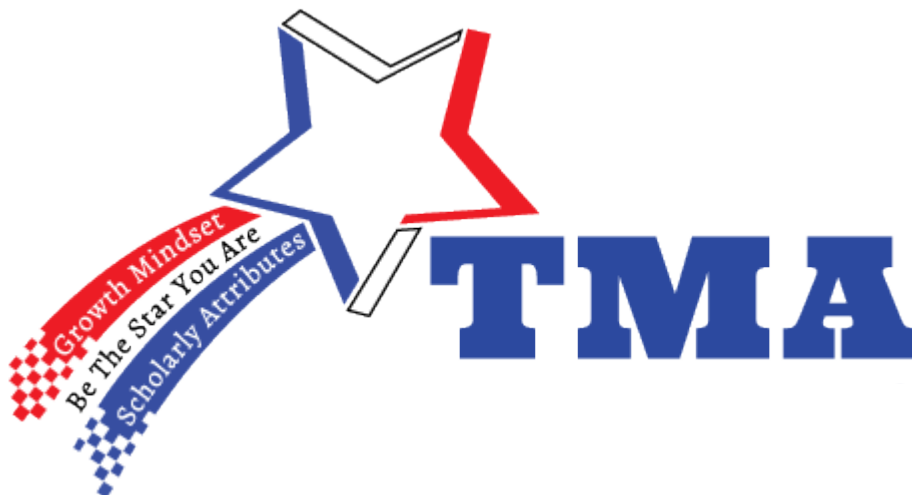




Reverse Engineering Online Challenge 2022
Remote Control Car
Team:30636D



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Report

I have been using a remote control car and the remote control. I chose to use a remote control car and remote control because its remote control car function is similar to a VEX robot remote control function and machine operation. These questions also kept me motivated. Why does it move without some wires connecting to the cars? How do the batteries connect to the wires and circuit board? Why does the car move back and forth when I move the pegs? Why does an unknown thing help the car run in straight lines? Why does it turn when I move the pegs?

I unscrewed 6 screws, 1 to take out the batteries and 5 to take apart the outer casing. I found 6 buttons 3 wires and another 2 screws. I unscrewed the two screws IC chip and some unknown things. When I press a button it sends a signal to the IC chip and the chip sends the signal to the car. There is an IC chip on the circuit board. The model of the IC chip's brand is YX and the number is 4116. This IC chip is a four-function wireless transmitter radio frequency transmitter chip. YX 4116 has 8 pins. This chip transmits signals to go backward, forwards, left, and right. After I removed the cap of the front wheels. I saw a motor with an 8 tooth gear connected to a fan-shaped unknown thing with 14 teeth. The 14 tooth thing was connected to a bar. When the motor turns the gear it also turns the fan-shaped unknown thing. There is a small pole that sticks out of the pole. Under the pole, there is a spring, when the bar turns the wheels the spring lets it bounce back to its place. After I unscrewed 2 screws to get the cap off of the back wheels. I saw a motor with an 8 tooth gear connected to a 36 tooth gear in the axel and an unknown thing that was also in the axel. After I searched it up I found out that the unknown thing stops friction in the axel and because I can't find any information about the 16 pin IC chip in the car so I used a digital multimeter to see if it is connected. The 6th pin is connected to the wires of the back motor and the 14th pin is connected to the wires of the front motor.

Through this process, I was able to gain new insights and perspectives on electronics. I learned how different parts cooperated in the remote control and the remote-controlled car. I was very perplexed by seeing how complex the circuit board was. During this process, I identified and discovered new components and robot systems. Sometimes my failures reminded me that investigation is a never-ending process and I can always dig deeper. Finally, I learn a lot more about how to deconstruct and research different components..

