

Background

BanGo is a cause-and-effect mobility vehicle designed to support young children with significant motor impairments in therapeutic environments. The device promotes motor learning, cognitive development and social engagement by providing access to independent movement.

Cause-and-effect learning is crucial in childhood development, as it teaches how actions influence the environment and supports the development of intentional movement. Cerebral Palsy is a neurological condition that impacts a person's physical development, decreasing muscle control and the ability to interact with their surroundings. Many children with CP experience delays in developing foundational cognitive and motor skills, limiting their independence and ability to perform everyday activities. Our device aims to address this gap by supporting accessible and consistent cause and effect learning experiences.

Design Specifications

Target Specifications	Characteristic	Minimum requirement	Pass / Fail
Can be carried by 2 people	Max Weight	Weight < 100 lb.	Pass
Must fit through a door	Max Width	Width ≤ 26"	Pass
Seat must be reclinable	Max Recline	Recline Angle ≤ 45°	Pass
Must target a spectrum of CP	Binary	4 sensor inputs	Pass
Must have variable speed control	Binary	3 Speed options	Pass
Must have multiple ways to stop the system	Binary	E stop remote & button on device	Pass

Exploded View



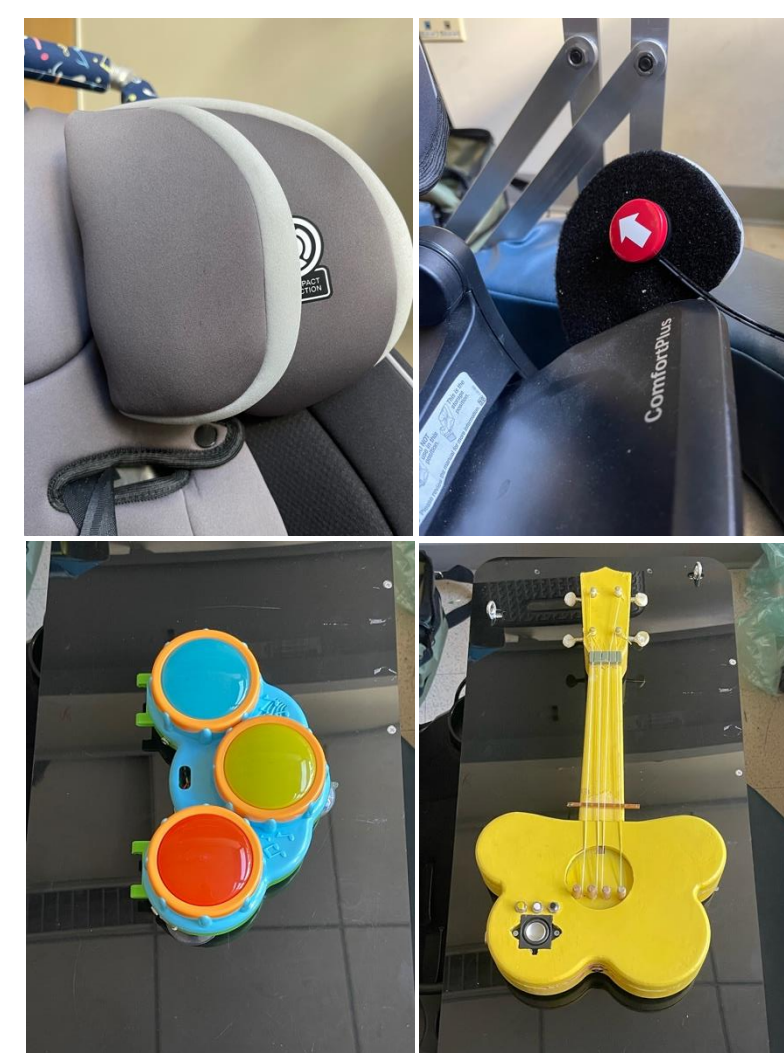
BanGo



Fully assembled device with joystick attached

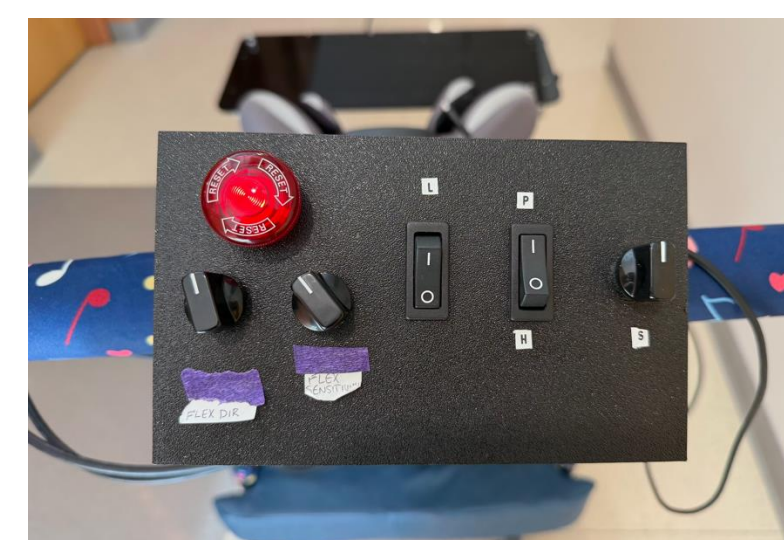
Key Components

Varying Sensor inputs



Four primary user inputs allow the therapist to tailor sessions to each child's abilities. Flex head sensors offer adjustable sensitivity to support a wide range of motor abilities. Peripheral buttons can be positioned anywhere on the vehicle to encourage engagement of all limbs. Drum buttons light up when activated and offer a large surface area for easier interaction. A guitar interface activates upon string deflection, triggering musical feedback in addition to the vehicles motion.

