

Autobed: Open Hardware for Accessible Web-based Control of an Electric Bed

Healthcare
Robotics

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Overview

Electric bed controls may be inaccessible to users with severe motor impairments



Invacare Full-Electric bed remote control

- Individuals with severe motor impairments may spend significant time in bed
- Electric hospital beds reconfigure to:
 - Increase user comfort
 - Reduce likelihood of pressure ulcers
- Many electric bed controls use physical buttons that may be **inaccessible to users with severe motor impairments**

The Autobed enables accessible web-based control of an electric hospital bed

- Connects between bed's control remote and motor control box
- Provides control of bed functions in a modern web browser
- **Accessible to motor-impaired individuals** who can use a computer



Autobed hardware unit, installed

Support



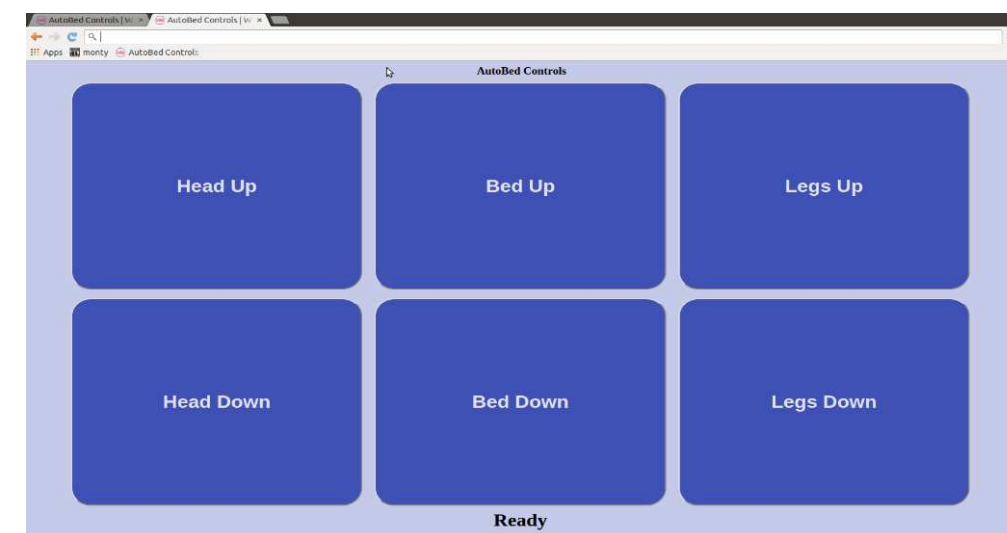
Residential Care Facilities for the Elderly Authority of Fulton County

