

Automatic Vegetable Slicer (AVS)

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Problem Statement

Preparing vegetables for a salad often becomes a hassle, easily replaced with microwaving pre-made meals or eating out. Automating this task would encourage the inclusion of vegetable into more people's diets. The AVS seeks to fulfill this objective and provide a simple, effective method to prepare vegetables for use in salads.

Functional Requirements

The AVS must facilitate:

- Automated cutting of long fruit vegetables
- Control of cutting speeds and widths
- User safety
- Compactness and portability
- Ease of use

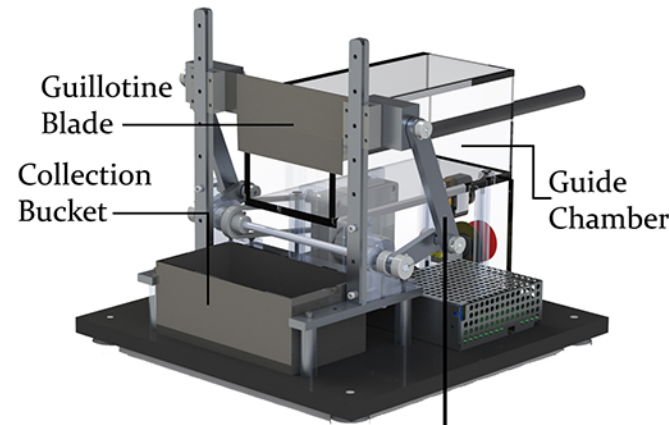
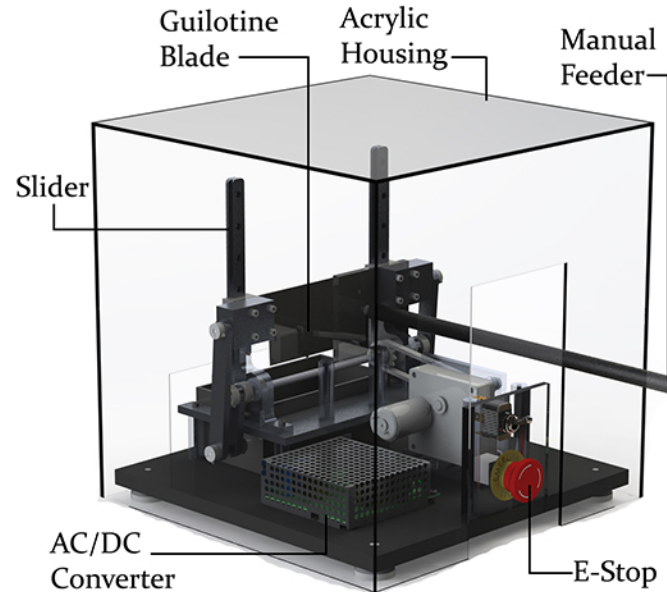
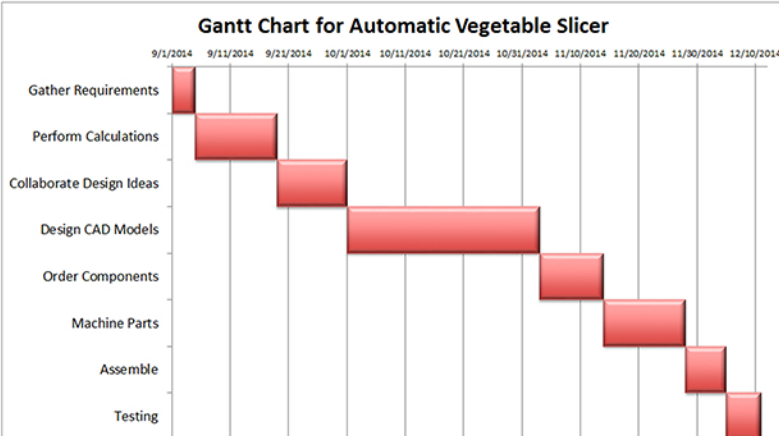
Engineering Specifications

The AVS' specs must meet the following:

- Max weight: 15lb
- Max dimensions: 1'x1'x1'
- Min applied force: 10lb
- Min motor torque: 20lbf-in
- RPM: 20

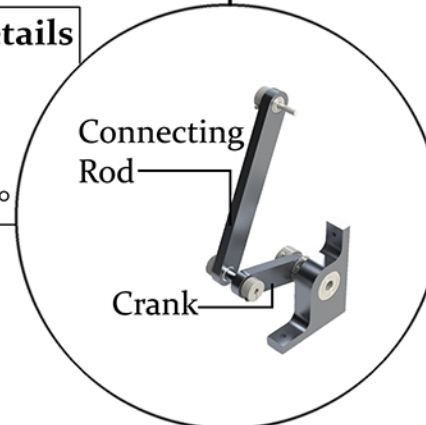
Project Scheduling

The Gantt Chart allowed for detailed planning of the entire project. It proved to be a valuable asset for maintaining tempo and momentum for the duration of the project.



Slider-Crank Details

Crank - 1.75in
Rod - 4in
Torque - 5lbf-in
Max Torque @ 26°



Determining Torque

The main cutting mechanism is a vertical slider-crank. Performing a free-body diagram on the blade (crank) with 10lb (experimentally determined) of force results in 5lbf-in of required torque. A safety factor of 4 is applied for a result of 20lbf-in.

Production

For simple and effective production, the AVS was assembled using a combination of precision-machined components and off-the-shelf parts. Due to the completeness of the CAD model, little room was left for error. As a result, no rework was necessary, and the AVS performed as designed on the first try.

AVS Usage and Features

Using the AVS is simple- after turning the mechanism on, push the vegetable through the guide chamber with the manual feeder while the blade is raised. The blade will slice the vegetable however large the user desires. Cut vegetables will drop into the collection bucket, which is removable.

Safety features include an acrylic housing to prevent unintentional access to dangerous moving parts. Only the guide chamber and collection bucket are readily accessible to the user. Additionally, a large red emergency stop button is mounted under the power switch for immediate deactivation of the AVS.

Future Improvements

The feed mechanism is currently manual and entirely user-driven. A possible solution would be to automate the feed by using a mechanism, such as a conveyor belt. This may also be timed with the blade's motions to ensure uniformity of vegetable slices.