Equipping an Automated Wheelchair with an Infrared Encoder Wheel Odometer

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Overview

- Background Information
- Project Goals
- Odometer Design
- Odometer Algorithm
- Results
- Conclusion

Background

- Assistive Technology
- Smart Wheelchair Designs
  - Provide additional mobility
  - Cost
- Past Research
  - Feasibility study: using microcontroller for motorized wheelchair control system
  - Investigation of existing automated wheelchairs

Project Goals

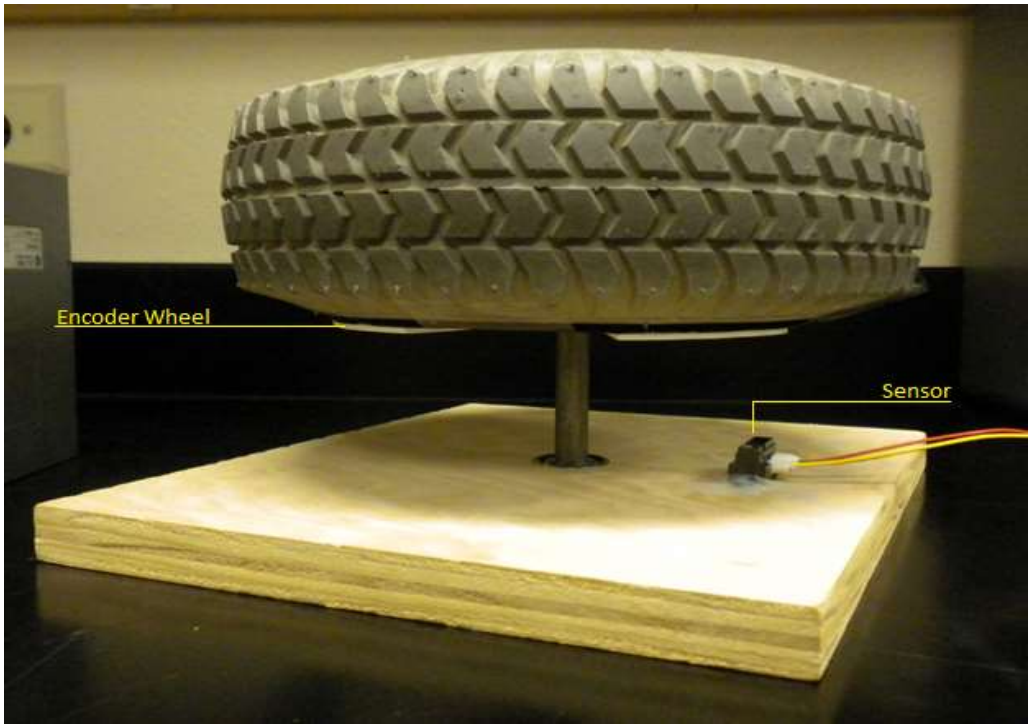
- Design Smart Wheelchair Control System
  - Affordable
  - Detachable
- Design Wheelchair Odometer
  - Measure speed, distance, direction of rotation
  - Easily removable
  - Versatile

Odometer Design

- Infrared Sensor
  - Advantages
  - GP2D120
- Encoder Wheel
  - Materials
  - Resolution
  - Dual-channel

