

Air Powered Soft Robotic Toy

Sammy the Sloth

University of California, San Diego
Sponsored by Neubo, Inc.

Executive Summary

This project was sponsored by Neubo Inc, a company that creates fun and engaging soft robotic toys for kids. The goal was to iterate on an initial prototype of a huggable pet sloth that is actuated using pneumatics and currently targeted towards children aged 6-12, but which could potentially be extended for adult use in therapeutic applications.

The toy needed to:

- Be user friendly/have an intuitive operation for children
- Be pop proof/kid proof
- Include a voice message recording feature

Additionally, the toy needed to improve on the previous mechanical issues, which included:

- decreased noise level (below 50 dB)
- increased speed of actuation (inflate in under 10 seconds)
- increased toy longevity/ battery life (3 hour battery life)
- reduced overheating of pump (cannot exceed 2 °C increase in temperature during use)
- increased feel of hug (52° actuator bending angle)

The design approach chosen was to iterate on the prototype design throughout the quarter, informed by three rounds of interviews with a control group of 3rd and 4th graders.

The final design consisted of:

- Knit textile actuators
- Pump System
- Interactive 'hug button' that turns on the toy when hugged
- Voice recorder
- Release button

Additionally, certain branding choices were made to enhance the appeal of the toy, such as naming the toy "Sammy the Sloth", and introducing an explorer theme. Finally, the mass production of these components was taken into account, with a comparison of manufacturer prices for a bulk order of components and injection molding modeling practices applied to custom electronics housing.

The final design met all objectives. The final time to hug was reduced to 6 seconds, at a chosen pressure of 13 psi with a bending angle of 80°. The Pump noise level was reduced to 3 dB above ambient, compared to the previous 27 dB, and the pump temperature increased 1.50 °C during 2 minutes of continuous operation. The end result was a toy that successfully gave hugs and brought joy to the control group, with an increased potential on the market.

