The S-90 Go-Kart
Alternative Design Report 2

By
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Design 2 is based around a shortened front chassis that has an open roll cage with side supports. Electrical systems are used to control steering, braking, throttle, and forward/reverse selection. The control software is embedded C based, and electric motor switching systems will be designed. A specially designed seat will be modified to accommodate the client’s needs.

This design implements a single roll bar into the chassis design. This will make it easier for our client to get in and out of the vehicle. The overall length of this design is short, with an extended rear chassis for parts storage and a dramatically shortened front chassis. While this front chassis is much shorter than design 1, it should still be long enough for our client to comfortably sit with legs extended. This design implements independent front suspension and semi-independent rear suspension, using the roll bar as a pivot point for the rear suspension. This design uses an independent front bumper to protect the vehicle’s delicate steering system and linkage.

The electrical systems for the go-kart include: the remote control system, the joystick, and the steering wheel and pedals. Also included are the controlled components. This encompasses the steering motor and its non-software controls, the motor for controlling the throttle, the motor for switching between forward and reverse, and the motor for applying the brake. In addition the power supplies and various buttons are also electrical components for this vehicle.

The main software control will come from a Microchip PIC microcontroller that is programmed using embedded C code. The software is responsible for taking the various input signals from the selected method of control, processing the data, and outputting the proper signals based on those inputs.

Two main loops will be present in the software code at all times. The first main loop is the primary main loop which controls inputs and outputs during normal
circumstances. The other main loop is the emergency main loop which is engaged by the activation of a kill switch. Each main loop will contain other loops and functions required to carry out all of the necessary tasks for operation of the go-kart.

Both the steering motor and the braking motor require control systems that can turn them both forward and reverse directions. To accomplish this, custom h-bridges are going to be designed and built. The basic concept of an h-bridge is to provide a way to switch current flow between the positive and negative leads of the motor, based on a relatively small electrical signal from the microcontroller. The h-bridge design would use solid-state switching elements to route current between the two legs of the bridge as selected. A challenge for a custom h-bridge is to ensure that all of the components can stand up to the levels of current that they are required to switch.

Five switches shall be used in order to perform the following operations: Igniting the engine, selecting forward and reverse on the gearbox, engaging the speed limiter, selecting the method of control, and finally a kill switch to halt the engine and stop the go-kart. The kill switch will be a head switch, mounted on the seat of the vehicle. The remaining switches will be mounted on a dashboard along with the gauges for both speed and fuel. Magnets will be placed on the rear axle and read by software for determination of the go-kart’s speed.

The steering wheel will be mounted on a ball joint attached to a telescoping shaft protruding through the dashboard allowing for adjusting the distance and angle of the steering wheel much like that seen in a car. Turning the steering wheel will adjust a variable resistor and will be read by software to determine the position of the steering wheel. The joystick will be mounted on the dashboard of the go-kart.

A possible seating option would be to buy a new seat for Sean. There are seats available for sale that would allow Sean to be positioned in a manner that comforts him and allows for extra control of his extremities. If a seat is purchased, it can be permanently mounted onto the seat plate. Seats can be found with safety harnesses already attached. This would safely strap-in Sean. The disadvantage with this would be the heavy cost of a new seat.

This design meets all specifications from the project proposal, and should provide the client with the safe enjoyment he desires.