



AMI

Acoustic Mapper and Isolator

Challenge 3: The Future of Industry Sound



**Alain
Bartels**



**Ming
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**Linda
Wang**



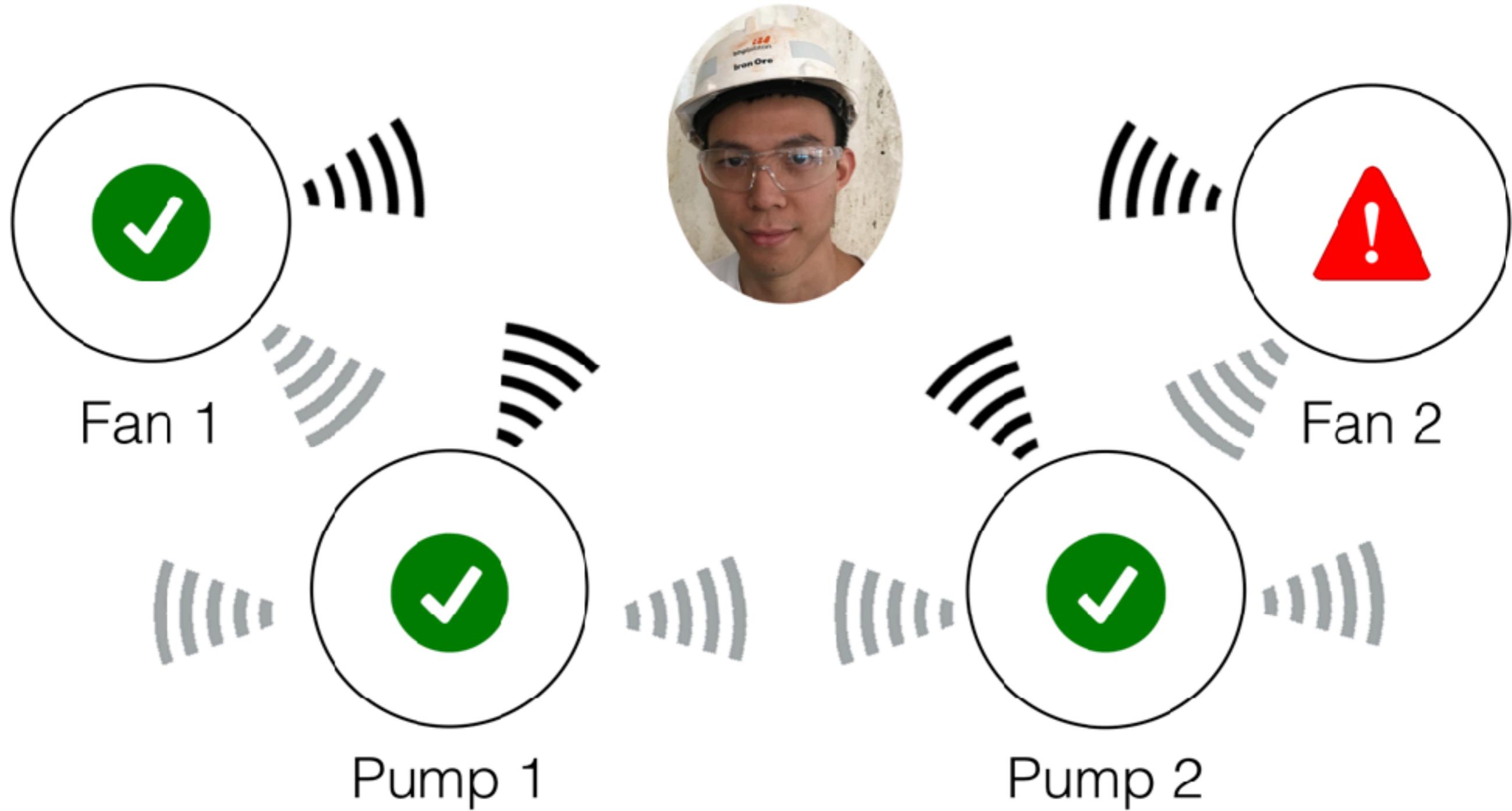
**Qisen
Tang**



**Peter
Du**

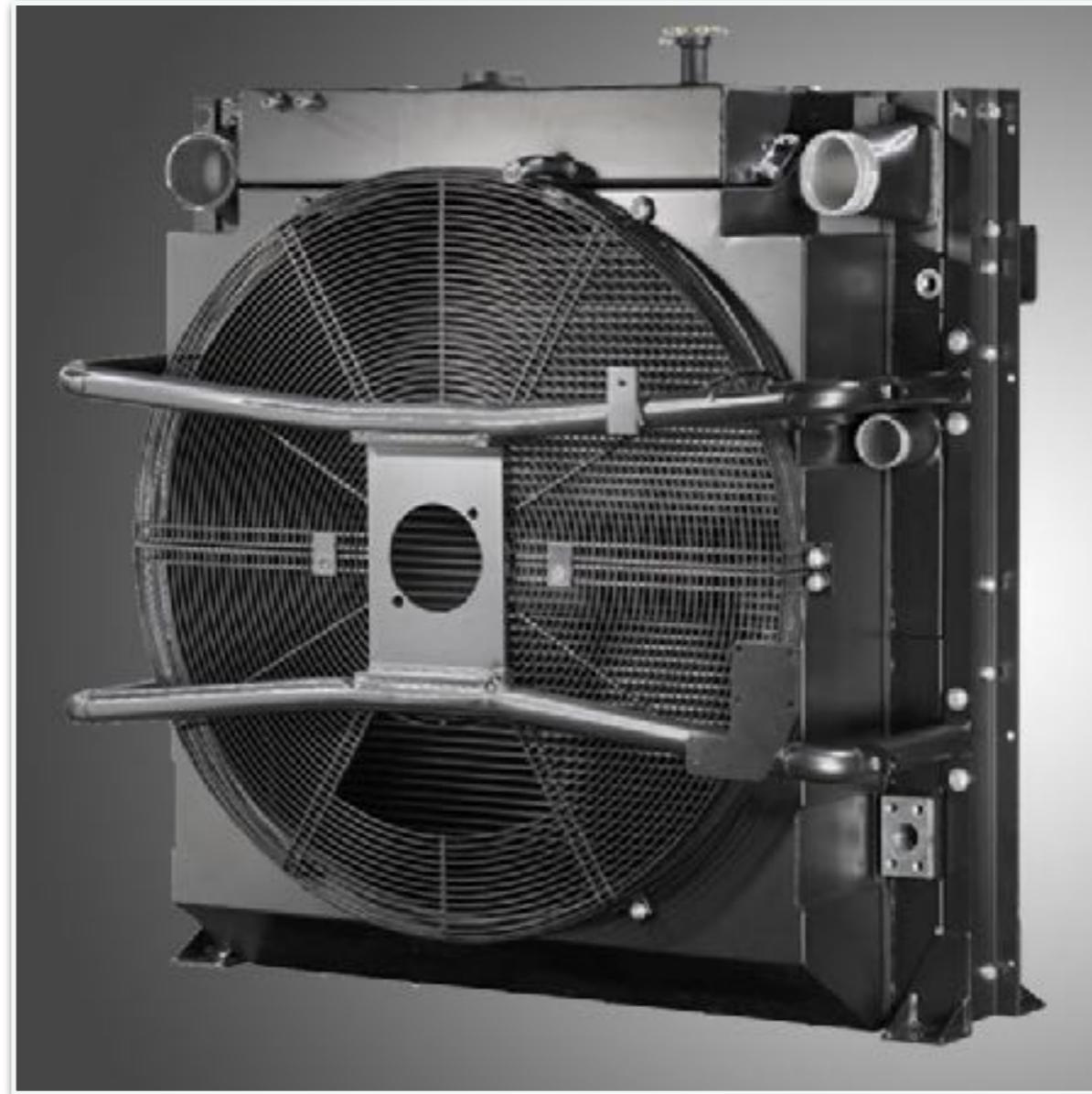


