Objective
Capos are a staple of modern guitar playing professionally and recreationally, and currently no designs exist for an integrated capo on an acoustic guitar.

General Need:
- Prevent users from losing the capo.
- Easy to access capo and readily available for quick transitions.
- Currently only an expensive, non-traditional integrated capo for an electric guitar exists.

Engineering Requirements:
- Force to actuate and force on strings
- Weight and external dimensions
- Track design and force to slide capo
- Material strength

Physics:
- Fits six strings
- Becoming a permanent installation

Constraints:
- Prevent users from losing the capo
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Market:
- 3 billion guitars were sold in 2009
- $1.2 billion in retail sales
- Acoustic guitar sales are increasing.

Customer Requirements:
- Inexpensive
- Easy to use: slide, clamp, and store easily
- Retains traditional guitar appearance and playing feel
- Durable, non-damaging to the guitar, and compact

Concept Generation

<table>
<thead>
<tr>
<th>Key Similar Product</th>
<th>Concept #1</th>
<th>Concept #2</th>
<th>Concept #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pros: Modern, attractive, ease of use</td>
<td>Pros: Clamps, locks and stows easily, discrete</td>
<td>Pros: Adaptable, one handed, no force on track</td>
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<td>Cons: expensive, non-traditional</td>
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Alternative Final Value
- Concept 1: 0.271
- Concept 2: 0.425
- Concept 3: 0.304

Concept 2 was selected based on its adaptability and ease of use.

Design Process:
- Identification of problem
- Development of possible solutions
- Construction and modification of prototype based on user feedback
- Testing of capo to determine effectiveness of design

Process Reflection:
- Being able to work hands-on with a constructed prototype and guitar neck allowed the group to conceptualize the size requirements effectively.

Operation:
The capo slides up and down the neck via a connector piece (red) connected from the capo to a brass rod (gold) embedded in the neck, allowing for the capo to slide with ease and always remain attached.
The capo is clamped and unclamped in the style of a traditional Kyser capo.

Prototype and Testing:
- Initial capo prototypes were constructed by hand out of aluminum foil.
- A plastic prototype was printed based on CAD drawings.
- Modifications were made to the design after each prototype received user feedback.
- Wood guitar necks were constructed to develop designs for the inner rod.
- The handle of the capo was significantly altered after our first prototype, as the ergonomic factor had been overlooked.

Test Results and Future Work:
- Obtain feedback from guitar manufacturers
- Design manufacturing process to adapt to current practices
- Large-scale manufacturing of aluminum capos
- Adapt design to electric guitars

Future Work:
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Tradeoffs: Less traditional feel and appearance opposed to an ordinary capo and guitar

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