Team 1: S-90 Go-Kart
BME 4910 Final Presentation

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S-90 Go-Kart
Introduction: Background

- Client: Sean Stenglein
- Disability: Cerebral Palsy
- Interests: Cars and the great outdoors
Introduction: The Project

- Goal: Design and build a go-kart that Sean is capable of operating.

- Constraints:
  - Sean has limited motor skills.
  - Vehicle must be able to be operated remotely.
Specifications

- The go-kart has:
  - Power steering
  - Power throttle
  - Power braking
  - Lights
  - Emergency kill-switches
  - Remote kill-switch
  - A roll cage and other safety equipment

- Three methods of control
- Fully adjustable steering column and power seat
- Solid rear axle for off-roading
- 10 hp gas engine with 7 amp alternator
- Automatic transmission
From Concept to Reality
Drive Train

- Torque converter
  - Automatic transmission
    - 3.76:1 (low) 1.04:1 (high)
- Chain driven
- Chain tensioner
- 5.8:1 gear reduction from jack-shaft to axel
Braking System

- High torque gearmotor
- Linkage system
- Hydraulic brake calipers
- 10 inch brake rotor
- Position feedback transducer
Steering System

- Powered by a Dayton 1L469 gearmotor
- Custom gear linkage to rack and pinion
- LWG position transducer for tracking steering
- Steering controlled by microcontroller
Throttle System

- Engine throttle linkage connected to throttle cable
- Throttle cable actuated by servo motor
- Servo motor supplied by separate 6V source
- Servo motor controlled by PWM output from microcontroller
Dashboard and Startup

- Right Dashboard
  - Ignition
  - Headlight switch
  - Control mode indicator lights

- Left Dashboard
  - Control mode selector button
  - Killswitch
  - Speed indicator lights

- Picture shows dashboard lights after proper startup procedures
Electronics System

- Print Circuit Board houses all control electronics
- Gear motors run off of speed controllers
- Wireless receiver inputs to PCB
- 3 PIC16 microcontrollers provide digital logic for control system
Steering Wheel and Pedals Control

- Primary mode of control
- Intended to allow go-kart to be driven conventionally
- Easiest mode of control to use
- Steering wheel and each pedal connected to individual potentiometers
- Signals from potentiometers sent to microcontrollers
Wireless Control

- Secondary mode of control
- Intended to allow parents to drive Sean around
- Remote control sends signal to onboard receiver
- Receiver outputs PWM signal to microcontrollers
Joystick Control

- Alternate mode of control
- Intended for use by Sean after extensive practice
- Joystick outputs variable voltages interpreted by microcontrollers
- Joystick plugs into electronics housing and can be removed when not in use
Killswitches

- One onboard total killswitch
  - Uses software routine to close throttle and apply brakes
  - Grounds engine sparkplug
- Two onboard killswitches
  - Ground engine directly
- One remote killswitch
  - Ground Engine directly
  - Activates software emergency routine
Budget

- Free parts value
  - $4600
- Purchases made
  - $2700
- Grand Total
  - $7300
- Since our budget for purchases was $3000, the S-90 came in under budget
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Questions?