

BACKGROUND AND OBJECTIVE

The University of Idaho's Marching Band is on a mission to elevate its halftime performances with more creative and unique elements. The band seeks to integrate a rover robot into its routine, as an ode to the Starship campus delivery rovers. The goal is to develop a robust, remote-controlled robot that can make regular appearances, enhancing the experience for the audience.

VALUE PROPOSITION

The Marching Band is enhancing performances through creative collaboration with engineering students. Past projects highlighted this partnership's potential. Now, the band aims to feature a Starship-like delivery robot to add humor and engagement to shows. This initiative strengthens ties between the arts and engineering, pushing the boundaries of what a marching band can be.

KEY REQUIREMENTS

- Drive up to 10mph on Kibbie Dome turf for 1 hour.
- Wireless remote-controlled option.
- Appearance similar to Starship Robot.
- Expandable platform for future development.

DESIGN APPROACH

- Two control methods—one wired, one wireless—for redundancy (Fig. 1,4).
- 3D-printed body, six wheels with four motors for the potential of 4WD, tank steering method (Fig. 2,3).
- Current system is limited safely to 2WD.
- All components mounted to wood-framed chassis.
- All wireless and motor-side control uses Pulse Width Modulation (PWM) 0-99% duty cycle.

FUTURE WORK

- Four-wheel drive with upgraded controllers and more robust power system.
- Live on-robot video feed and lights.
- Storage compartment with hinge lid for instrument.

ACKNOWLEDGEMENTS

Thanks to Spencer Martin for his leadership as band director. Special thanks to Calvin Hanson for base frame construction and Erik Satren of Gizmo for engineering support. We also thank The Guided Dragon for printing the robot's body and All Western Industrial Supply for parts. Gratitude to Dr. John Shovic for funding and Dr. Robert Rinker for guiding us as lead instructor and client.

