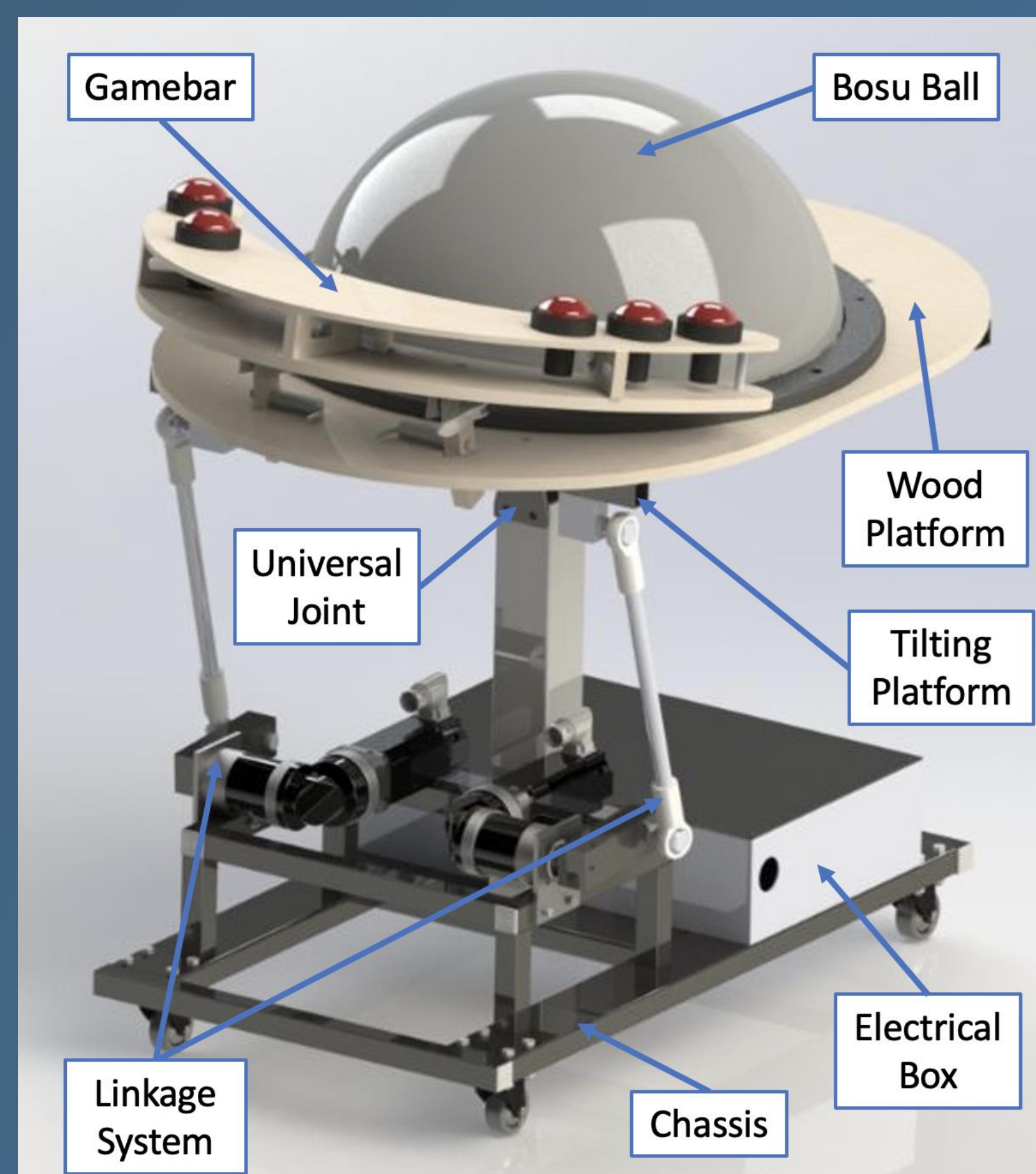# BabyBot

Jean Claverie
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Jiseelle Jimenez
Haoxiang Chang
Courtney Pham
Tom Huang

Sean Chu
Andy Ma
Jan Dukic

MECHANICAL STRUCTURE

Labels: Gamebar, Bosu Ball, Universal Joint, Wood Platform, Tilting Platform, Electrical Box, Linkage System, Chassis

PERFORMANCE TESTS

1. Emergency Stop & Control Panel Reliability
2. Homing Accuracy
3. Range of Motion and Slop (Rigidity)
4. Motion Sequences
5. Motion Sequences with load (infant simulant)
6. Motor Overheating

Our tests prioritized safety features before steadily implementing further complexity in functions.