**Kyle
Saltmarsh**





Single Faulty Fan



Operating Environment

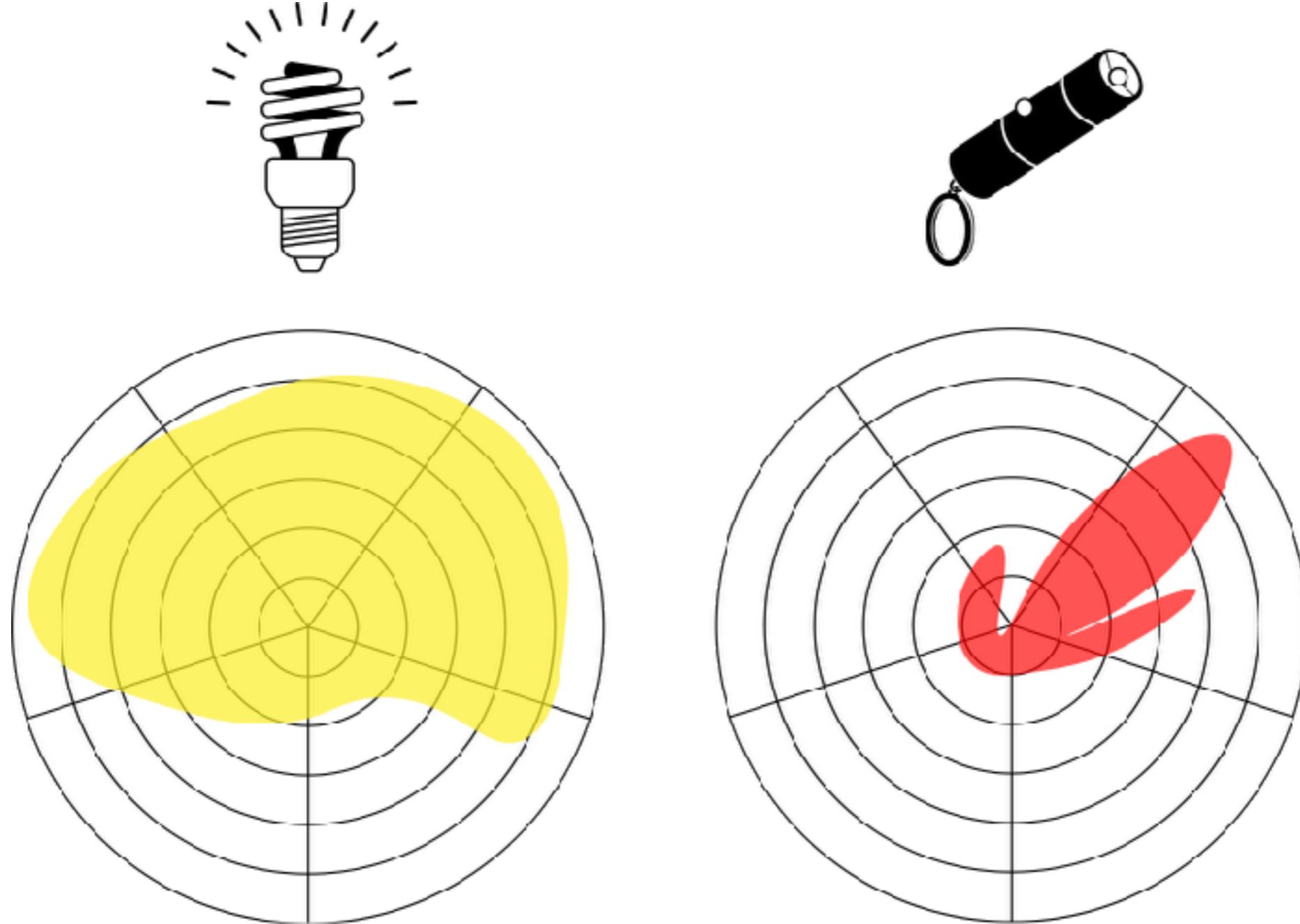


Acoustic Mapper and Isolator

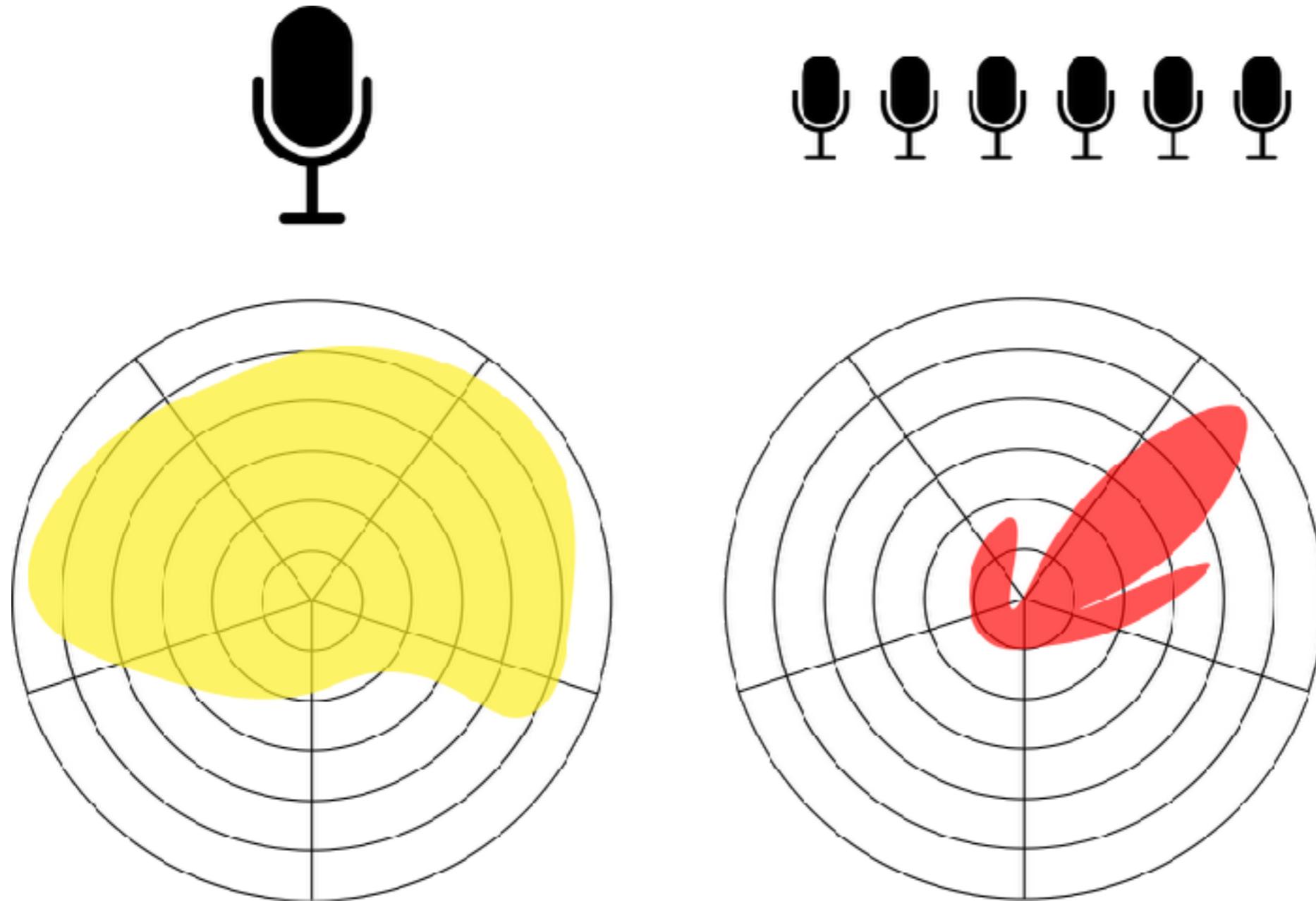
Microphone Array
ML Classification Models
Cloud Sound Library
User Application