DESIGN

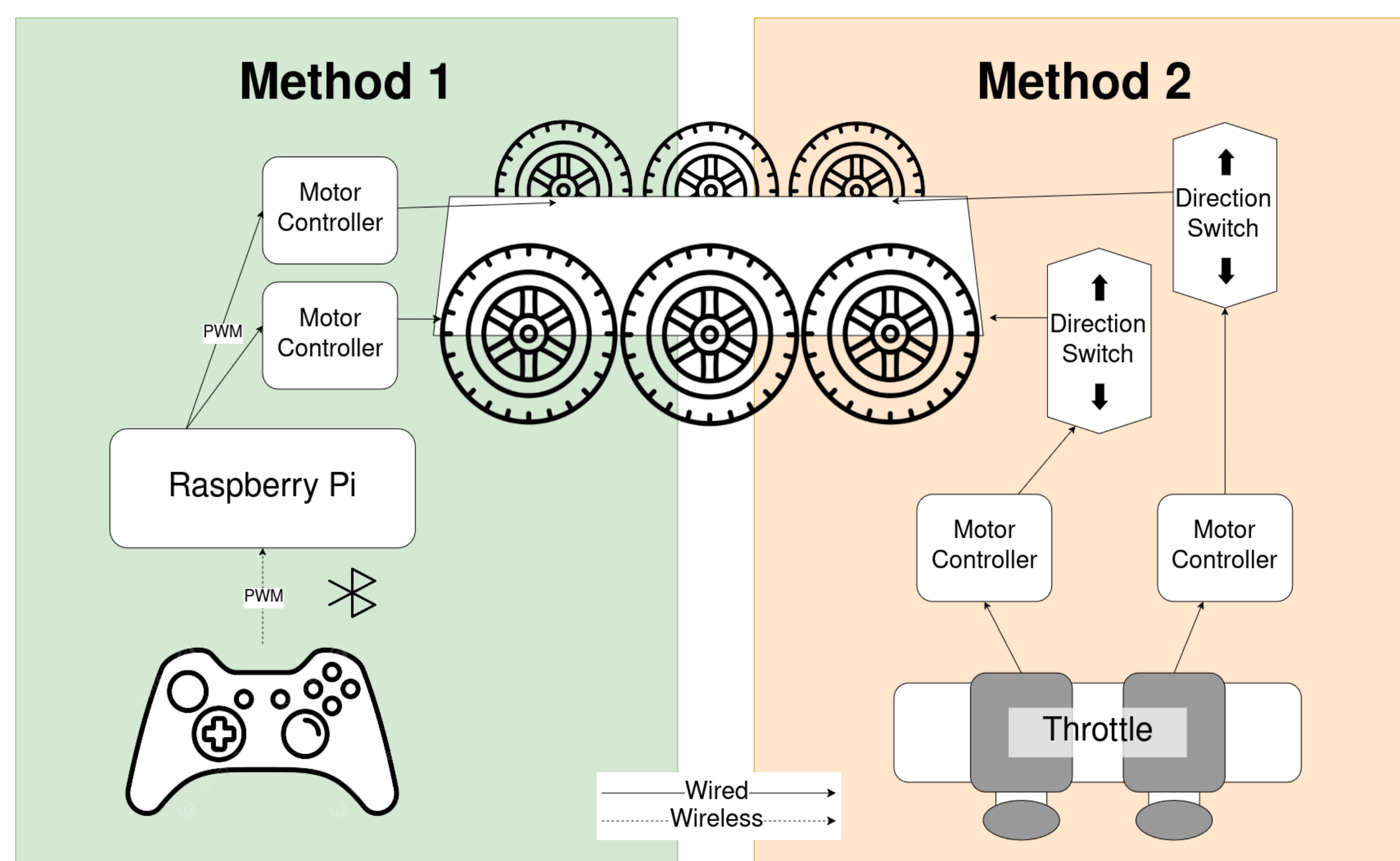


Figure 1: Robot control diagram—wireless setup (left) and wired setup (right).

