

THE MUSE Mario Kart Power Racing Project

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Background

Power Racing Series is a racing league that encourages engineers and non-engineers of all ages to create miniature electric cars. The basic platform for these vehicles is a child's ride on battery powered toy car, the Fisher-Price line is called Power Wheels. The vehicles are then upgraded to become a power racer. Common modifications include reinforcing the frame, replacing the wheels, and upgrading the battery and motor. Rules for the Power Racing Series include:

- \$500 budget (Batteries are worth half their fair market value towards the total \$500 budget)
- Third party wheels are permitted.
- Motors must be electrically powered.
- All power supplies must range from 12-36 V RMS maximum input to the motors.
- A Kill Switch system must be incorporated in the vehicles.
- The vehicle may not exceed 62" long by 36" wide

More rules can be found at <http://www.powerracingseries.org/rules>.

Purpose

This project will be the first stage of modifying a Fisher-Price Power Wheels Barbie Mustang Ride-On into a Power Racer. The long term goal is to have a Power Racer ready to participate in a racing series in the Spring of 2016.

Design/Method

The first phase of this project was evaluation of the condition of the used Fisher-Price Power Wheels Barbie Mustang Ride-On purchased for this project. Findings from this review include:

- Original battery is 12V.
- The car was heavily used.
 - Wheels were torn up
 - Body is worn
- The frame is fairly weak; it barely accommodates a 150 pound person (130 pound weight limit)
- The acceleration is low, speed maxes at about 2 mph

The second phase of this project will be replacing the wheels, strengthening the frame, and re-constructing the back half of the car to accommodate a driver (seat and harness). Once completed, the

base capabilities of the repaired vehicle will be tested. Acceleration, braking, top speed, and handling will all be evaluated.

The final phase of this project will be upgrading the drive train (motor, batteries, and transmission). This may also require modifying and reinforcing the existing chassis to support and accommodate the new drive train.

To meet the safety requirements of the racing series and prevent any injury the following will be included:

- A motocross helmet
- Harness to act as a seat-belt
- A safe location for testing
- Provide a body free of any sharp or protruding edges.
- Safe wiring techniques and correct gauge wires

Results

The majority of the testing will focus on vehicle performance (acceleration, top speed, braking, and handling). In addition, the current and voltage of the batteries and rotations per minute from the motor will be monitored. The results will include the following:

- Voltage and current output by the battery bank
- Maximum speed and acceleration
- Speed vs. braking distance
- Turning radius
- Efficiency of motor: Compare mechanical energy output to the electrical energy input
 - Mechanical energy: Average rotational energy of the wheels over a certain time period
 - Electrical energy: Average electrical energy (power) over the same time period

Conclusions

The project will report on cost and complexity of basic modifications and upgrading the drive-train to create a legal Power Racing Series vehicle. Details on the next set of upgrades to the vehicle will also be presented. Recommendations for future advancements or similar projects will also be made.