

Reverse Engineering Challenge



Centennial CyberHawks

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Word Count: 469

Reverse Engineering Challenge

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Selection

RC Car Overhead (Without Outer Casing)



7983S has decided to reverse engineer a hobby-grade RC car. Our team is interested in motor vehicles, and RC cars are electronic devices that replicate simplistic aspects of actual cars. We are excited to see a glimpse of the functionality of real car components through learning more about the intricacies of this fun device.

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Overview

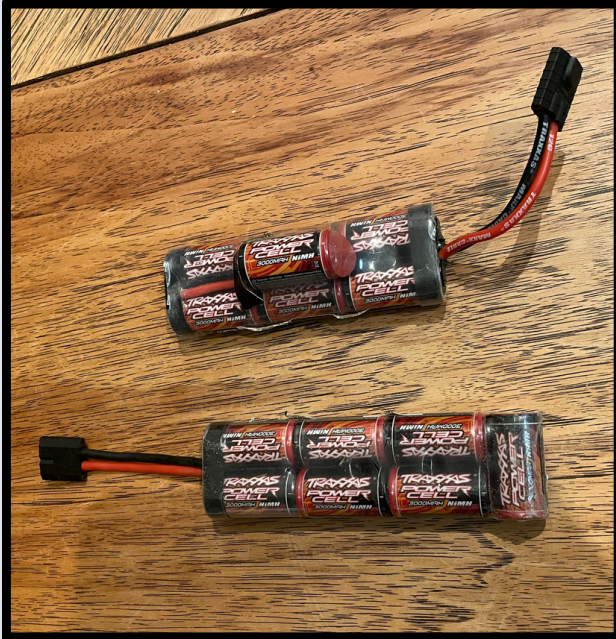
The RC car we have selected is the Traxxas Bandit XL-5. It has several structural, electrical, and mechanical components. We will be focusing on what is inside of the RC car that allows it to efficiently drive, turn, and change speeds due to input from a controller.

Below are the electrical components, which will be further elaborated on.

- Batteries
- Gyro
- Transmission/Clutch
- Wheels
- Suspension
- Servomotor
- Electric Speed Controller
- and Receiver

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Components



Batteries

Provide electrical energy for the electronic systems of the RC car.



Gyro

Counteracts over steer and under steer to prevent spinning out/losing control. Helps control drifting through turns and launching straight while accelerating quickly.

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Components



Transmission/Clutch

Only releases a safe amount of power snap to the drive line. Prevents parts from breaking under too much force. Also changes between 2 gears to provide both lower and higher speeds while keeping the motor between 15000-18000 RPM.



Wheels

Rolling surface that allows power transfer from drive line to the ground. Provides traction.

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Components



Suspension

Allows for consistent movement across bumps and holes in the road surface at high speeds.

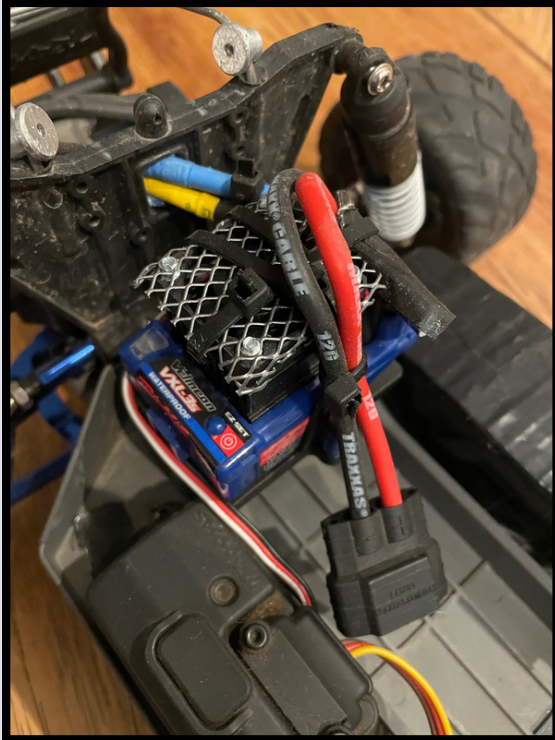


Servomotor

Powers the front wheels, enabling them to steer.