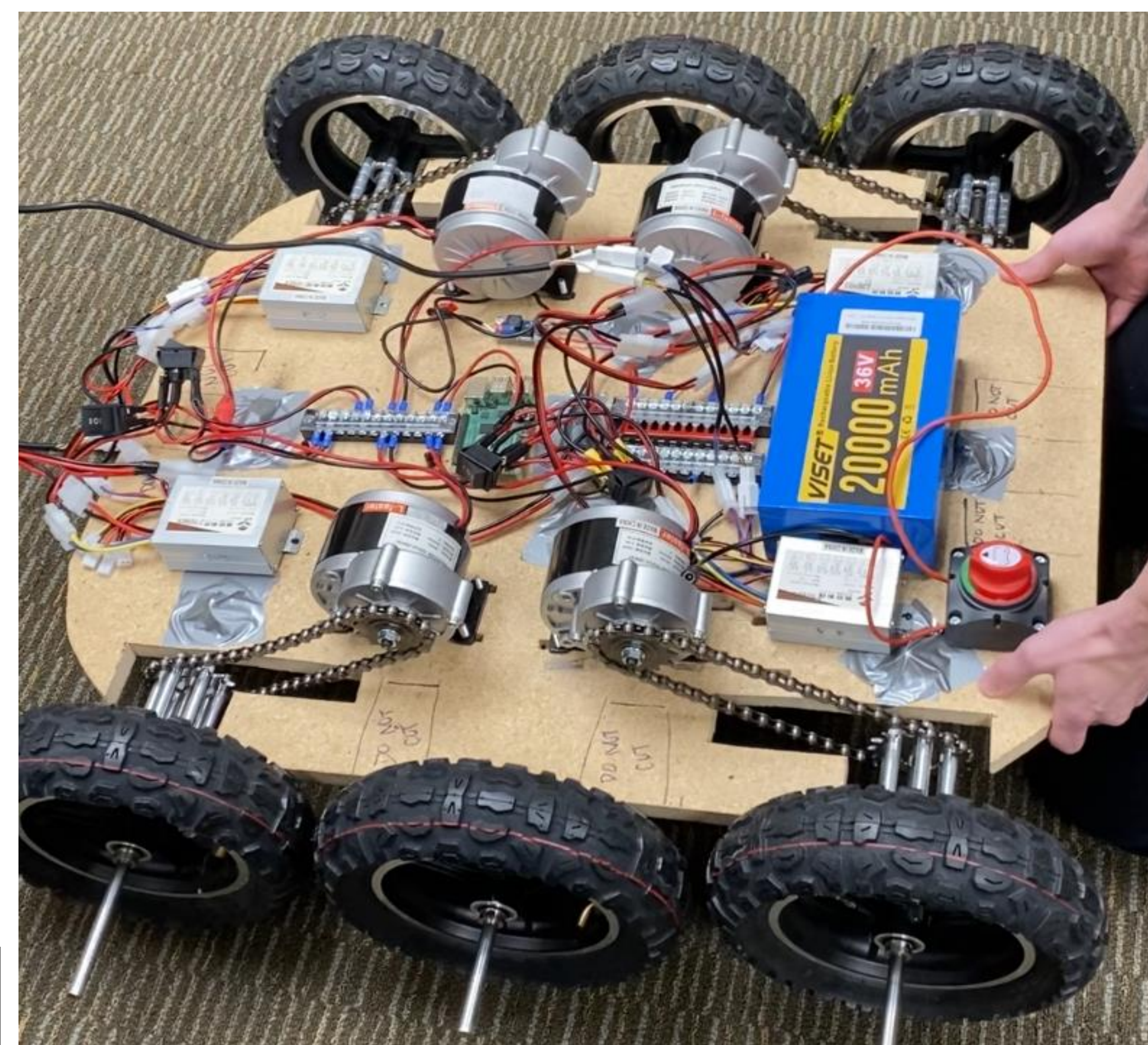


Figure 2: Internal robot wiring.