Word count: 491

Complete Deconstruction and Research Process



Figure 1 : deconstructing remote & car by unscrewing & detaching outer casing

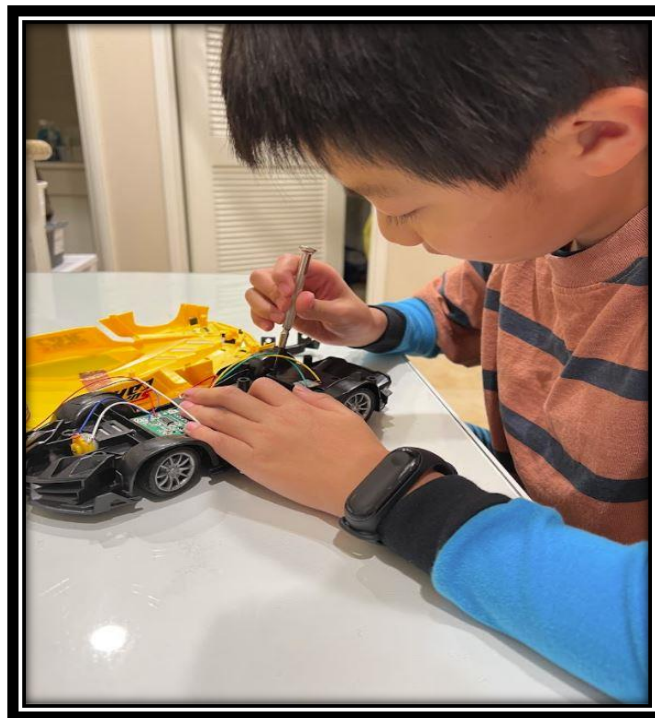


Figure 2 : Removing the outer casing to get access to the internal circuit board

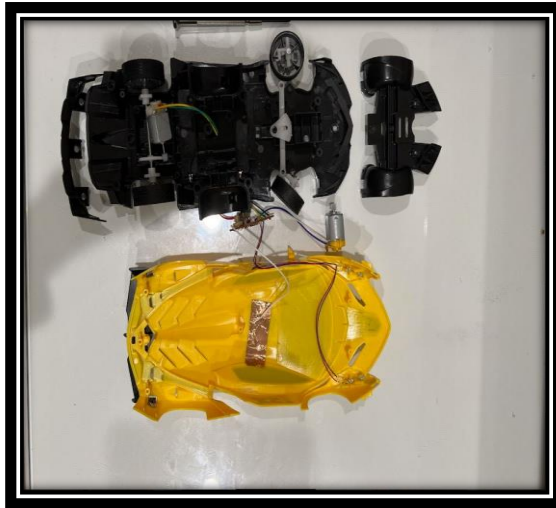


Figure 3 : Completely disconstructed car and remote