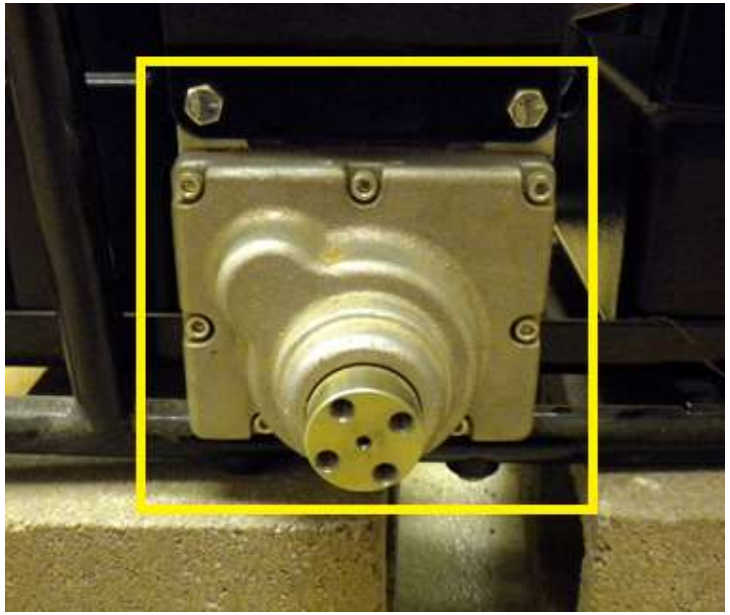
Odometer Design Continued

- Testing Apparatus



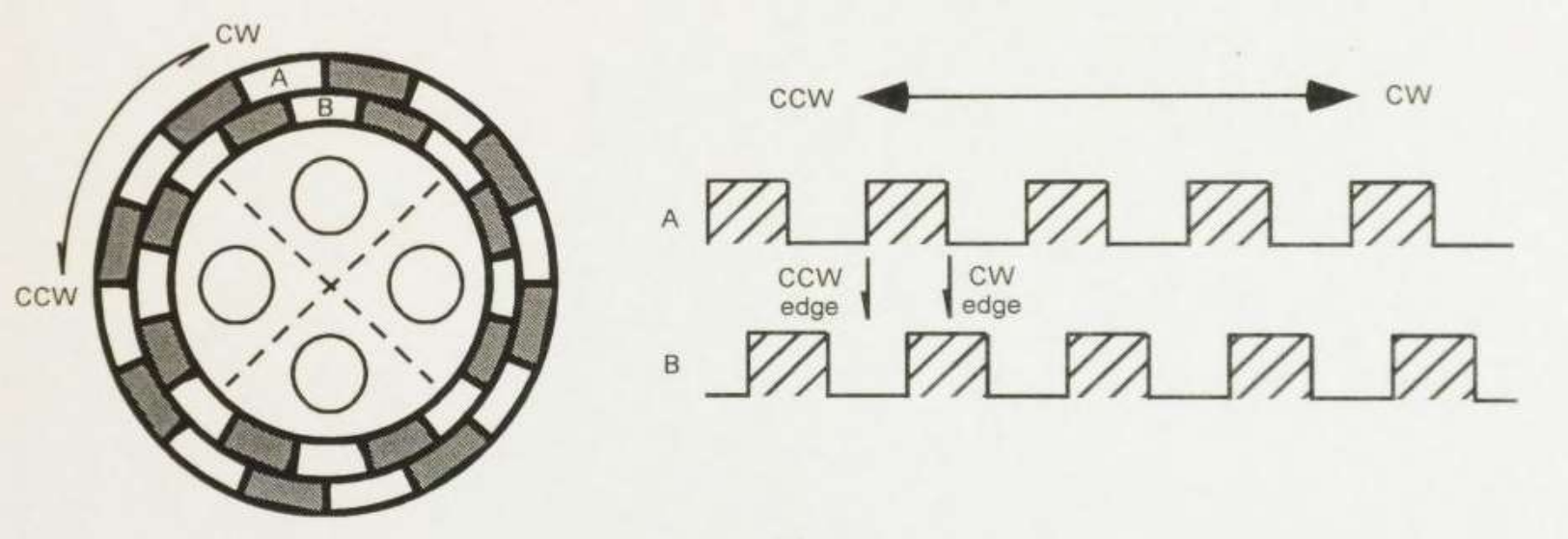
Odometer Design Continued

- Mounting Plate
  - Sensor alignment
  - Space restrictions



Odometer Algorithm

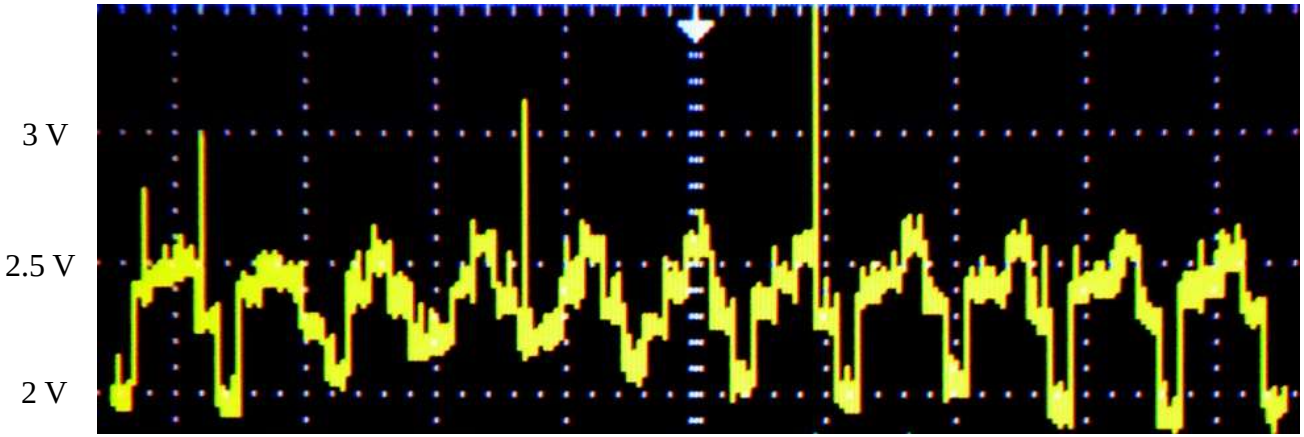
- Direction of Rotation
- Speed and Distance Travelled

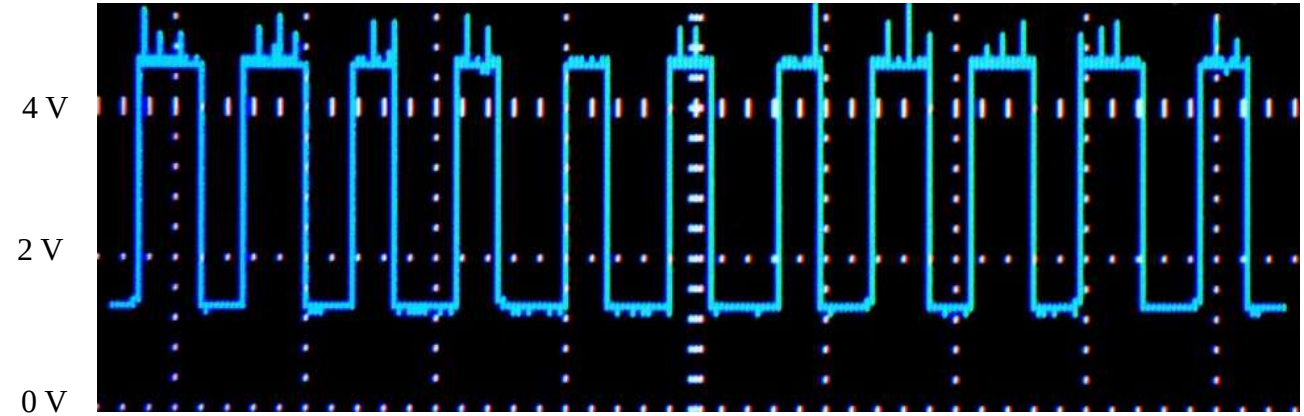


Results

- Sensor Output
- Conditioning Hardware
  - Comparator Amp
  - Filter

Results





Conclusion

- Initial Successes
- Additional Testing
  - Verify algorithm
  - Field tests
    - Precision
- Additional Considerations
  - Optical Shielding

References

- Philips, G. R., “Expanding Smart Wheelchair Technology for Users with Severe Disabilities.” Master’s thesis, University of Wyoming, 2008.

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