Trem-Lock

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Project Overview & Generate's Contribution

Overview

Idea Title	Trem-Lock
Overview Summary	A vibrato system on a guitar is a device that allows users to temporarily change the pitch of strings on the guitar. On electric guitars, these are commonly known as "whammy bars" or "tremolo arms." Oftentimes, guitarists find it useful to lock the tremolo arm to prevent accidental modulation. Although some guitars have tremolo arms capable of locking, there is no good solution for retrofitting a guitar that comes without this feature. Trem-Lock is a product that solves this problem.
Problem	There is no cheap, temporary solution for guitarists that wish to lock their tremolo arm. Guitarists that want to lock their guitar tremolo usually have three options: sticking a block of wood in between the back cavity on both sides, buying a number of modifications that permanently alter the guitar by drilling into it, or buying a Tremol-no, which is expensive and isn't completely reliable in terms of tuning stability.
Proposed Solution	A plastic or machined part that can be attached to any guitar that allows the tremolo to be easily locked and unlocked.
Current Development	Some preliminary ideation sketches have been made.
Existing Alternatives	<u>Tremol-no</u> is an existing product that can be added to guitars to lock a tremolo arm. However, this product is expensive and a permanent addition to guitars.

Support requested	Generate will conceptualize a design that solves the problem of allowing guitarists to lock and unlock their tremolo at will. We will design CAD models and 3D print a functional prototype.

Generate's Contribution

Summary

Generate will conceptualize a design that solves the problem of allowing guitarists to lock and unlock their tremolo at will. We will design CAD models and 3D print a functional prototype. In addition, Generate will do research into the guitar market and determine if there are any additional functionalities that would be beneficial for this product. If identified, additional features will be designed and prototyped in one all-inclusive package.

Priority Deliverables

Priority Deliverable 1	Product Requirement Document (PRD)
Background	Existing mechanisms and product solutions, including the Tremol-no, solve the issue of locking the tremolo arm in place in specific circumstances.
Summary	A Product Requirement Document will outline all features that Trem-Lock will include within our final functional prototype. This early deliverable will allow the team to independently research and brainstorm while ensuring that client requests are met.
Details	 The team will perform research into existing solutions to determine the following: Where existing solutions fall short Existing concepts that can be effectively implemented in a new product New specifications that can be added to differentiate Trem-Lock from competitors

Handoff Materials	An exhaustive document outlining technical specifications of
	Trem-Lock that can be used as a reference for engineers during
	product development and as a benchmark for success.

Priority Deliverable 2	Functional (works-like) Tremolo-locking Device
Background	Using PRD, the team will perform research and identify mechanisms to reach product specifications. Client input will be referenced throughout the process.
Summary	To validate the team's research and design, a fully functional prototype using custom 3D printed parts and off-the-shelf components will be created that meets all product specifications. This prototype will be tested with actual guitars to confirm efficacy.
Details	 A functional prototype will be created that can perform the following: Locks tremolo arm in place Attaches to guitar without causing permanent damage Attaches to any guitar 3D CAD files will be created in conjunction with the physical prototype. Files will include every part necessary for a fully functional design, such as: Full assemblies Individual parts Revision history
Handoff Materials	A fully-functional 3D-printed tremolo-locking device. A Fusion 360 folder containing all Trem-Lock CAD files created throughout the semester.

Priority Deliverable 3	Engineering (works-like and looks-like) Tremolo-locking Device
Background	The team will determine best solutions for meeting technical product requirements in a functional prototype. After functionality is confirmed, redesigns can occur to improve aesthetic value of design.

Summary	In addition to meeting all technical product requirements, an engineering prototype will represent what the final product would look like.
Details	 The design of this prototype places emphasis on the following: Aesthetically pleasing form factor Material Surface finish Although the capabilities of Generate prevent the team from physically exploring options such as injection molding and machining in depth, recommendations for product design will be made and represented in CAD.
Handoff Materials	A Fusion 360 folder containing all Trem-Lock CAD files created throughout the semester, including an engineering prototype. Final rendered images can also be created.

Reach Deliverables

The reach deliverables discussed in this section are "stretch goals" for the Generate team to pursue if time constraints, technical feasibility, and budgeting allows. It should be emphasized that the pursuit of these goals is at the discretion of the Generate team, and may not be completed, or started at all when the project is handed over to the client.

Reach Deliverable 1	Design for Manufacture
Summary	The team will remodel the existing design for manufacturing through injection molding that can be brought to external manufacturers.
Details	 The final manufacture-ready design will include: Full assembly CAD models Bill of Materials Recommendations for material and surface finish Quote for production run

COVID Fallback

The deliverables discussed in this section are what the Generate team will deliver to the client by the end of the semester if access to the makershape is rescinded due to COVID-19.

Deliverable 1	[TITLE OF DELIVERABLE]
Summary	[2-3 sentence summary]
Details	[Detailed paragraph of what this deliverable will consist of]

Deliverable 2	
Summary	
Details	

Timeline

Benchmark 1

Product Requirement Document [9/28/2020]:

- The team will perform research into existing solutions to determine the following:
 - Where existing solutions fall short
 - Existing concepts that can be effectively implemented in a new product
 - New specifications that can be added to differentiate Trem-Lock from competitors
- A final document outlining all technical product specifications will be created and presented to client before continuing development

Benchmark 2

Mechanism Design Selection [10/15/2020]:

• The team will test multiple mechanisms for tremolo arm locking and determine the most successful candidate through rapid prototyping. One design will be selected to continue to Benchmark 3 with an alternative chosen in case of failure.

Benchmark 3

Functional Prototype [11/2/2020]:

- The first functional prototype that will be used to validate, test, and learn.
- CAD (2-3 Engineers)
 - Fusion 360 files created for prototype
- Build Prototype (2-3 Engineers)
 - Physically build prototype from 3D printed and off-the-shelf parts
- Testing (1-2 Engineers)
 - Ensure that device successfully locks tremolo arm and can fit in multiple guitars

Benchmark 4

Engineering Prototype [11/19/2020]:

- The prototype that will be fully functional and take the form factor of the final product
- CAD (2-3 Engineers, 1 Designer)
 - Fusion 360 files created for prototype
- Build Prototype (2-3 Engineers)
 - Physically build prototype from 3D printed and off-the-shelf parts
- Testing (1-2 Engineers)
 - Ensure that device successfully locks tremolo arm and can fit in multiple guitars

Benchmark 5

Manufacture-Ready Design [12/3/2020]:

- The design that can be passed off to client for external manufacturing
- CAD (2-3 Engineers, 1 Designer)
 - Fusion 360 files created for prototype

Budget

Grants will cover the cost of engineering work, equipment use, parts and materials up to \$2000. Any additional costs that Generate incurs above this amount will be charged to the client. However, any additional charges will be thoroughly discussed with the client prior to execution.

Agreement

The undersigned parties, _____ [project lead] and _____ [client] agree to the above scope of work, but acknowledge that changes to the scope may be necessary throughout the course of the semester and the above listed deliverables are not guaranteed.

Client Name

Signature

Date __/__/____

Project Lead Name

Signature

Date __/__/____