Full Paper

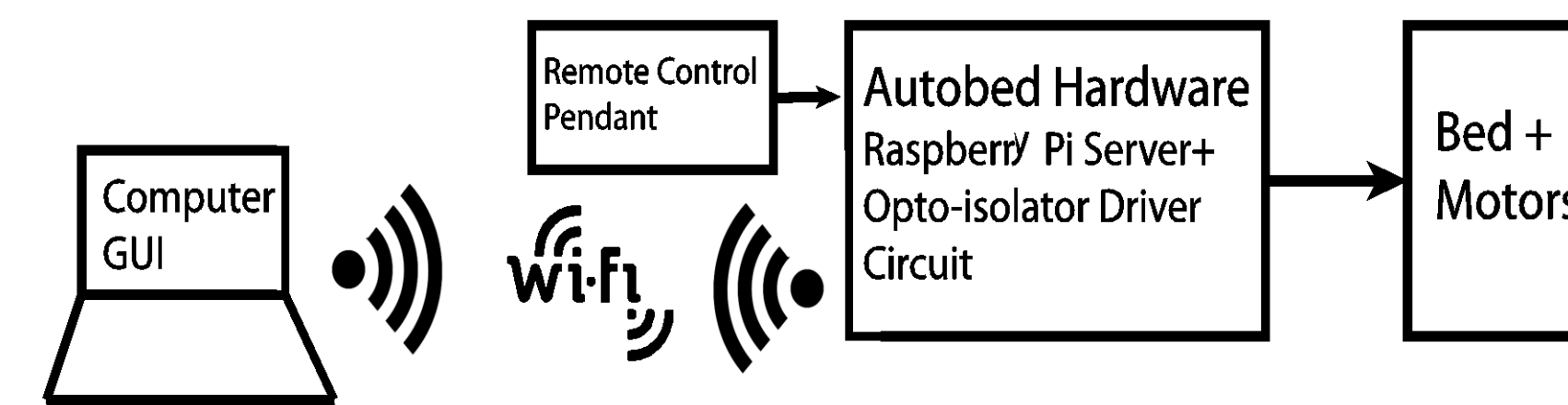


System Description

Autobed enables web-based control of an electric bed using low-cost open hardware and open software



Accessible web-based GUI



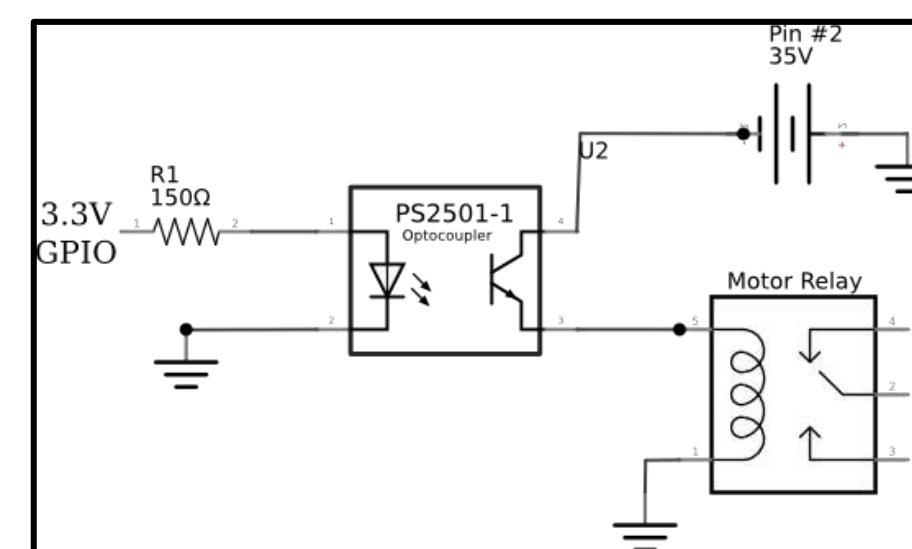
System Block Diagram

- Connects between control handset and bed motor controller
- Serves a web-based Graphical User Interface (GUI) to users on the local network
- Activates bed motors using a custom opto-isolator switching circuit
- Allows the remote pendant to continue working, even when Autobed is off