Control Box



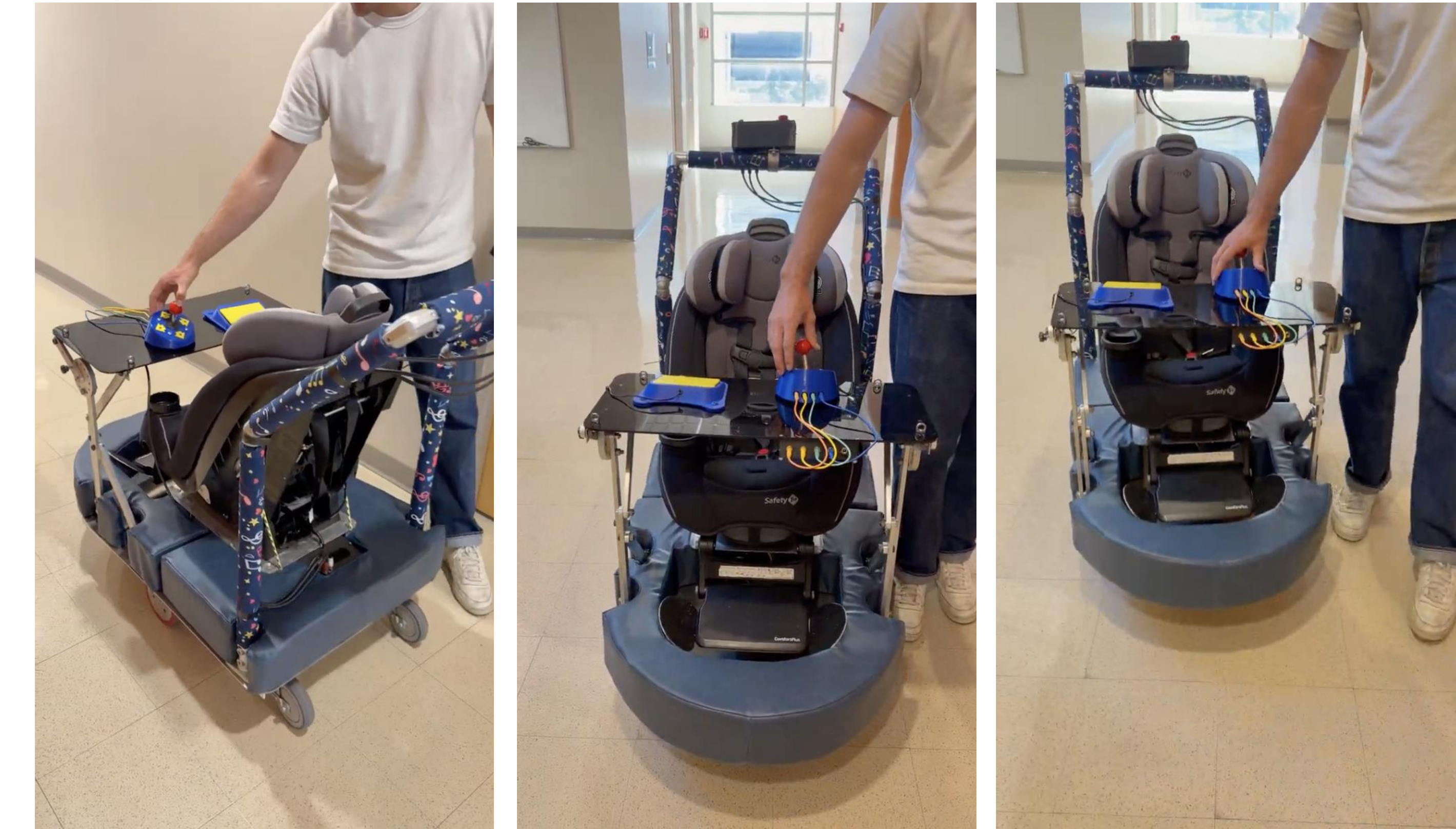
An input control box allowing the physical therapist to adjust speed, duration, volume and sensitivity of head sensors.

Driving Modes



The vehicle operates in two modes. Line following mode allows the therapist to create custom paths using black tape, guiding the vehicle safely when activated. Free drive mode allows the vehicle to respond directly to the user's input, producing short, controlled movements.

Varying Speed Tests



- We tested four different speeds when the vehicle was travelling both forwards, backwards and rotating
- All speeds had a smooth acceleration and deceleration while maintaining a stable and safe operation
- Final speeds are 1.02, 1.4, 1.7 and 2.1 mph.

Live Test



- We tested the safety and enjoyment of the device for a 3-year-old.
- The children were able to operate the vehicle in an open outdoor area.
- The device performed exactly as designed and was enjoyable to use

Acknowledgements: