

EASY-TO-CONTROL TREADMILL FOR BEHAVIORAL RESEARCH



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OBJECTIVE STATEMENT

Design, build, and evaluate a variable speed and variable incline treadmill for exploring the impact of locomotor activity on the development of motor control and musculoskeletal tissues. (Fig. 1)

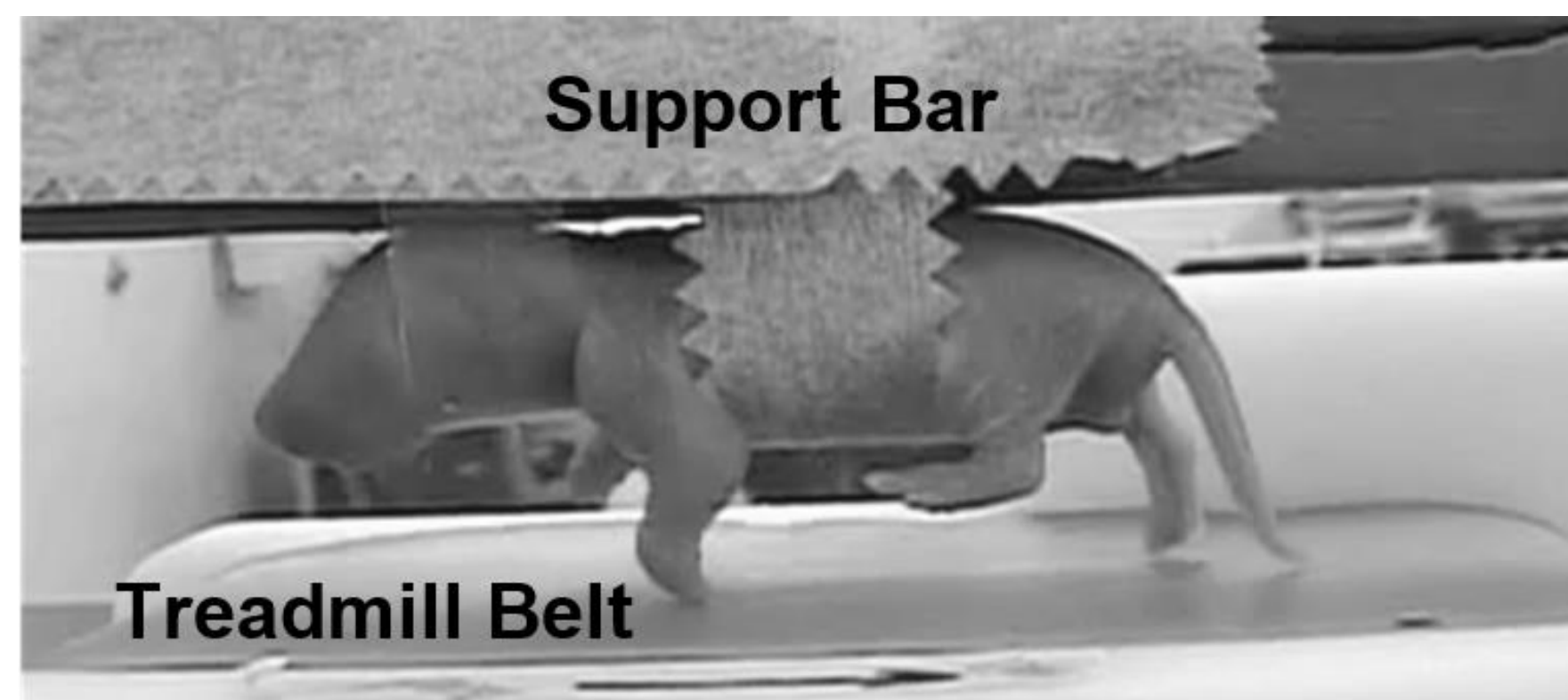


Fig 1. A photo of neonatal rat on the currently used treadmill

PROJECT GOALS

- An intuitive peripheral control interface
- Operational speeds ranging from 0.5 – 15 cm/s
- Larger system for future research directions
- Easily replicable components
- Open source software allowing for customization
- Simple disassembly for cleaning and belt replacement



Fig 2. Photos of ISU's current treadmill

FUTURE IMPACT

- I Allows for further understanding of behavioral and physiological responses to exercise in murine models
- I Cost effective model to reduce the barrier of entry into research for small/new labs (>\$10000 for commercial models)
- I Simplistic model eliminates need for training personal to maximize results of research.

DESIGN

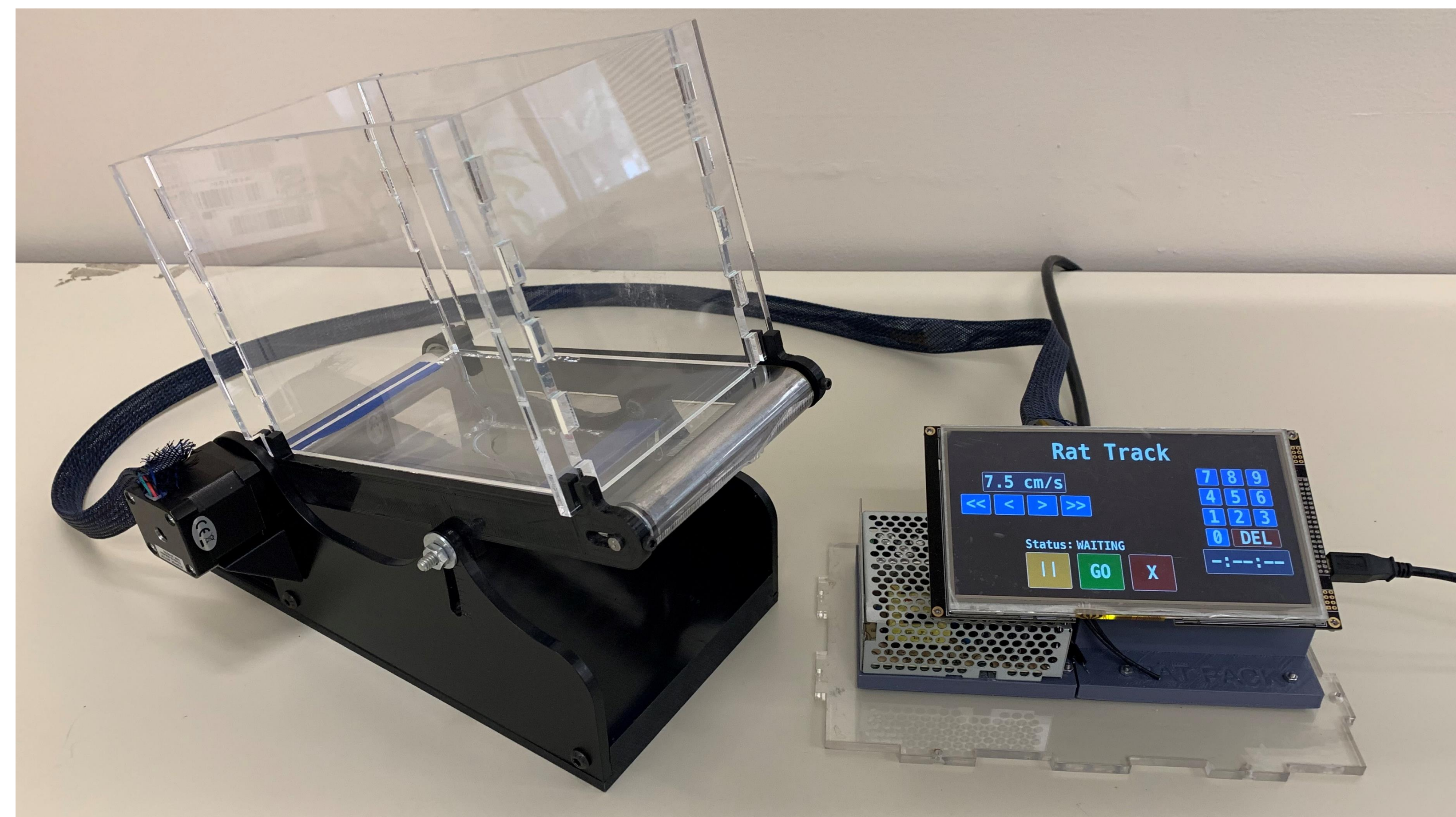


Fig 3. Photo of the Rat Track treadmill and control unit

Transparent side walls and belt

NEMA17 stepper motor

Adjustable belt tensioner

Inclination range of 0 to 15 degrees

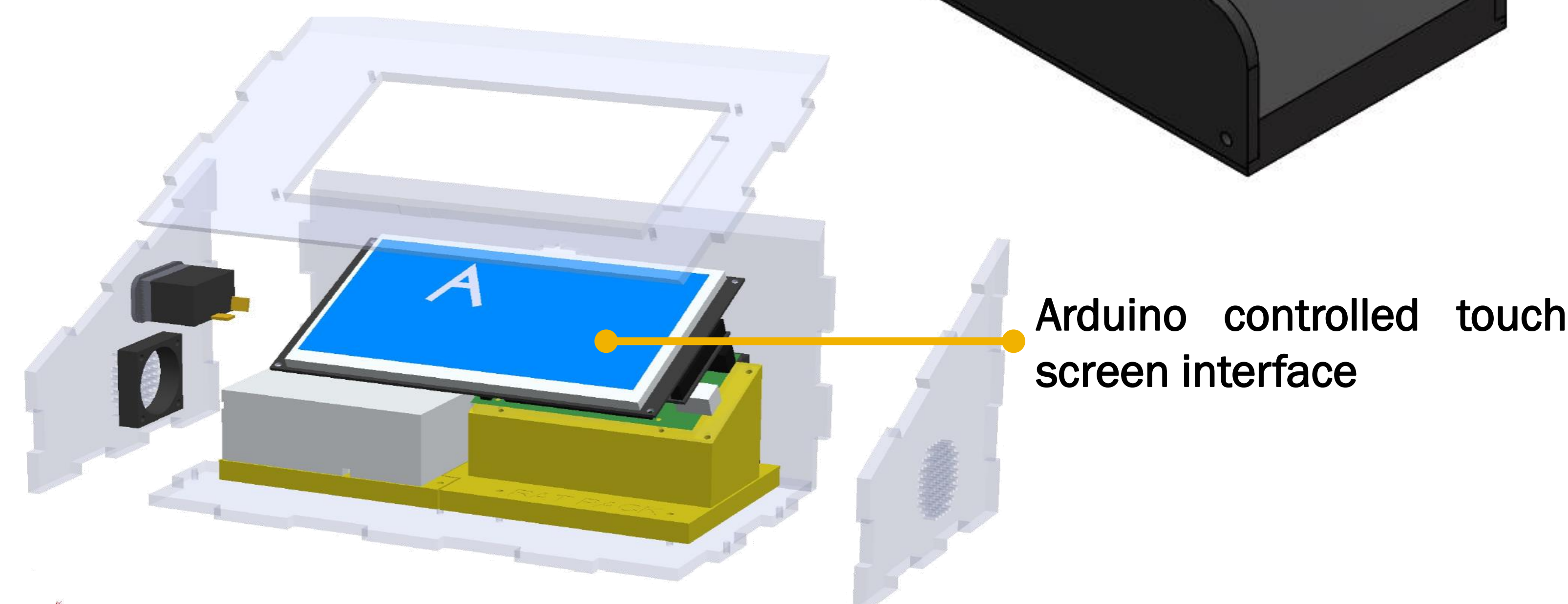


Fig 4. CAD models of treadmill and control unit with major components labeled

SPEED VALIDATION