Open-source design: Hardware, Software, Build Instructions



Autobed computer and circuit

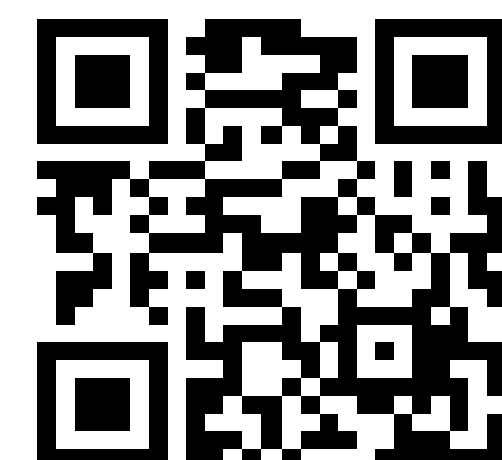


Opto-isolator circuit for controlling bed motors

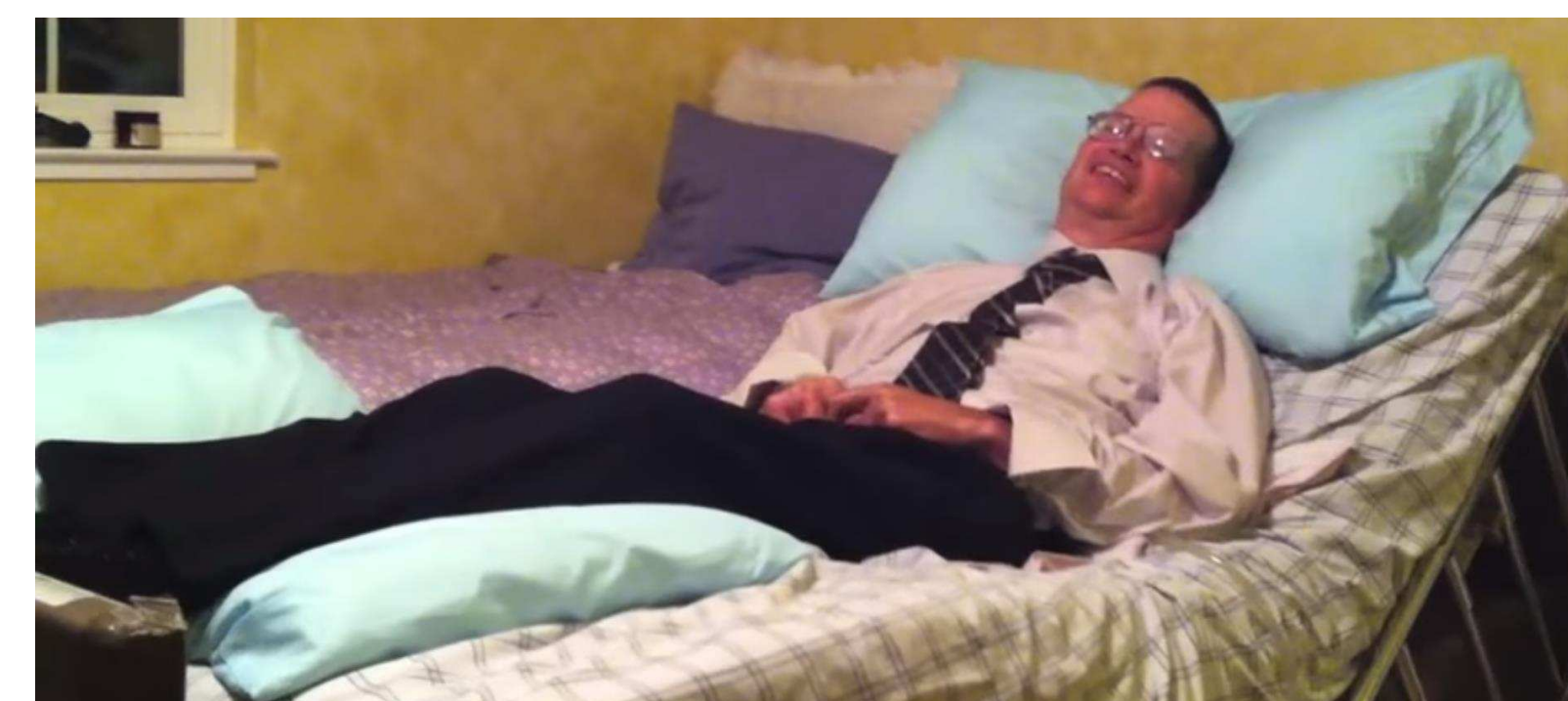


Autobed Device

Design Details & Build Instructions:



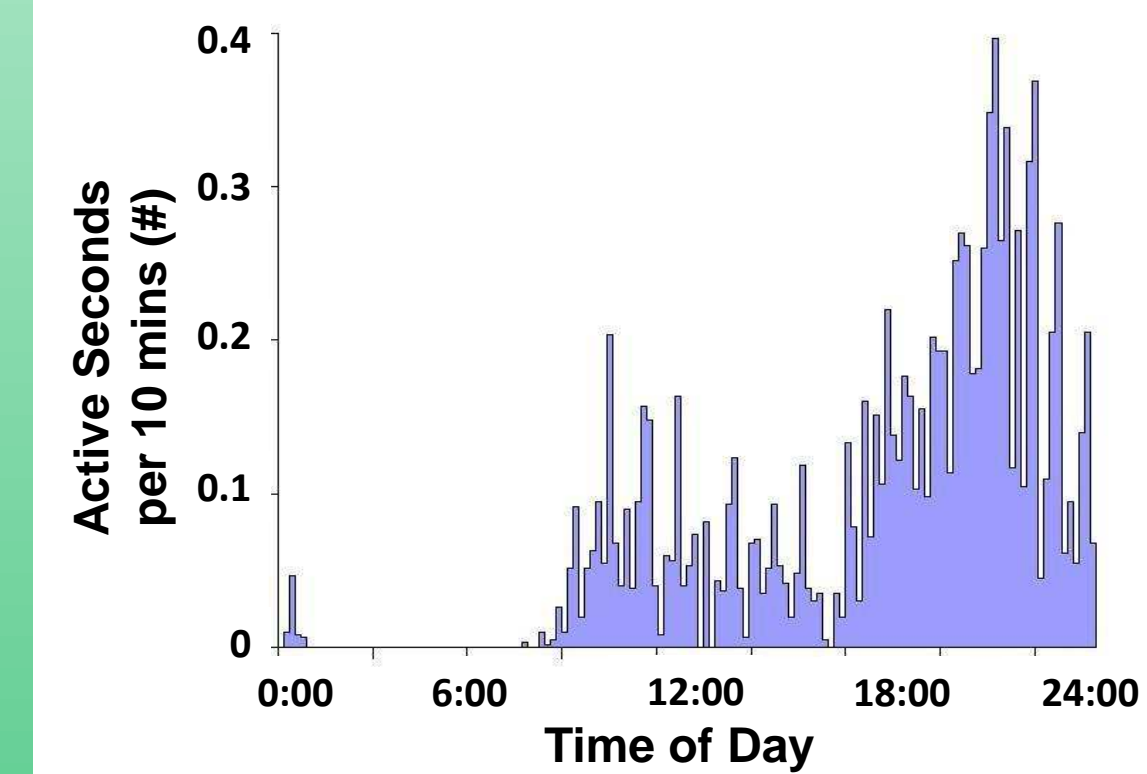
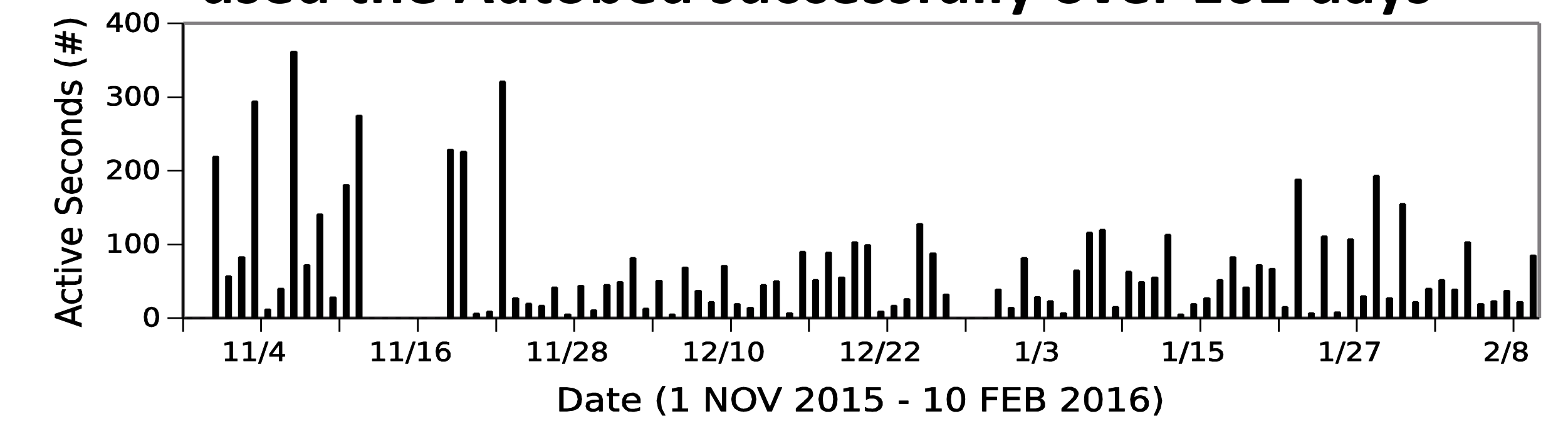
<http://hdl.handle.net/1853/54531>