Figure 4 : Deconstructing remote control by unscrewing outer casing



Figure 5 : Removing the outer casing to get access to the internal circuit board



Figure 6 : Completely disconstructed remote control



Figure 7 : Identifying the different components using Iphone magnifi

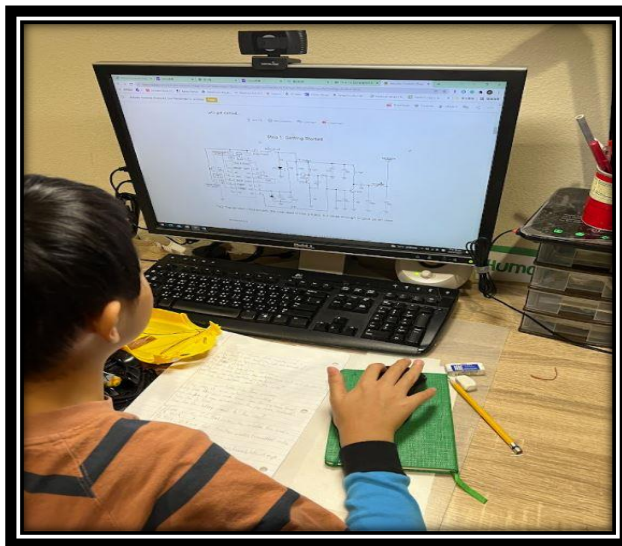


Figure 8 : Researching on different components online to get more information

