Alternate Design 3

Team 5- Go-Kart
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Go-Kart for Joey Toce
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The chassis for design 3 is a pre-fabricated model from Northern Tool. This model comes with everything shown and is specifically designed for the mounting of a personal motor. This chassis has dimensions of 72 x 43.5 x 47.25 in. (l x w x h) This model is meant for two people and with this design we will incorporate a passenger seat for one of the client’s parents. Since this design will be meant to carry two passengers, there will be more batteries implemented to power the entire kart. For instance a single deep cycle marine battery will be installed in the front of the chassis to power the gear motor for the steering. Furthermore, a small generator will be installed to keep the batteries charged during operation to maximize runtime per charge.

This design will integrate 2 seats, a customized seat for the client and a standard bucket seat for a passenger. The client’s custom seat will be mounted on the left side symbolizing him as the driver and owner of this vehicle. This seat will incorporate all safety features stated in the project proposal including but not limited to trunk and head supports, a 5 point safety harness, Velcro leg straps and groin support to prevent slipping out. The passenger seat will be a standard off the shelf bucket seat with a safety harness. Both seats will be installed on an adjustable sliding track to accommodate for differences in passenger size and the client’s growth.

The drive train for the go kart includes all of the necessary components that take the signals from the microcontroller and convert them into a mechanical output. This includes the speed controller, motor, and gearing as well as the braking system. The go kart will get power from the batteries and will be regulated by the speed control via Pulse
Width Modulation (PWM). The speed controller proposed to be used in this system can deliver a current range from 100-300A which is more than enough to power the motor. The speed controller comes with on board potentiometers which can give a threshold limit to the amount of power that can be delivered to the battery. It also contains an adjustable torque limiter which can help avoid current overload to the motor.

The braking system will also use a motor controller but does not have to be as robust as the one used in the drive train. The braking system will use this motor controller to control an alternate motor that controls the compression of the brake calipers. The calipers will compress onto a rotary brake disc that is mounted on the axle which will ultimately bring the go kart to a stop.

The dual seat design is based off of a prefabricated chassis that will be bought in order to reduce raw material costs as well as the time and effort put in to welding together a custom chassis. However, the prefabricated chassis comes with its own steering system built in already. The prefabricated chassis uses a steering wheel to control a lever arm which when rotated, moves the tie rods and turns the wheels. The problem with this design is that the client does not possess the motor control to manually move a steering wheel. Therefore, the steering column will have to be removed and will be replaced by a gear motor which drives a rack and pinion system which will control the movement of the wheels. The prefabricated frame also comes with front wheel brackets and attached tie rods. These components will have to be replaced or readjusted in order to implement the power steering system proposed for the go kart.

The remote control will use a trigger and wheel style remote. When the trigger is pushed it will accelerate the go kart. The wheel will control the steering. Using a steering wheel will be natural for the parent and will take less time to adjust to. The remote will also incorporate a kill switch. The kill switch must override all other systems and shut down the go kart when activated. The remote will use radio frequency so that there does not have to be a direct line of sight for the radio to work. This will also allow a greater range for the remote control. The remote will also come with a removable antenna so that the range of the remote can be extended if necessary.

The dashboard controls will consist of three pushbuttons. The center button will be for forward motion, the left and right buttons will control left and right, respectively.
The buttons will be pressure sensitive, so that the harder the button is pushed, the more power will be delivered. If the client wishes to make a hard turn, he can fully depress the button. If a slighter turn is needed, the button will only need to be slightly depressed. Each button will deliver power to go kart, so that only one button needs to be pressed at a time. The buttons must be continuously depressed in order for operation. When the button is released, power will stop being delivered to the go kart. When the left and right buttons are pressed, less power will be delivered to the go kart. This will allow for slow turns to ensure the kart does not flip.

The software will be controlled using a Microchip PIC microcontroller. The microcontroller will be controlled by embedded C code. The software will be in charge of taking the input signals from the remote control, or the dashboard buttons, and converting those signals into mechanical output through the electrical interface. The software must also account for control loops to continuously relay signals throughout the system.

There will be two main loops, the primary control loop will control normal function of the go kart and the emergency control loop will shut the go kart down safely when the kill switch is activated. The main loops will also consist of secondary loops which will control more specific functions.