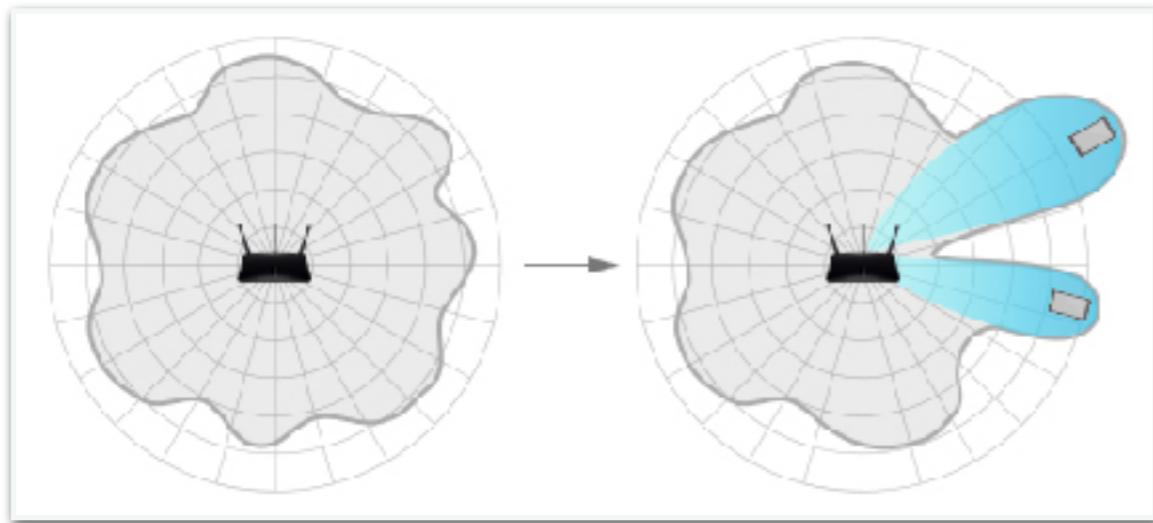
Beamforming



Beamforming



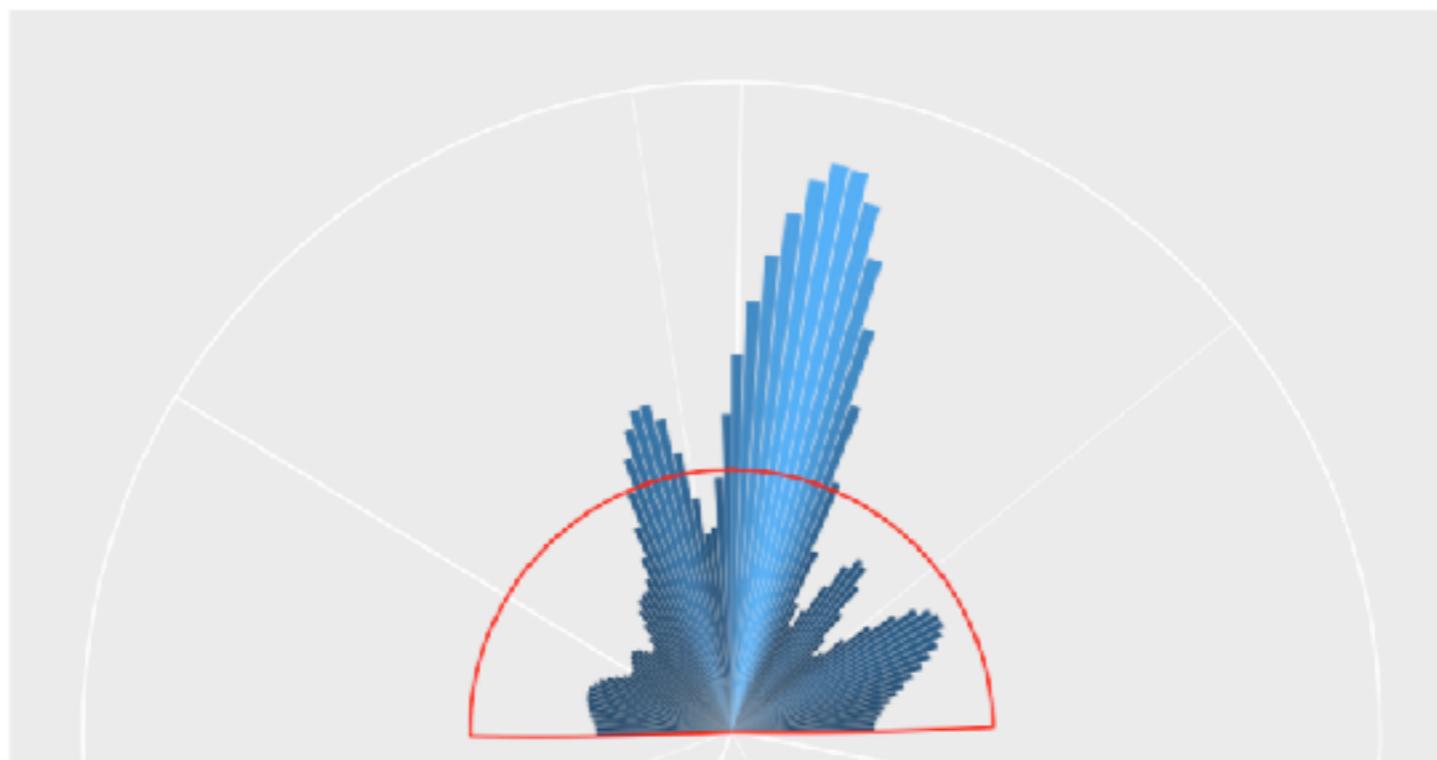
Beamforming Applications



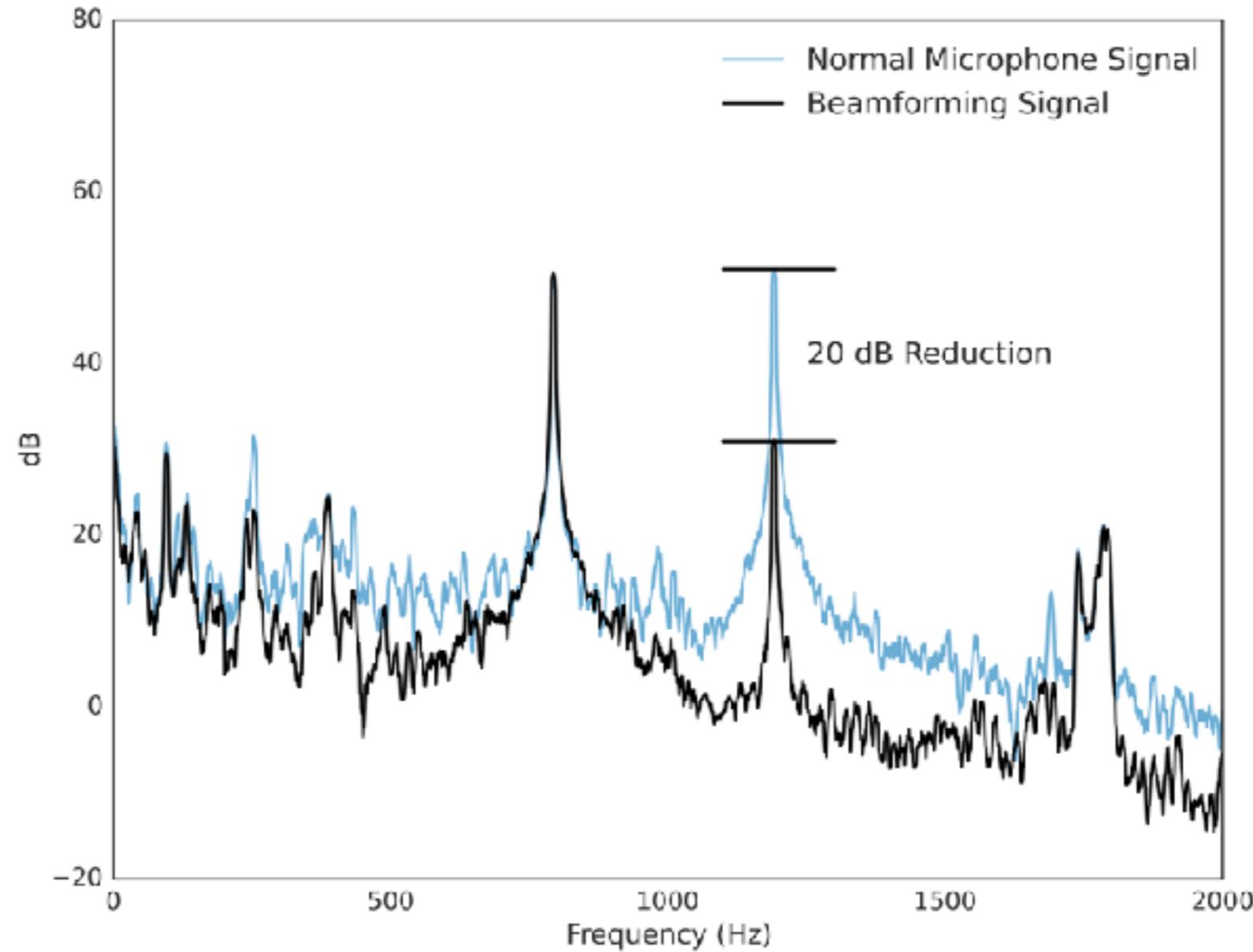
Solution in Action



Direction of Sound Sources



Solution in Action - Isolation



Performance

		True Condition		
		Lab Fan	Normal Fin Fan	Corroded bearing Fin Fan
Prediction	Lab Fan	194	2	1
	Normal Fin Fan	0	176	0
	Corroded bearing Fin Fan	0	0	167

		True Condition		
		Healthy	Unbalanced	Stop Working
Prediction	Healthy	444	17	15
	Unbalanced	27	464	0
	Stop Working	2	0	79