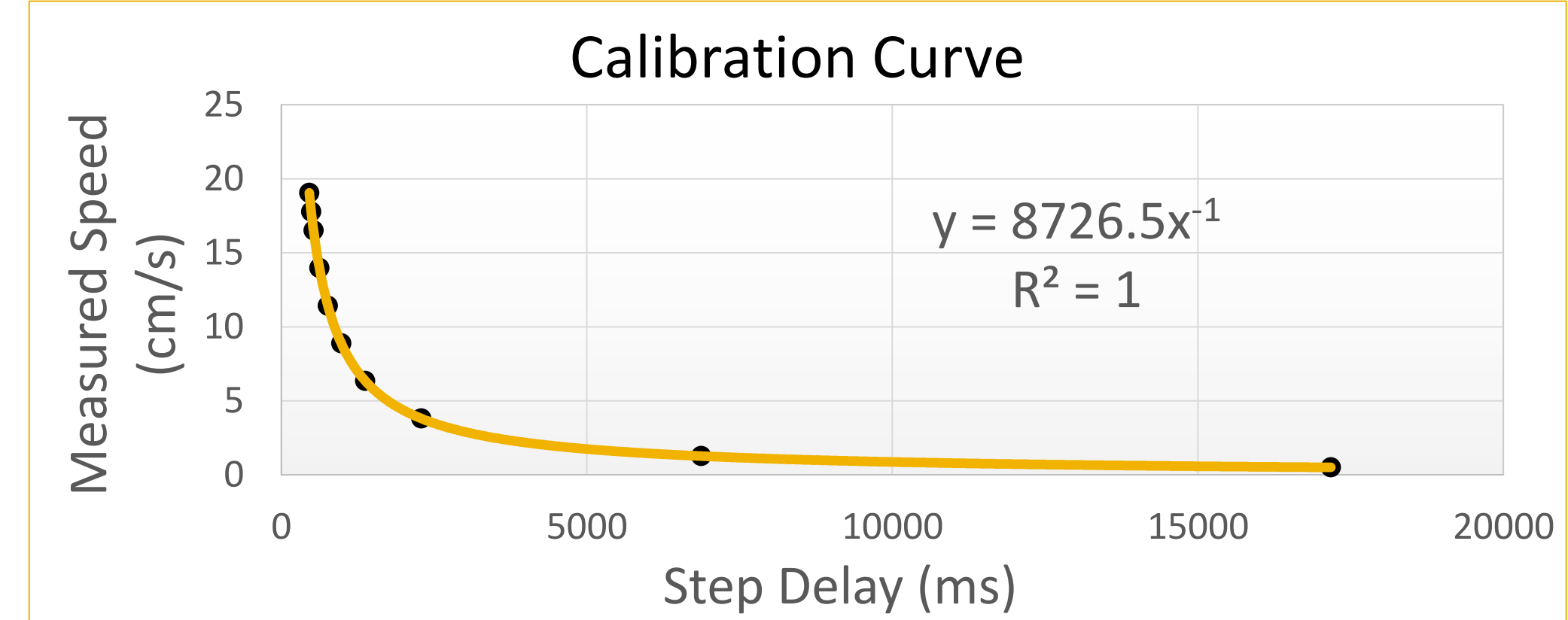


Fig 5. Calibration curve generated to relate speed and delay time. Speed was measured via tachometer.

- The average difference between actual and user defined speed was 0.24 ± 0.31 cm/s
- Error increases at higher speeds (Fig. 6)

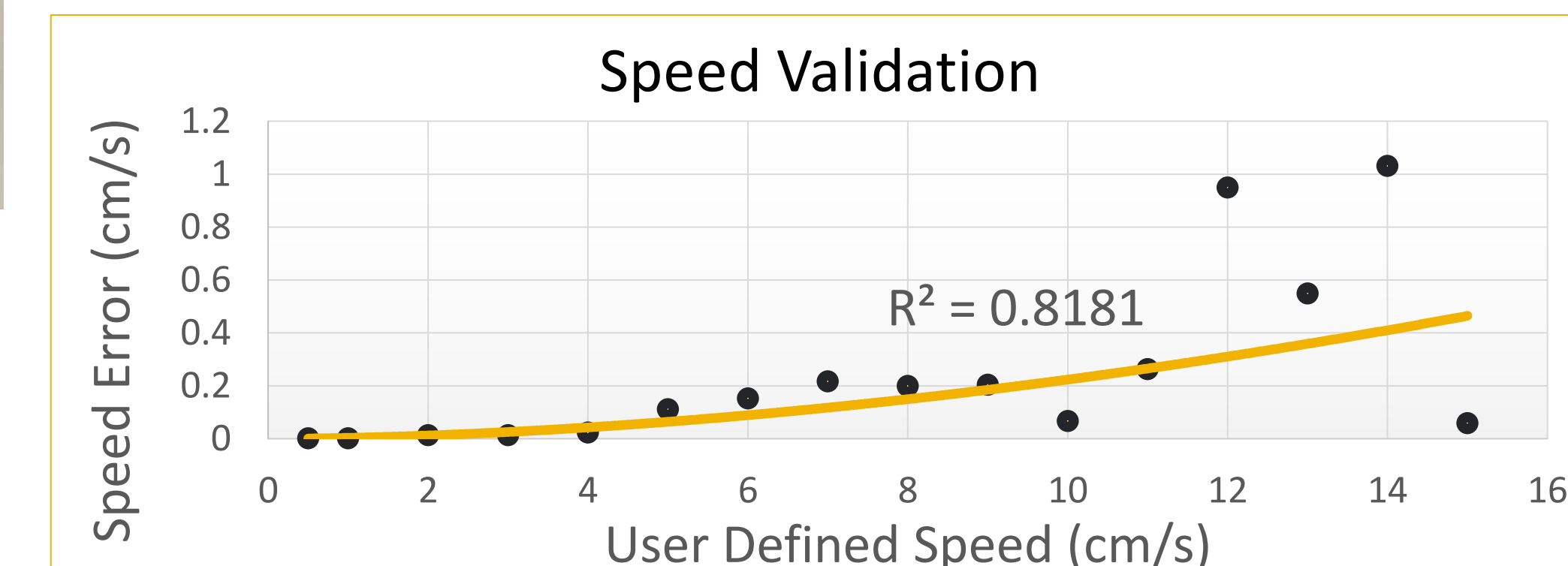


Fig 6. Speed validation. Speed was measured via video footage



Fig 7. Team members from left: Mitchell Williams, Colin Burkhalter, Stuart Sater, and Stephen Schoonen

I “Rat Track”, is a variable speed, variable incline, neonatal rat treadmill designed for Idaho State University to address current limitations and replace their outdated treadmill (Fig. 2)

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