Autobed installed in the home of Henry Evans for evaluation

Evaluation

Henry Evans, a user with severe motor impairments, used the Autobed successfully over 102 days



Average frequency of use throughout the day (Median Interaction Time: 10 seconds)

Questionnaire Responses

Henry and Jane Evans (Henry's wife and primary caregiver) both agreed:

- Henry used the Autobed often
- The Autobed is reliable
- **Autobed makes Henry more independent**

Low Effort for Caregiver

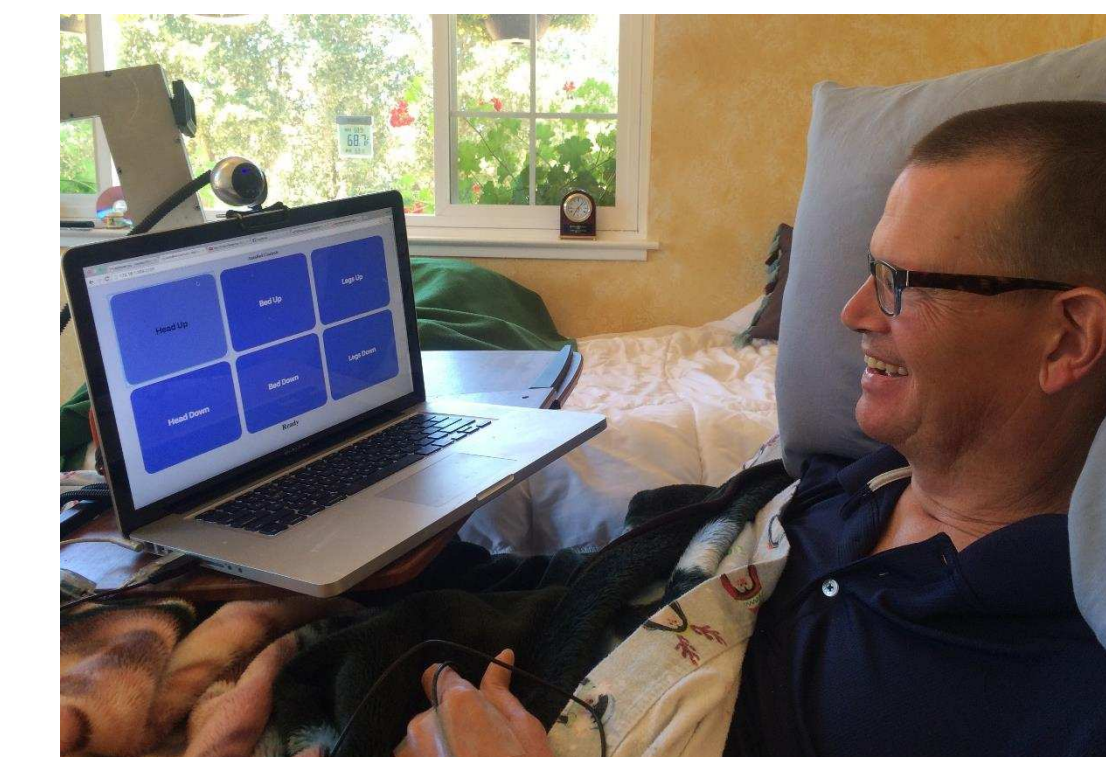
"I don't interact at all with the Autobed except if a wire becomes loose" -- Jane Evans

Quotes from Henry

"[the Autobed] prevents me from lying in pain until my caregiver arrives"

"Maximizes my productive time"

"It has become part of my life. I love it."



Henry Evans using the Autobed