BLOCK DIAGRAM

GAMEBAR — CONTROL PANEL — MAIN MICRO-CONTROLLER — KOLLMORGEN DRIVER ▶ KOLLMORGEN MOTORS

- Dual axis motors controller by **Kollmorgen** drivers
- Main **micro-controller** takes input from **Gamebar** and **Control Panel** and outputs motor motion
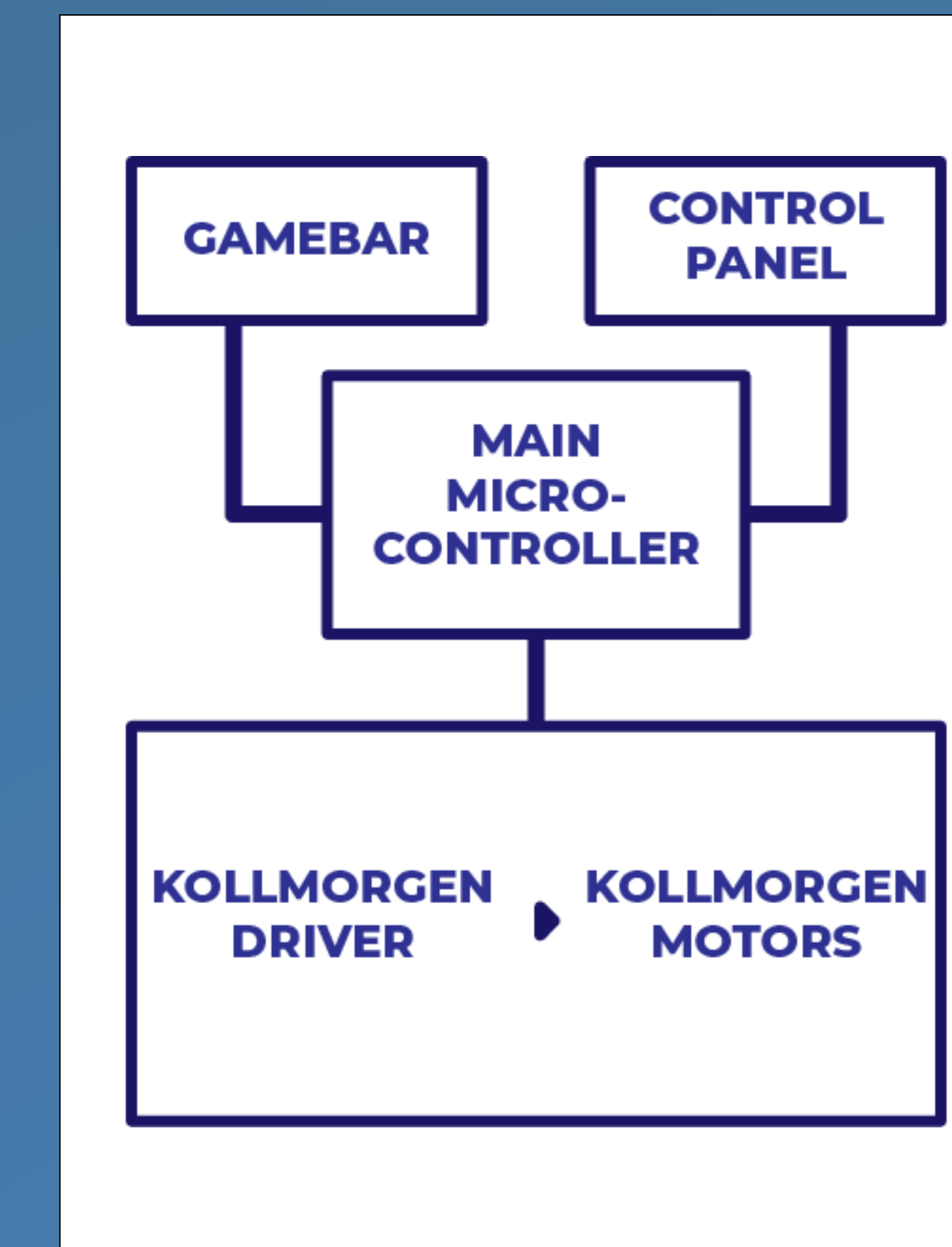
OVERVIEW

Nearly ten million people with Cerebral Palsy under the ages of 18 may never be capable of walking independently without a hand held mobility device.

BabyBot simulates Ball Therapy, the most effective form of treatment for these children, allowing the child to receive treatment anywhere and at any time.

BabyBot features both Auto Mode that performs a wide range of preset motion sequences as well as a Baby Mode that takes into consideration the baby's input via the game bar in order to provide the most effective form of treatment for children with different levels of Cerebral Palsy.

- 20° tilting angles
- 1-3 in/s tilting speed
- Supports load of 400 lbs

LIVE TESTING

Performing a series of tests overseen by a clinical professional, the BabyBot proved to be capable of completing all necessary functions while maintaining the safety of the child. With smooth motions and reliable stops at various speeds and angles, results proved the system to be consistent, user friendly, and effective in simulating ball therapy.

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Kollmorgen Servo Motor Driver

The AKD2G motors controls 2 axes simultaneously using EtherCAT and Modbus TCP protocol. Motion Tasks are set in the Kollmorgen software defining position limits and velocities.

