Robot
Kit



Lipo Battery

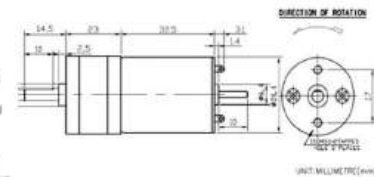
Motor parameters(9V& 150rpm)

- 25mm DC brush motor (with Hall sensor encoder)

Load noise:	56dB	Screw size:	M3.0
Working voltage:	9V -12V	Shaft diameter:	4mm, d3.5
Shaft extension size:	14.5mm	Code disk parameters:	2 pulses / circle
Axial clearance:	0.05-0.50mm	Working voltage of sensor:	3-5v
Locked rotor torque:	9.5kg NAN	Output speed:	150 ± 10% rpm
Load speed:	100 ± 10% rpm	Load current:	200mA (max)
Load torque:	3000g NAN	Locked rotor current:	4500ma (max)
Load current:	1200Ma (max)		



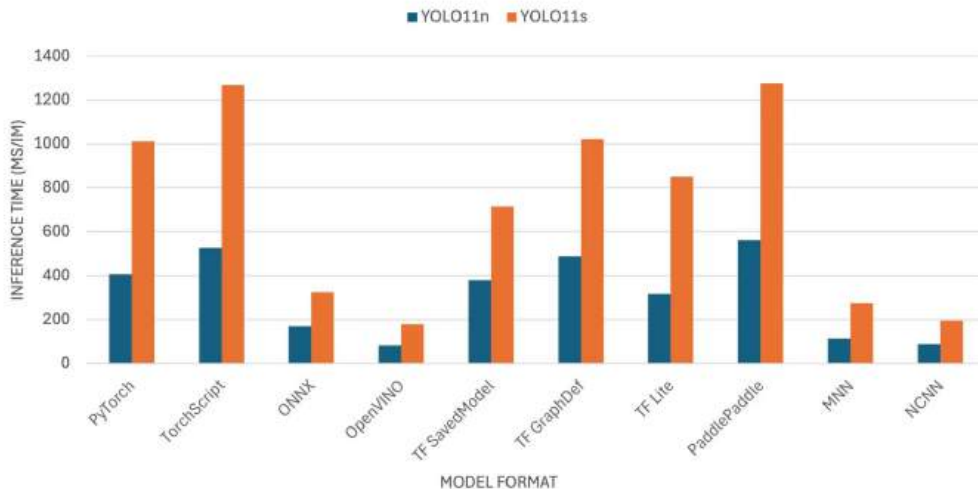
- Product outline drawing



Solution Approach

Detection

Inference Time per Image by Model Size and Format
(Raspberry Pi 5 at 640 Image Size)



Testing

Preliminary Distance and Angle

Speaker-Fire Distance

Speaker Angle Distance

Robot Mechanics and Response Time

Fire Identification Accuracy

Fire Identification Time

Robot Motion with Model



Tasks and Division of Labor

Cole	Kushaan	Stephanie	All
Constructing Robot Kit	Collect Fire Image Data	Constructing Speaker Apparatus	Preliminary Fire Tests
Test Robot Mechanics and Response Time	Writing Fire Detection CV Model	Testing Speaker-Fire Distance	Design Review
	Testing Fire Identification Accuracy	Testing Speaker Angle Distance	Integrating CV Model with Robot
	Testing Fire Identification Time		Integrating Robot with Model and Speaker

Conclusion

Acousti·Kill *proper noun*

- 1. an autonomous robot that detects fire, using acoustic waves to extinguish**