



The Touch Guitar

Enabling Music for Guitarists with Hand Arthritis

Opportunity

Improving the playing experience for guitar players with hand arthritis.

Community

Arthritis is characterized by limited grip strength and range of motion in the fingers and hands. Over **83%** of acoustic guitarists report musculoskeletal issues over their lifetime.

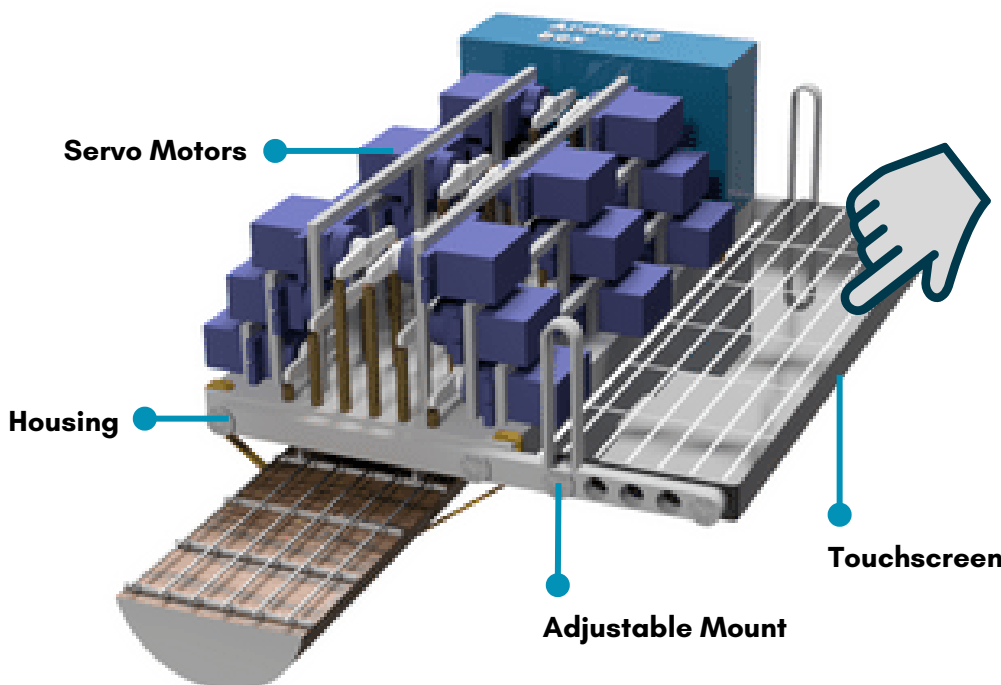
Our Solution

The Touch Guitar is an attachment that allows guitarists to **play the guitar without the strain of pushing down on strings**. Motors translate the notes played on the **virtual touchscreen strings** onto the guitar neck.

Design Objectives

- Reduce strain and range of motion
- Allow for a variety of guitar techniques
- Retain the feeling of playing guitar
- Retain authenticity of sound

Design Features



Servo Motors

- Covers all chord combinations
- Allows for single note control
- Pushes rods down onto strings

Touchscreen Interface

- Eliminates need to fret physical strings
- Near zero activation force
- Tactile strings to retain feeling

Adjustable Mount

- Pegs allow touchscreen angle to be customized
- Ranges from 0 to 90°

Housing / Attachment Body

- Removable attachment that clamps on to neck
- Eliminates damage to guitar

Improvements Over Existing Designs



Reduced Force

Removes strain needed to hold down strings. Allows for quick and easy transitions between notes.



Creative Freedom

Allows for greater range of techniques including single note fretting, barres, and hammer-ons.



Ergonomic

Adjustable touchscreen interface to reduce range of motion needed to play notes and chords.



Authentic Sound

Securely holds down strings for clear sound. Retains authentic sound quality of playing guitar manually.

Test Results

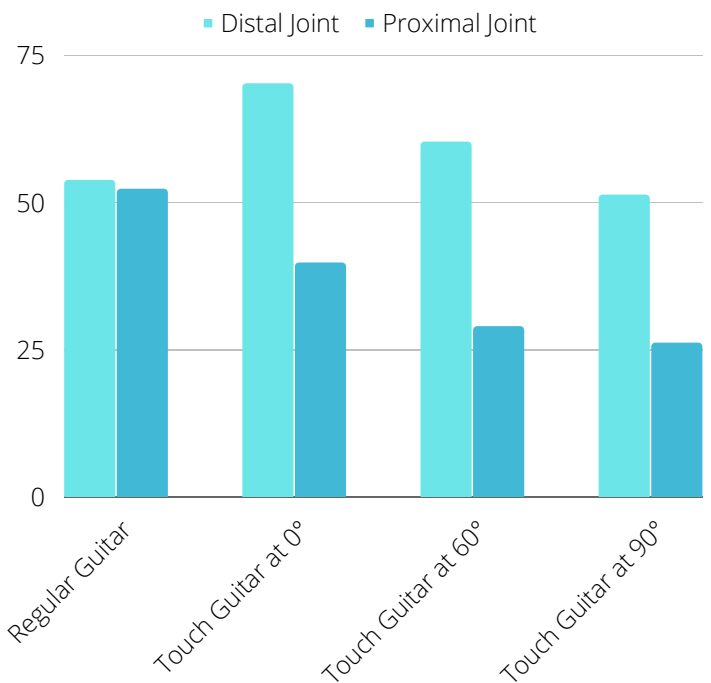
Reduction of force needed to hold down strings on the Touch Guitar compared to playing manually



Frequency ratio of amplitudes between harmonics in comparison to regular guitar

First Harmonic 94.3%

Second Harmonic 89.6%



Average angle of finger joint flexion over all six strings using index finger

Next Steps

- Testing with SG 90 servos and lighter housing material for more detailed verification of comfort and authenticity in playing
- Hands on testing with guitarists who have hand arthritis for qualitative assessment

Recommendation

The Touch Guitar did the best job in addressing the limitations of hand arthritis while retaining the greatest range in musical technique. Testing also showed that the design was able to mimic the feeling of playing guitar naturally, making it the best design to recommend.