

Oregon Tool

Sensor Placement Analyzation

Oregon Tool Electric Chainsaw

Purdue Students: Kaelen Preasha, Kevin Prestipino, Cole Nolting, Emmanuel Ndegwa, Kyle Ondrovic
Purdue Mentors / Customers: Richard Voyles, Oregon Tool
Purdue Professors: Dr. Fred Berry & Dr. James Condon



Customer Background

- Established in the early 1940s Oregon Tools is a renowned company that has been a pioneer in providing high-quality tools and equipment for various industries, primarily focusing on outdoor power equipment and cutting solutions.



Problem Statement / Scope of Work

- We aim to improve chainsaw safety, maintenance, and useability through the experimentation of optimal sensory locations for relaying feedback to the manufacturer.

Requirements Matrix

Design Requirements

- Characterization of data
- Ability to measure vibration
- Ability to measure sound
- Is able to be implemented within the chainsaw in a minimally invasive manner
- Monitors the characteristics of chainsaw performance

Experimentation / Concepts Exploration

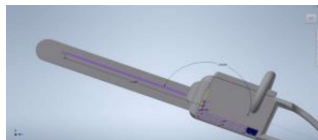


Figure 1-CAD Model of Chainsaw



Figure 2-Location 2 for sensor



Figure 3-Location 1 for sensor



Figure 4-CAD Model 2nd view

Final Design

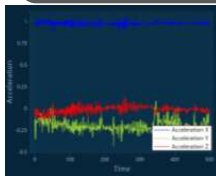


Figure 5-WTMOTION program graph



Figure 7-Location 3 for sensor

- We opted for the second test location for sensor placement in our final design, as it yielded superior results based on the collected data.



Figure 6-MATLAB feature graphs from Location 2

Failure Mode and Effect Analysis

FAILURE MODE AND EFFECTS ANALYSIS									
Item:	Intelligent Maintenance			Responsibility:			Kyle Ondrovic		
Model:	Electric Chainsaw			Prepared by:			Kyle Ondrovic		
Core Team:	Kyle Ondrovic, Kaelen Preasha, Kevin Prestipino, Cole Nolting, Emmanuel Ndegwa			Date:					
Process Function	Potential Failure Mode	Potential Effects of Failure	S	O	D	Current Process Controls	D	E	R
Microphone sensor detection	False Positive	The chainsaw does not power on.	2	1	1	Microphone is poor condition. Classification is inaccurate.	2	1	4
Microphone sensor detection	False Negative	The chainsaw continues to run and break.	4	1	1	Microphone is poor condition. Classification is inaccurate.	1	1	6.8
Microphone sensor detection	Inaccurate Microphone Data	The chainsaw safety precautions fail.	5	1	1	Microphone is poor condition. Classification is inaccurate.	3	1	1.50
A to D Link Power	No power sensor power	The chainsaw does not power on. The chainsaw fails.	3	1	1	Poor condition of A to D link.	2	1	24
Microphone sensor detection	Destruction of Microphone	The chainsaw does not power on. The chainsaw fails.	2	1	1	Environmental conditions (Moisture, Temperature, Chainsaw damage) damage microphone.	2	1	8
Current monitoring (Current Clamps)	Destruction of Current Clamps	The chainsaw does not power on. The chainsaw fails.	2	1	1	Fasten security inside chainsaw. Insulate from moisture conditions.	2	1	3.2

Testing

Testing Procedure

- Objective/Deliverables
 - Gather Data
 - Classification, Characterization and Analysis
 - Determine the best locations for sensor placement on chainsaw
- Mounting the Bluetooth sensor to three specified locations on the chainsaw
- Set board on saw-horse
- Perform 5 cuts halfway while collecting data on each cut
- Label files by cut, location, and wood type
- Repeat with other 2 wood types
- Final Design: Location 2