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Components



Electric Speed Controller (ESC)

Amplifies signals from the receiver and converts them to brushless motor signals to power the servomotor. Also regulates internal temperature and battery consumption.

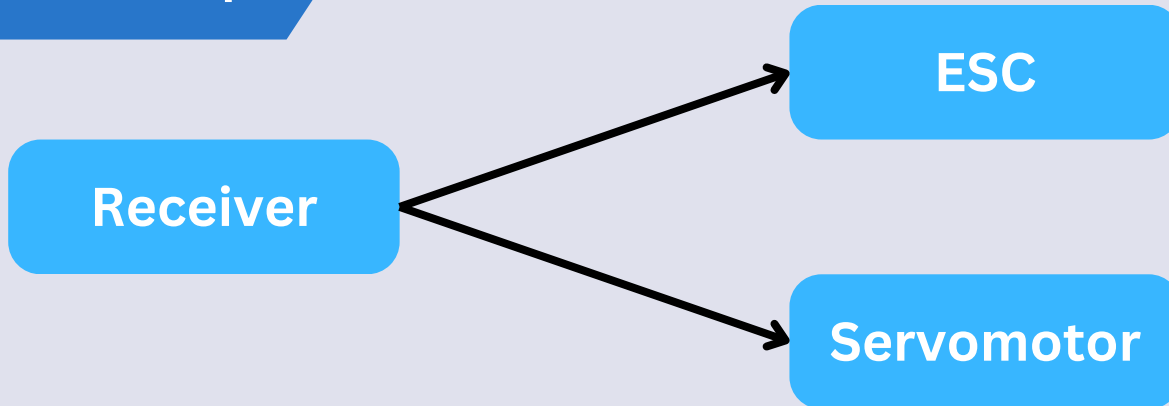


Receiver

Converts radio signals (2.4 GHz band) into receivable signals by the ESC. It also controls the turning servomotor.

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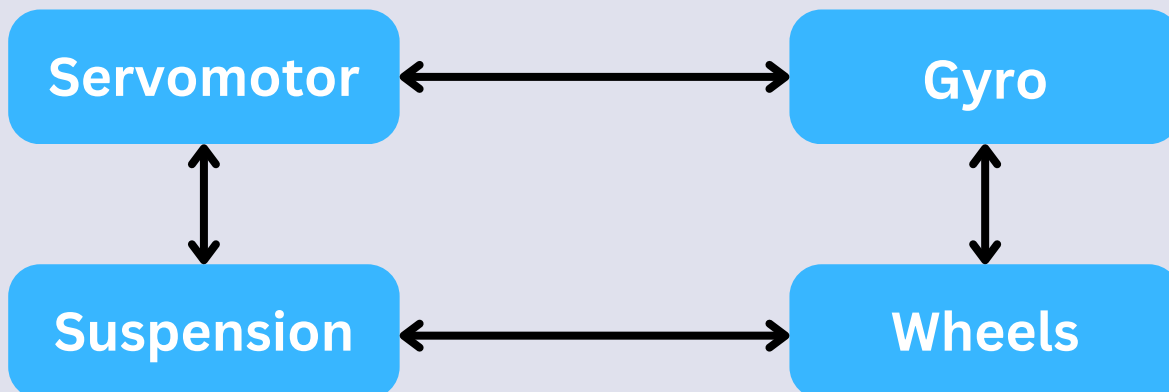
Relationships



Sends radio signals to ESC and Servomotor to react to user input on a controller.



Sends electrical signals to power servomotor.



Work together for easily controlled movement.

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Summary & Findings

RC cars are representations of actual vehicles, meaning many of the components found within an RC car are also within a normal car. These components are sized up to fit the real vehicle, and are more complex, however the purpose of these mechanisms stays the same between the simple electronic device and its intricate counterpart. Each aspect of the RC car is integral to its overall function, many of the mechanisms working in conjunction with one another to carry out an action.

Our team members have now taken apart and assessed what components are found within this seemingly basic electronic device. This has bettered our understanding of how an exciting aspect of our childhoods works, as well as opened a door to what more complex vehicular mechanisms would look like.