Labelled images of receiver circuit board

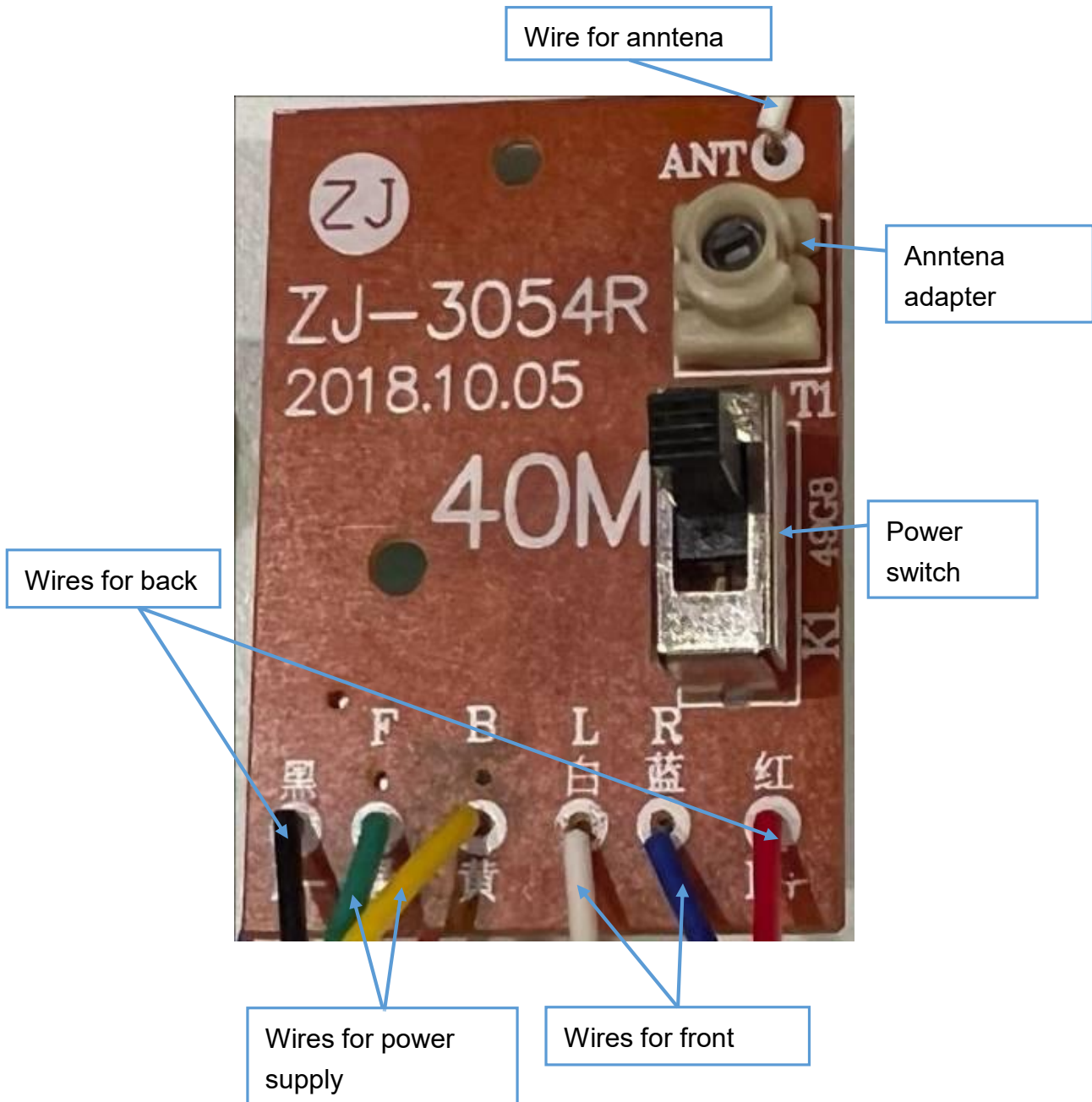


Figure 9:Top view of recivier curcuit board

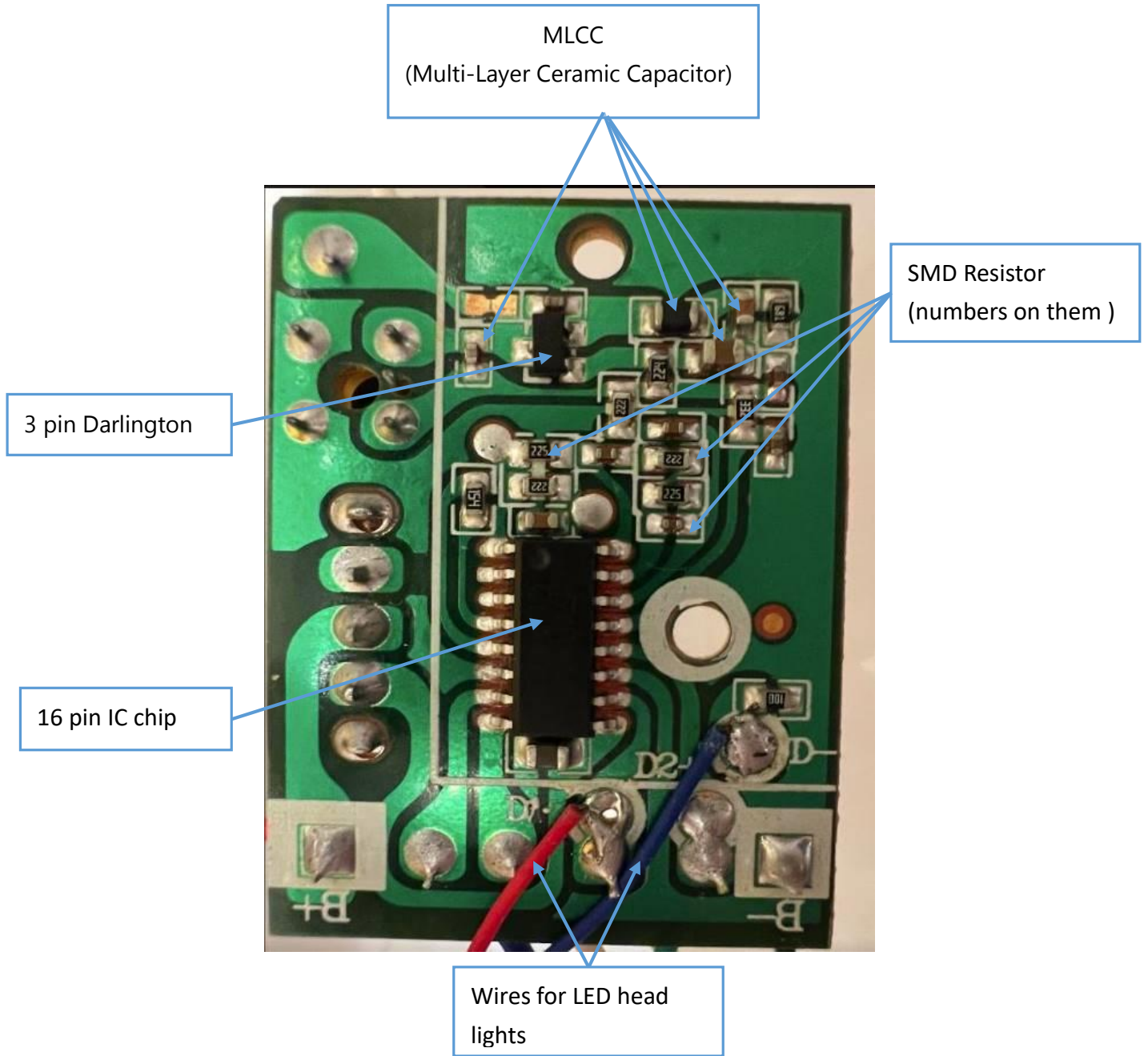


Figure10 :Bottom view of recivier curcuit board

Labelled images of the transfer circuit board

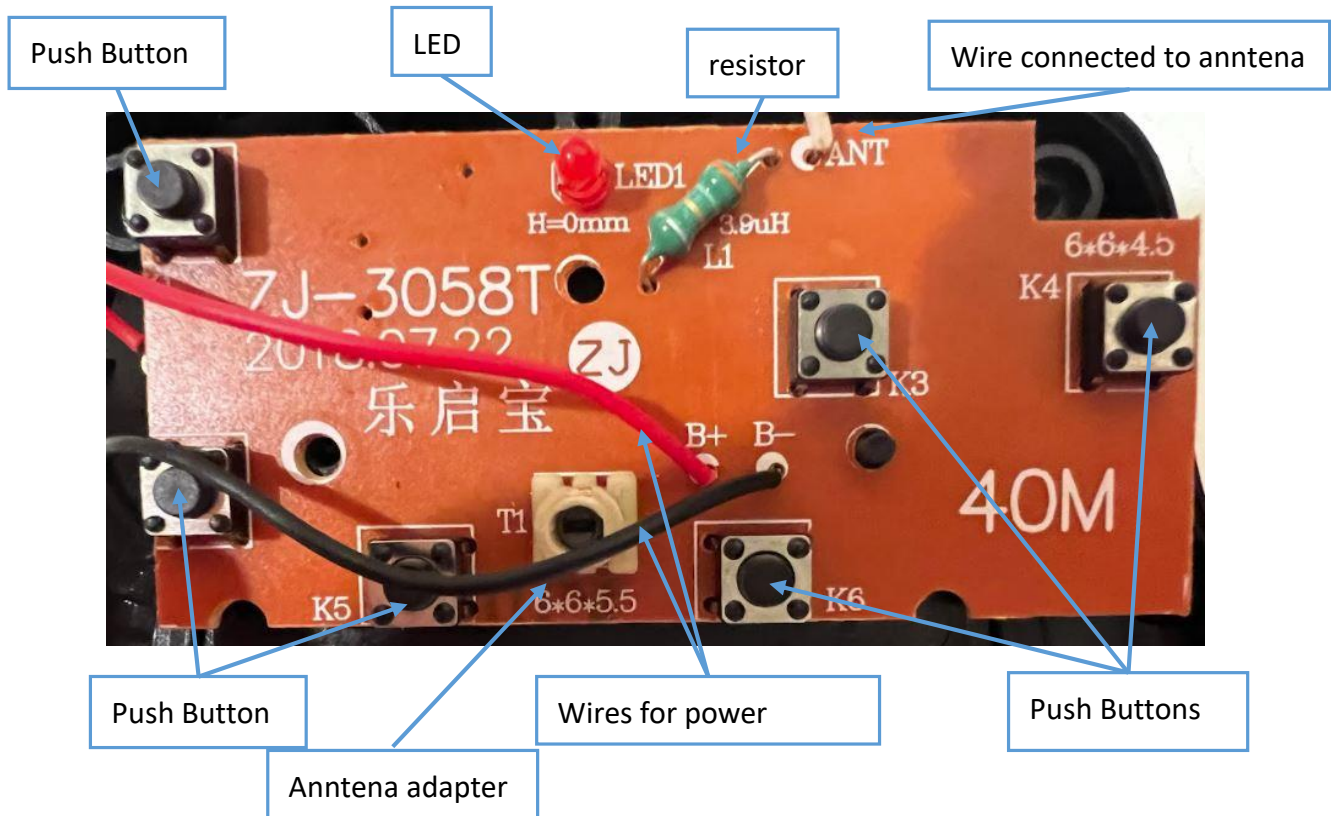


Figure 11: Top view of the transfer circuit board