Plant Overview

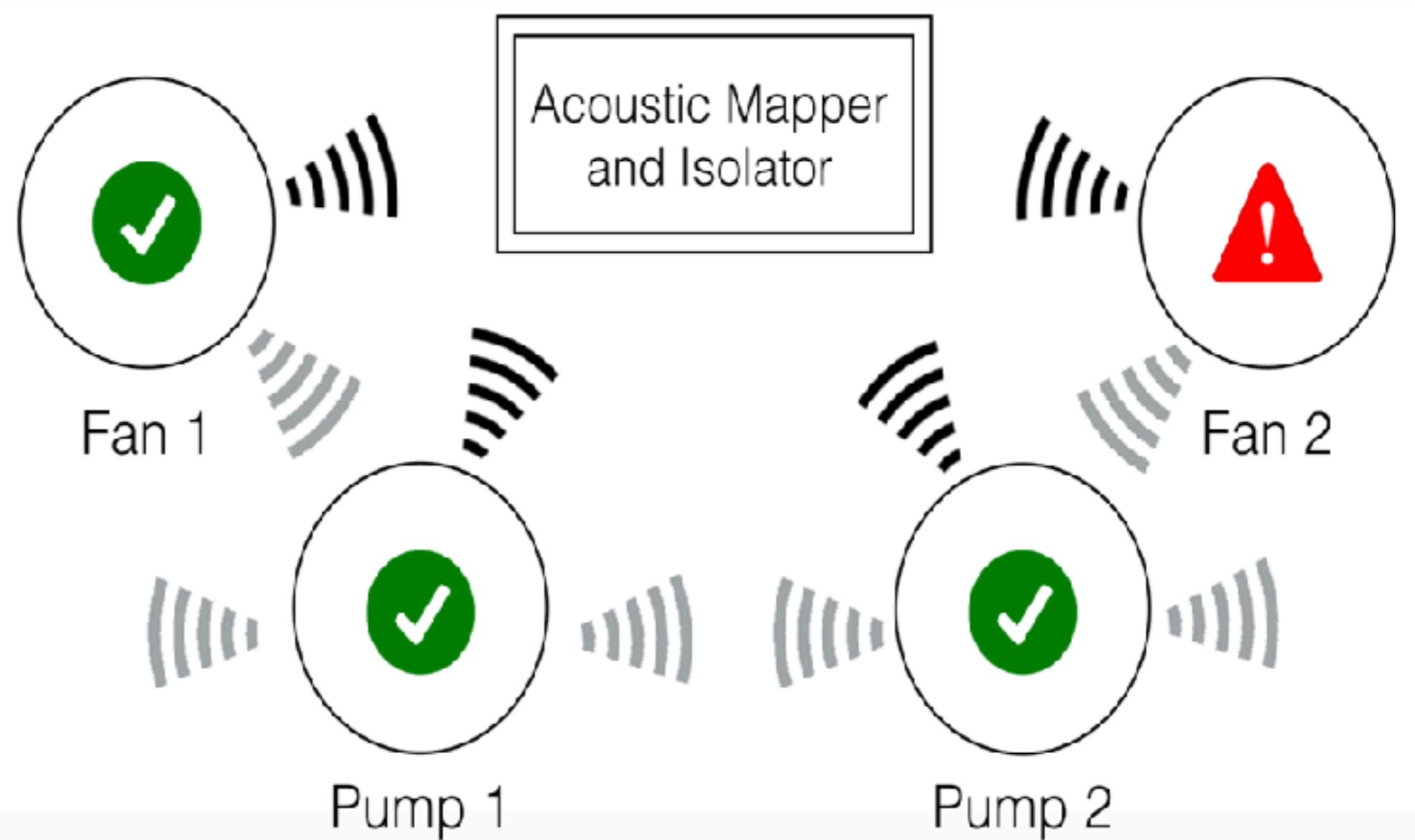
Monitor Equipment

Maintenance Records

Alerts

Record a Fault

Plant Sector



[Plant Overview](#)[Monitor Equipment](#)[Maintenance Records](#)[Alerts](#)[Record a Fault](#)

Equipment Time History

Equipment ID

Predicted Fault

Fan 1

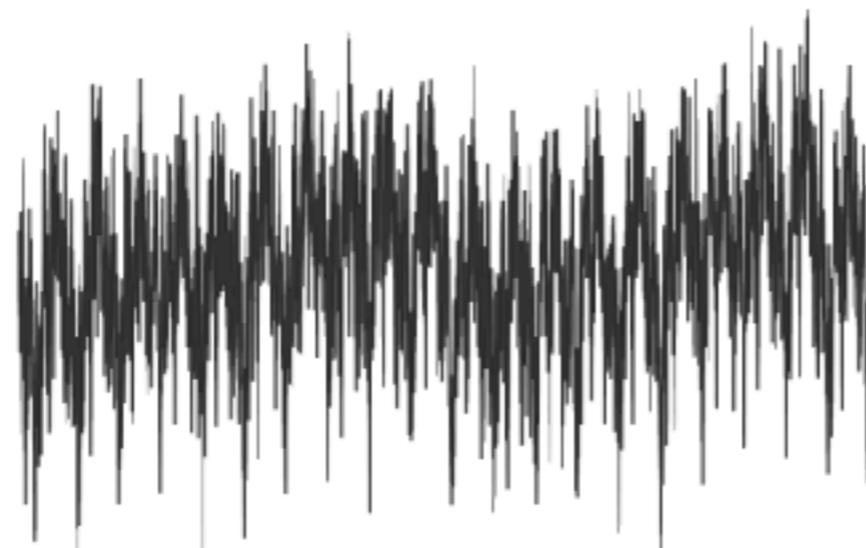
Obstruction

Status: Abnormal



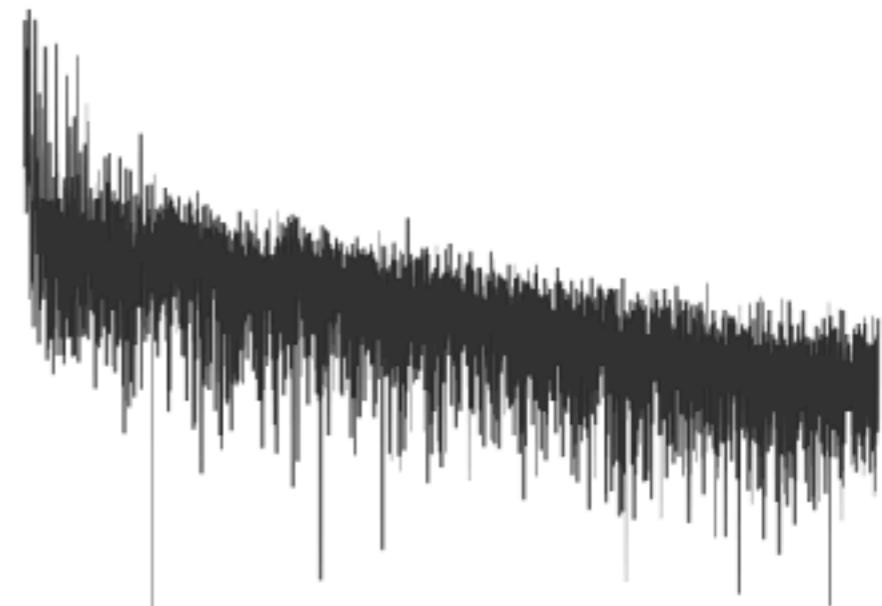
Time History

Acoustic Output



Frequency Spectrum

Acoustic Output



 Plant Overview Monitor Equipment Maintenance Records Alerts Record a Fault

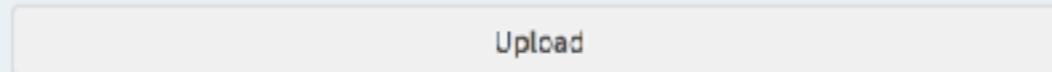
Respond to Alert

Was the alert correct?

