# Rehab Robotics: KWIC Wheel Chair

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## Background

Kinect-Wheel Chair Interface Controlled (KWIC) Smart Wheel Chair was designed and built in 2012 by UCI students for pediatric powered mobility training. The project was designed to help children demonstrate their ability to use a powered wheel chair facilitating the requirement needed by insurance companies to provide them with one. 2 out of 8 children successfully acquired a powered wheel chair through KWIC Wheel Chair training.

## Mission Statement

To enhance the current design of the Kinect-Wheel Chair Interface Controlled (KWIC) Smart Wheel Chair to provide a better user experience for children with special needs.

## Device Design and Operating Principle

- USB joystick (Apem HFX-11S00-U)
- Digital compass (VectorNav VN-100)
- Depth sensor (Microsoft Kinect™)
- On-board laptop with custom control software
- Two DC motors controlled by a commercial motor controller (Rnet System - PG Drives Technology)

## Improvements

1. Need for additional access methods beyond the single joystick provided with the device.
2. Difficult and time intensive to initially set up and turn on the device using the laptop before a training session
3. Lack of clarity as to who was in control of the device during the overground training

## Design Consideration

1. Installation of head array and/or sip and puff system. Children would have more options to control the wheelchair, for those who may face difficulty utilizing joysticks.

2. Replacing current laptop with Windows Surface for fast booting time and seamless user interface
3. Installation of heads up display (HUD) to increase the quality of the overground training mode between the children and the therapist.

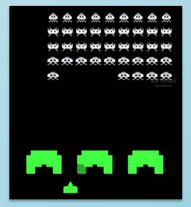
## Project Significance

To provide children with special needs with the tool they need to improve their quality of life.

## Two Training Modes

### 1. Training mode

- Allows children to accustom to using joystick control by simply playing videogames
- Level 1: Popping balloons (left/right input only)
- Level 2: Alien Invader (left/right input, forward input for shooting)
- Level 3: Racing (left/right for steering, forward/backward for acceleration/braking)




### 2. Overground Training mode

- Therapists interactively train children by standing in front of them
- Therapists can override the control by gestures shown on right (from left: forward, reverse, stop )

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