Motor Specifications
Absolute Maximum Ratings: 240V, 9.7A, 4kW

Tilting Mechanism

The tilting mechanism is a 2 degree of freedom linkage system that supports rotation of the tilting platform about the universal joint in the pitch and roll directions.

Range of Motion Characteristics
- Max Pitch Angles: 20° Forward, 30° Backward
- Max Roll Angles: 22.5° Right, 22.5° Left
- Supports 360° Crank Linkage Rotation

Control Panel

The new dedicated control panel allows the users to operate the Babybot easily through buttons and rotary switches. All settings and changes are reflected clearly on the display. Through codes, we also enable over 200 combinations of tilting speed, range, and directions.
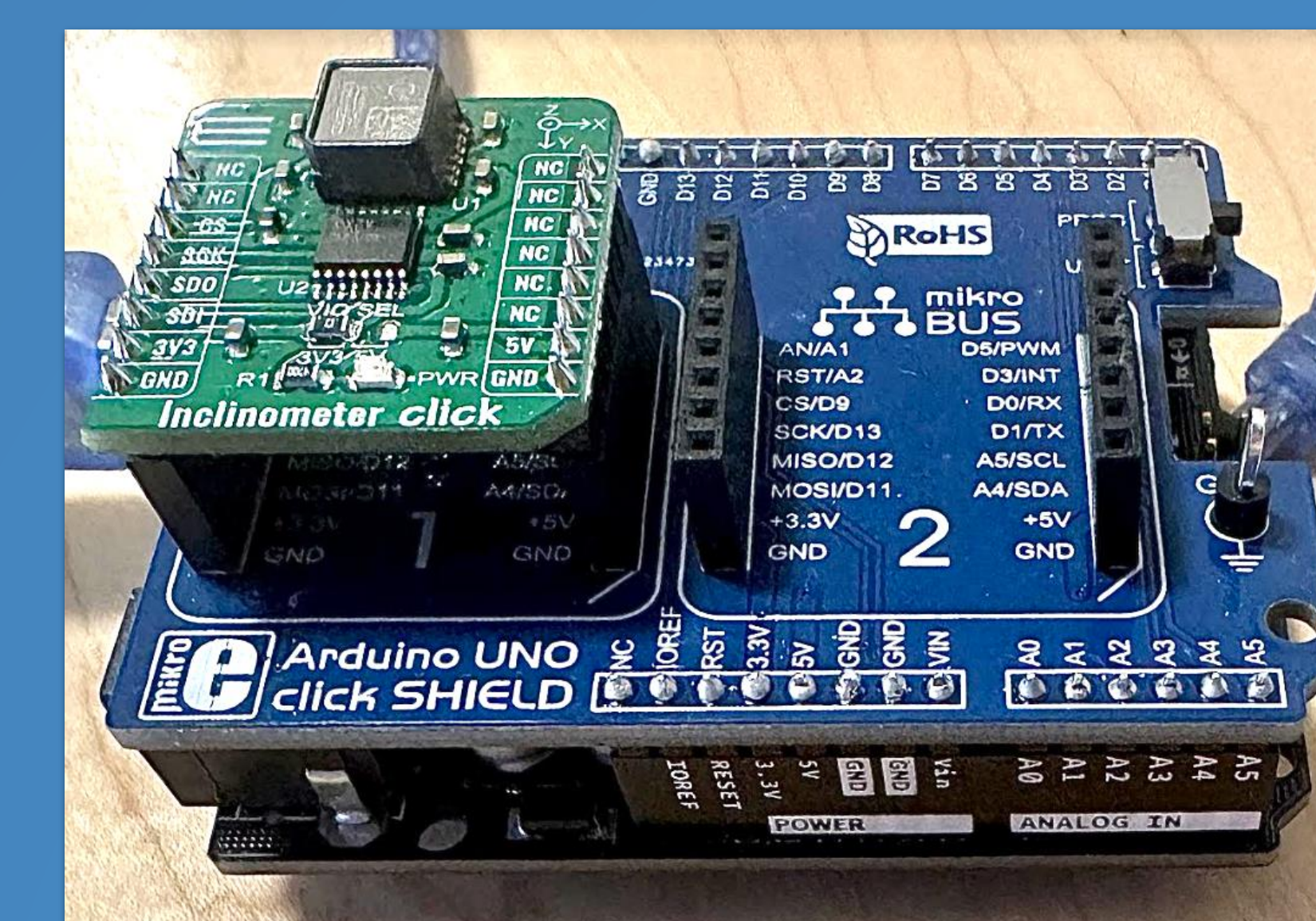

Gamebar

Combining entertainment with therapy, the game bar engages infants with LED lights and music while providing instantaneous feedback on their progress, facilitating their focus on therapy sessions.

Self Homing

The system employs an inclinometer for the purpose of accurately recalibrating the machine to its initial position, ensuring stability and maintaining high-quality treatment.

Lab D4H

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