Yes - Incorrect Diagnosis

**Please provide the correct cause of the alert.****Fault Type**

Unbalanced

 Upload

Applications



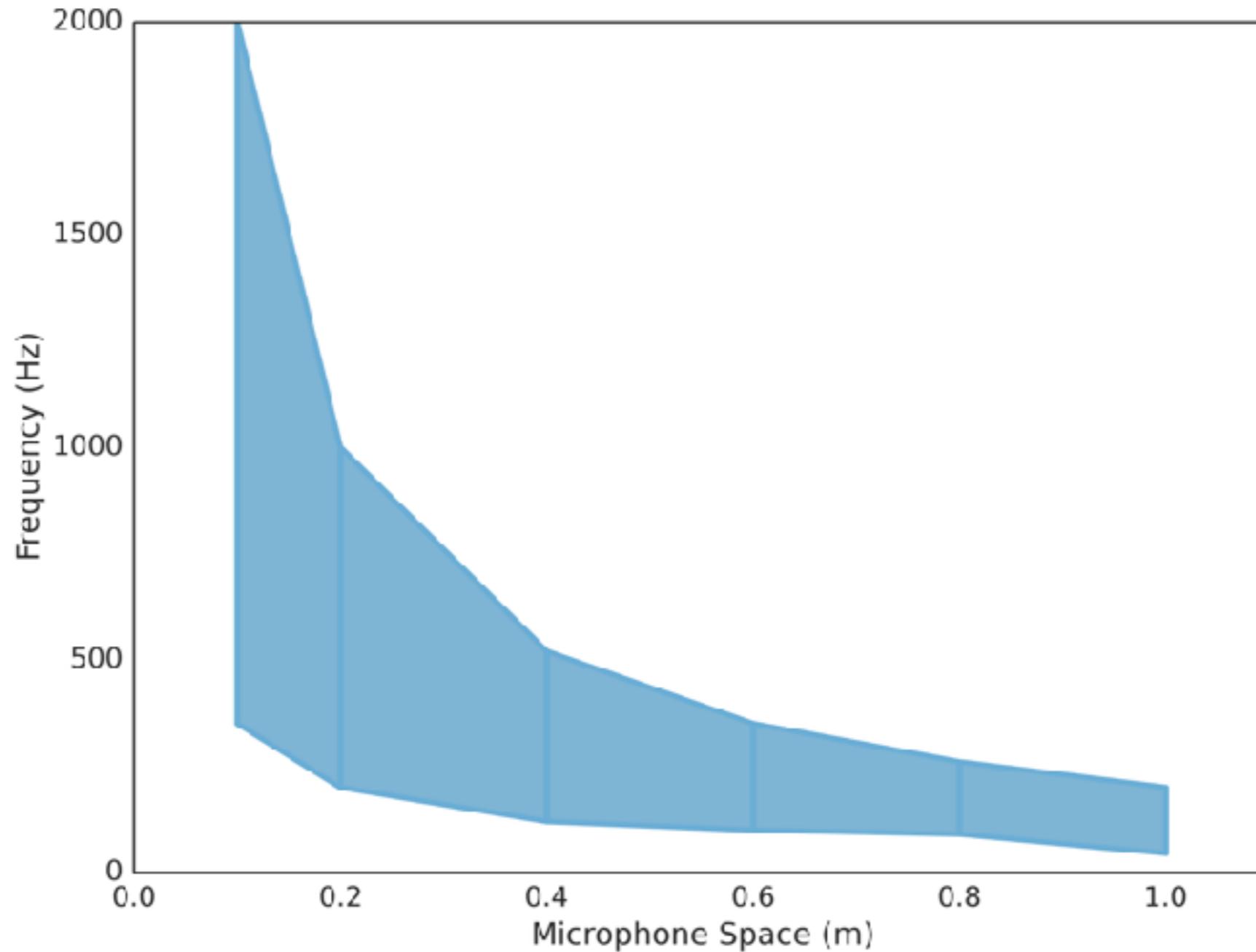
Thanks



EWMA Method

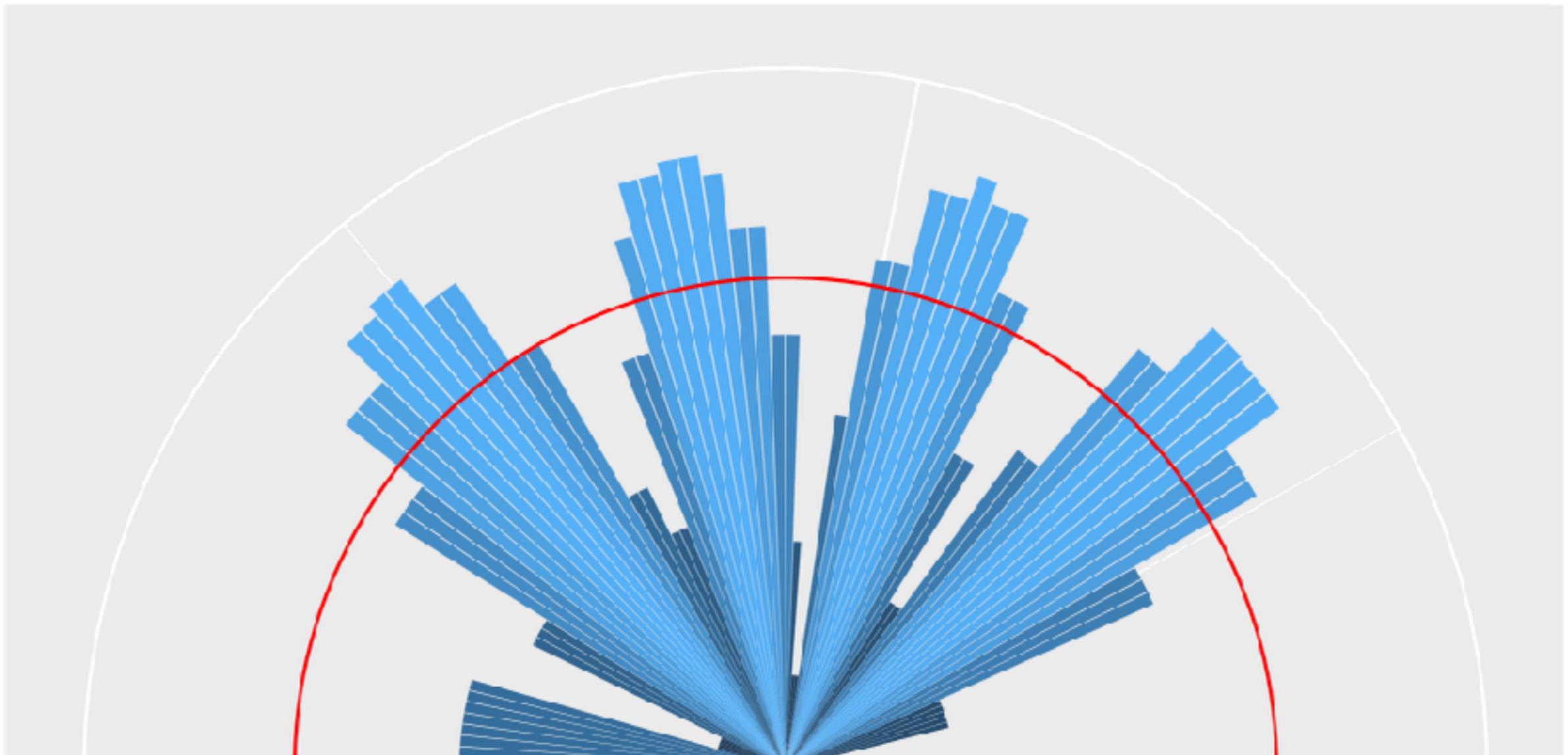
- Can detect gradual changes in a signals
- Algorithm automatically updates control limits
- Very Robust - wide applications