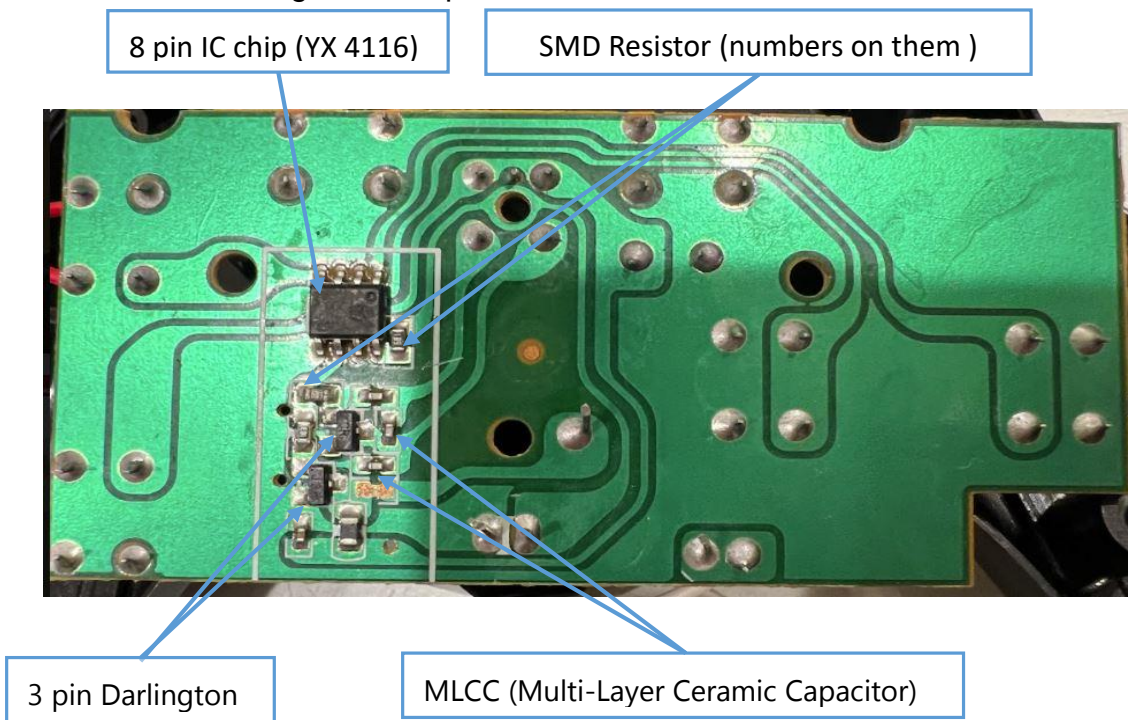


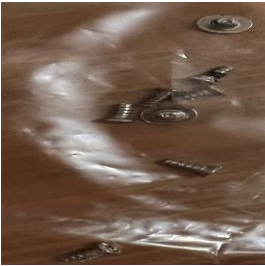


Figure 12: Bottom view of the transfer circuit board

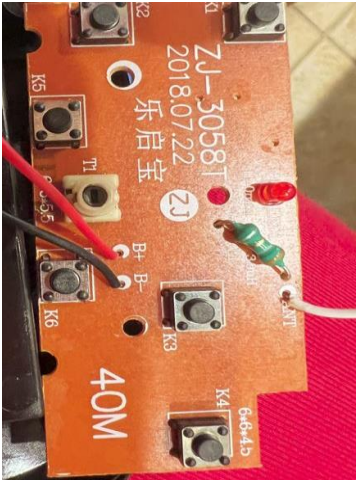


List of components

Remote Controller

External Components

Components(Name, Picture)	Description	Function/Comments
<p>Black case of remote control</p> 	<p>Durable plastic case</p>	<p>Makes remote control easy to hold & protects inside components</p>
<p>Antenna on remote control</p> 	<p>Inside - metallic wire Outside - black plastic tube</p>	<p>Used to transfer controlling signals from the YX 4116 chip</p>
<p>Screws</p> 	<p>Flat head screws & Phillips truss head self-tapping screw</p>	<p>Holds case, circuit board, and other together.</p>