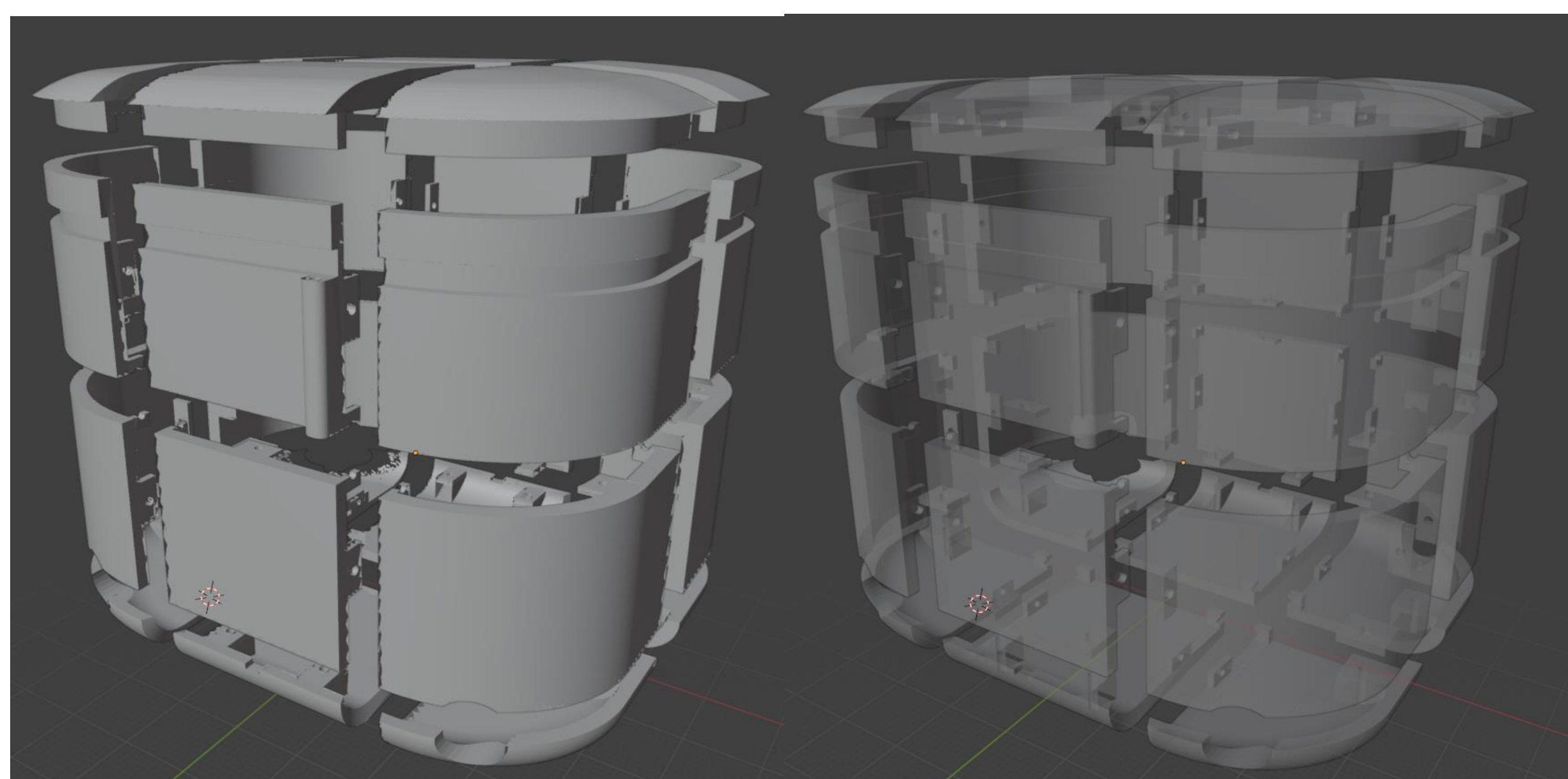


Figure 3: Robot body 3D model.

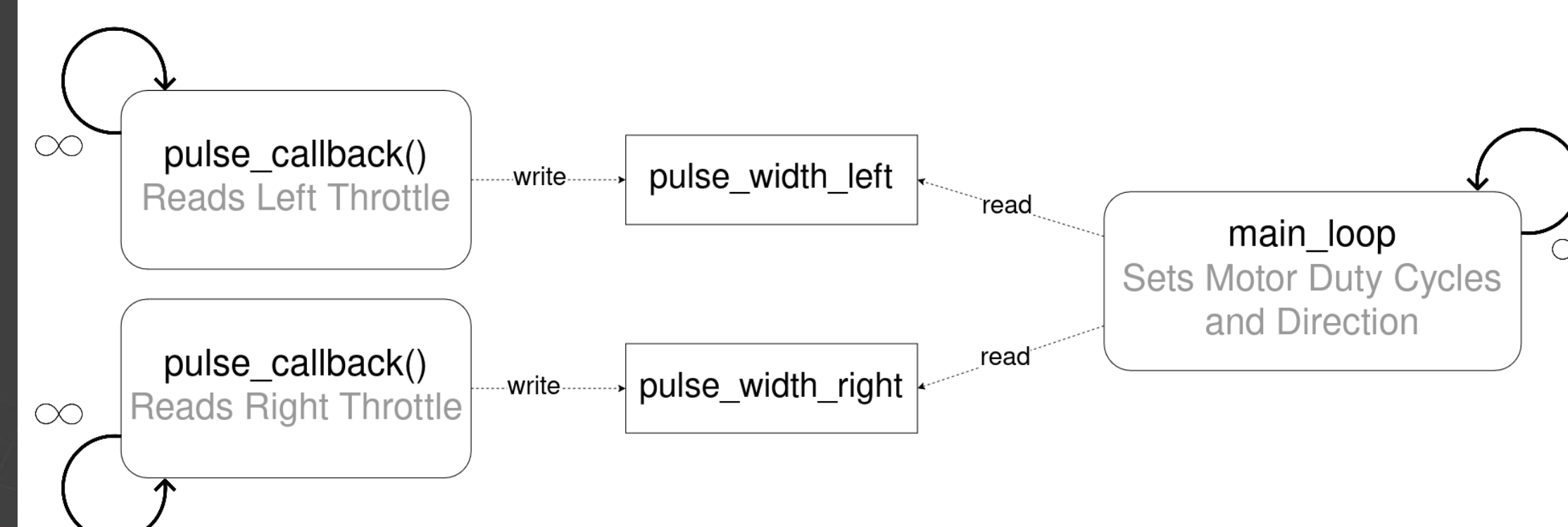


Figure 4: Control Method 1 code block diagram.