Operating Frequency

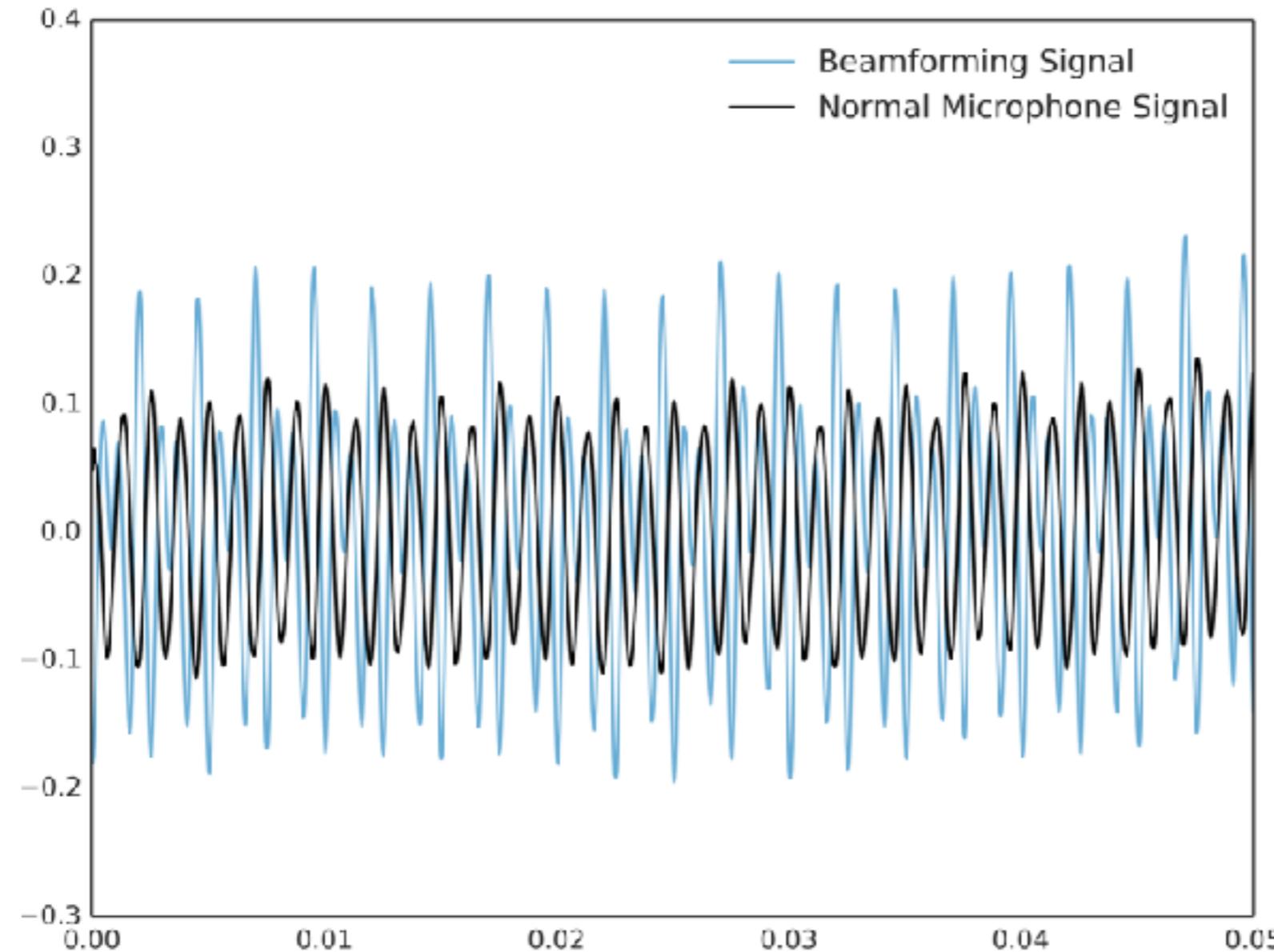


Solution in Action - Simulated

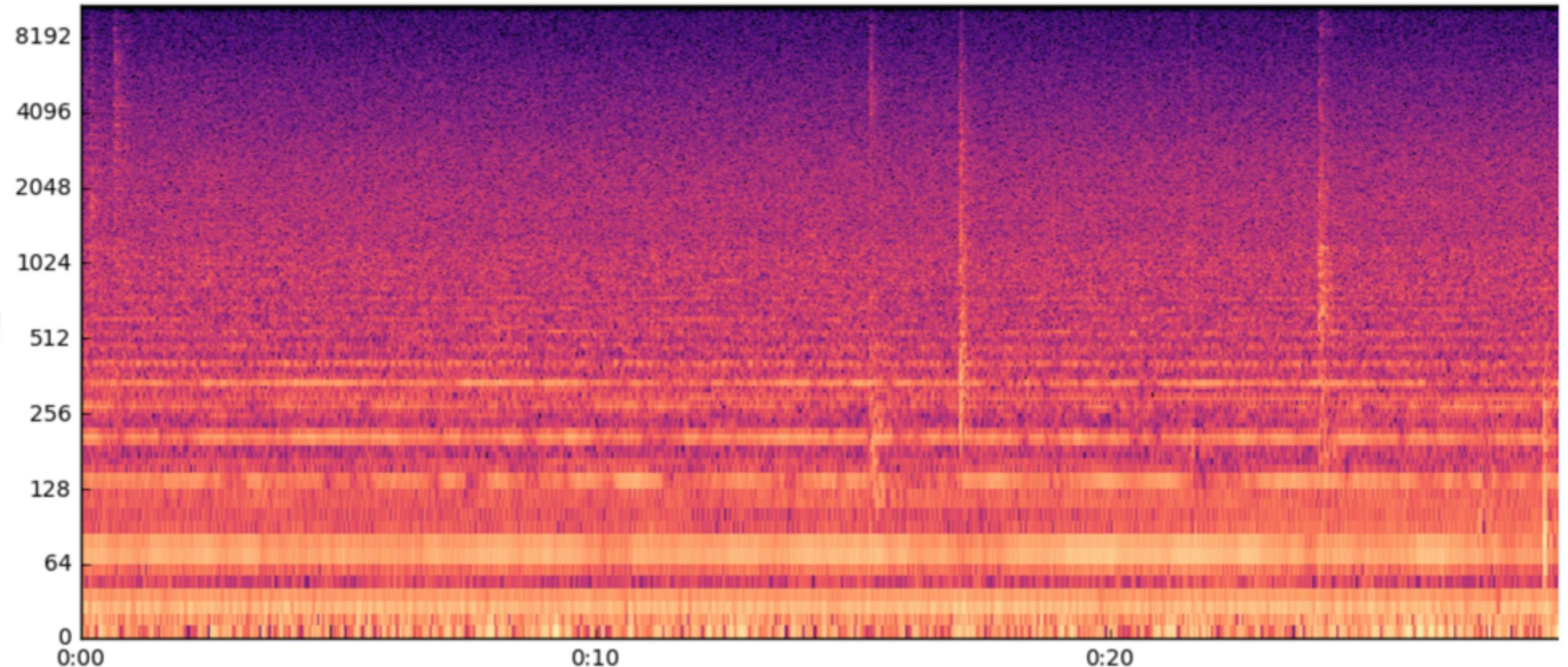
Direction of Sound Sources



Beamforming in Action



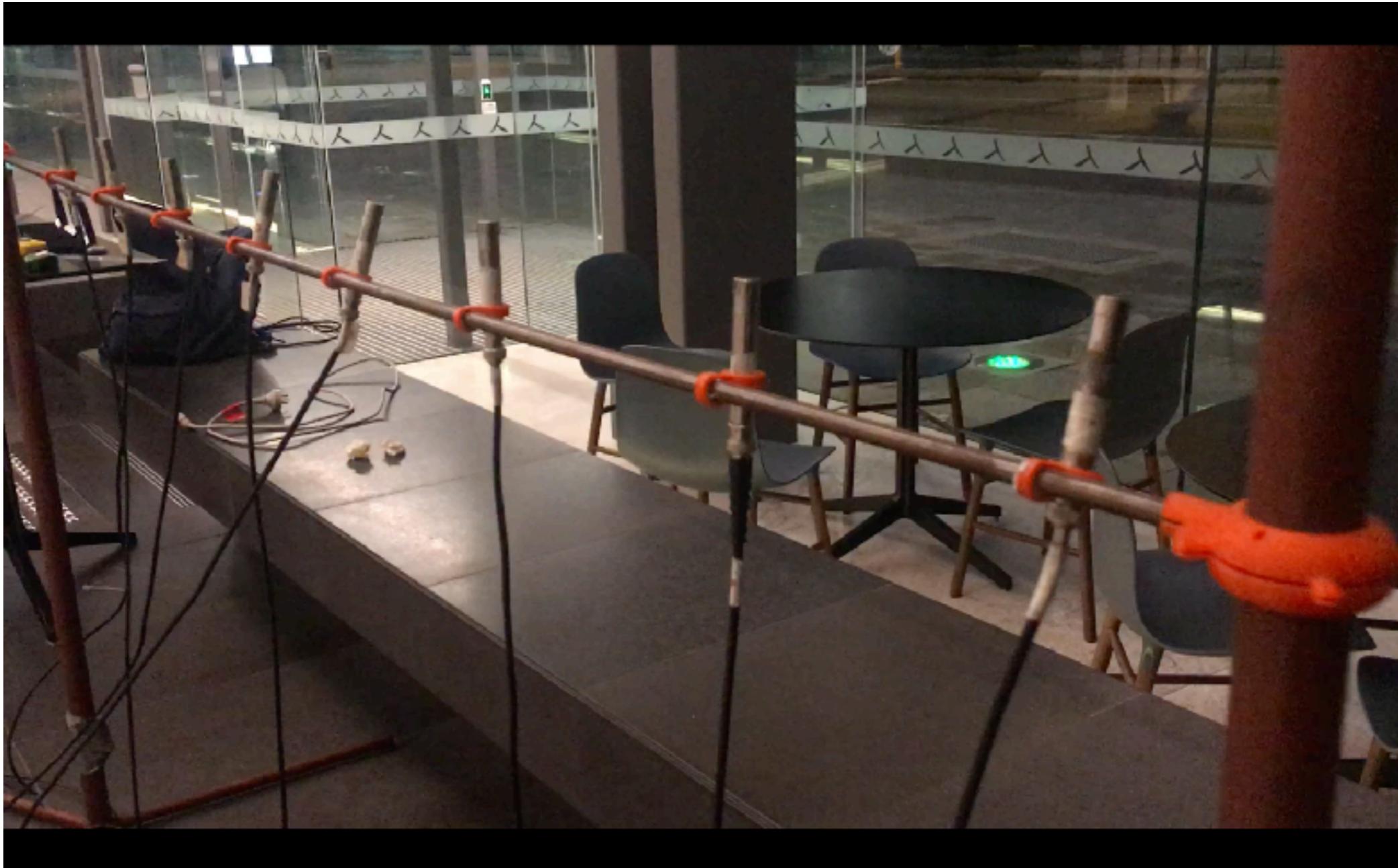
Acoustic Features



Acoustic Features



Acoustic Features



QuickTime Player File Edit View Window Help

100% Sun 12:03 pm

~Documents/UWA/Jnearthed Hackathon/App - Shiny

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Equipment Acoustics

Plant Overview

Monitor Equipment

Maintenance Records

Alerts

Record a Fault

Plant Sector

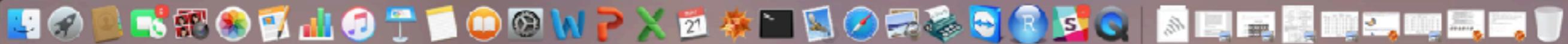
Acoustic Mapper and Isolator

Fan 1

Pump 1

Pump 2

Fan 2



UWA
System Health Lab