Internal Components

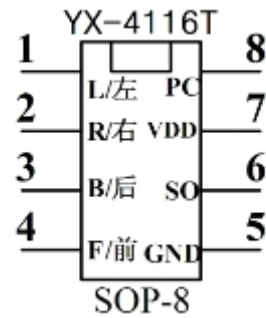
Components (Name, Picture)	Description	Function/Comments
<p>circuit board</p> 	<p>Include:</p> <ul style="list-style-type: none"> - Wires - ic chip - push buttons - LED - resistor - adapter - Wires; copper wire with plastic tube 	<ul style="list-style-type: none"> - wires get connected to the battery box so it gives the board the power source it needs - The LED will shine if you press a button - Transfers signals
<p>6 press switches in remote control</p> 	<p>Silver with black buttons</p>	<ul style="list-style-type: none"> - Connects/disconnects a path in an electrical circuit board
<p>Resistor</p> 	<p>Four band resistor.</p>	<ul style="list-style-type: none"> - Reduces current flow, divides voltage, adjust signal levels, etc. - The bands order is Orange, white, gold, and silver - The resistor value is 3.9 Ohm.

8 pin chip (YX 4116)



Black body with 8 metallic pins

- four-function wireless radio frequency transmitter chip



- 1 (LEFTB): turn left function
- 2(RIGHTB): turn right function
- 3(BACKWARDB): go backwards function
- 4(FORWARDB): go forwards function
- 5(GND): ground (negative power supply)
- 6(SO): output that connects to the antenna
- 7(VDD):5V voltage input (positive power supply)
- 8(PC): power control

antenna adapters







White with hole



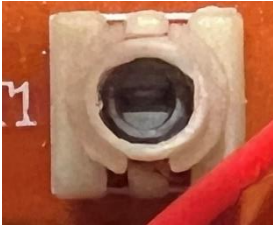

- Used to connect an external antenna

Remote Controlled Car

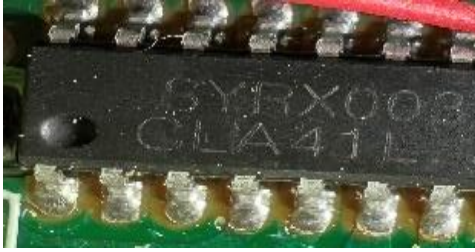
External Components

Components(Name, Picture)	Description	Function/Comments
<p>Black & yellow case of remote control car</p> 	<p>Durable plastic case</p>	<ul style="list-style-type: none"> - Makes remote easy to hold & protects inside components
<p>Wheels</p> 	<p>Two metallic & black wheels</p>	<ul style="list-style-type: none"> - Front wheels designed for 2 dimensions; 1st dimension: moving backward and forward 2nd dimension: left and right
<p>Black cap of front wheels</p> 	<p>Durable plastic cap</p>	<ul style="list-style-type: none"> - Holds & protects inside components (front wheels, white fan, spring white bar, motor Wheels)
<p>Screws</p> 	<p>Flat head screws</p>	<ul style="list-style-type: none"> - Holds case, circuit board, and other together.

Internal Components - Receiver

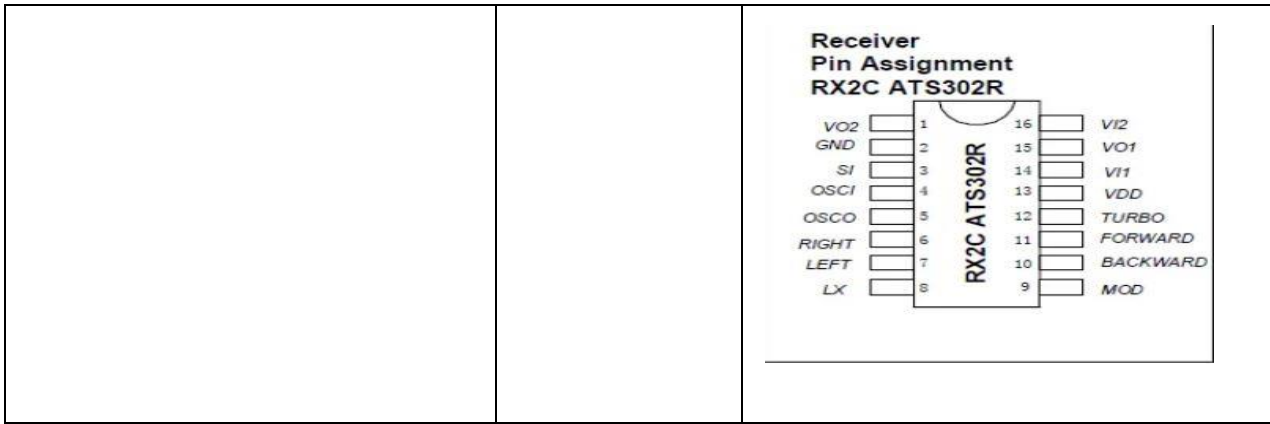
Components(Name, Picture)	Description	Function/Comments
<p>Circuit board</p> 	<p>copper wire with plastic tube ic chip switch</p>	<ul style="list-style-type: none"> - Let electric go through the circuit board to other places - Receives csignals
<p>Slide switch</p> 	<p>Silver with black sliding thing</p>	<ul style="list-style-type: none"> - Connects/disconnects a path in an electrical circuit board
<p>2 antenna adapters</p> 	<p>White with hole</p>	<ul style="list-style-type: none"> - Used to connect an external antenna
<p>antenna</p> 	<p>copper colored tape</p>	<ul style="list-style-type: none"> - reseive signals from the remote control

IC chip




Black body
with 16
metallic pins

- Researched model number SYRX003 CLA41L online but found no results but after testing it is the receiver
- I used a digital multimeter to measure the voltage of the pins by pressing the push buttons.
 - The 6th & 7th pins is connected to the wires of the back motor to make the car go backwards and forwards
 - The 11th & 12th pin is connected to the wires of the front motor witch makes the car turn
 - I used the beeper mode on the digital multimeter and found out that the 3rd pin is connected to the antenna
- According to the information I found a ic that has settings like the ic

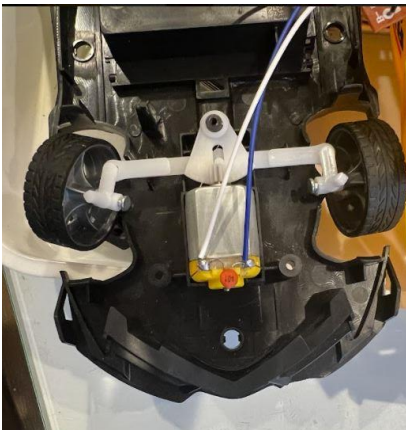







Internal Components - Rear drive motor with gearbox

Components(Name, Picture)	Description	Function/Comments
<p>Rear drive motor with gearbox</p>	<p>Rear wheel ,& motor</p>	<p>- Let car move backwards and forwards</p>
<p>Rear drive motor</p>	<p>Metallicwith gear on the end</p>	<p>- Let car move backwards and forwards</p>

<p>Rear wheels</p> 	<p>Includes</p> <ul style="list-style-type: none"> - Wheels - Axel - Gears 	<ul style="list-style-type: none"> - Front wheels designed for 1 dimension 1st dimension: moving backward and forward
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Internal Components - Front Steering system

Components(Name, Picture)	Description	- Function/Comments
<p>Steering system</p> 	<p>Includes</p> <ul style="list-style-type: none"> - Wheels - Gear - Motor - Front axel upright - Spring 	<ul style="list-style-type: none"> - Lets car turn left and right
<p>Spring</p> 	<p>Metallic rod coiled</p>	<ul style="list-style-type: none"> - When front wheels turn lets wheels go straight again after the turn
<p>Gear</p> 	<p>White with 14 teeth One sixth of a circle</p>	<ul style="list-style-type: none"> - Designed in-between the spring and the white bar to turn
<p>Front axel upright</p>	<p>White bar</p>	<ul style="list-style-type: none"> - Connects to front wheels and lets

		<ul style="list-style-type: none"> - wheels turn left and right
<p>turn motor</p> 	<p>Metallic with gear on the end</p>	<ul style="list-style-type: none"> - Let car turn left and right
<p>Wheels</p> 	<p>Two Metallic & black wheels</p>	<ul style="list-style-type: none"> - Front wheels designed for 2 dimensions; 1st dimension: moving backward and forward 2nd dimension: left and right