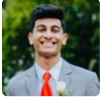




## How to Make an Electric Go Kart



by SrikarG3

*Note: I do have this Instructables page created into a PDF that I converted and modified for readability. If you need or would prefer a PDF version please let me know...*

### **My Experience:**

This was one of my very first completed projects. I have been very interested in physics and electric

bikes, go karts, and cars ever since I was in elementary school. Besides from the fun of building and driving this go kart, the experience and knowledge that I gained are priceless. The process of building and converting this go kart from gas powered to electric powered not only aligned with my passion, but also helped me to learn and grow as a student.

<https://www.youtube.com/watch?v=-PpibFe8O3M>

<https://youtu.be/UlvH5U6x0Q8>

## Step 1: How to Get Started

1. **Make time for this project:** Since I dived straight into this project I didn't have much prior knowledge or experience to utilize for this project. Thus, I spent a whole 3 months to complete it. And, within those 3 months, I spent around 4 hours a day.
2. **Be prepared to invest into this project:** Before I started this project, I had nothing in my hands. Seriously... I didn't even have many screwdrivers. And obviously, if you plan on building a go kart with lower performance parts, you will be cutting down this bill significantly (See the bottom of this page for my personal Expenditures Sheet). I think that because I started this project without any idea, I spent a lot of money on unnecessary things like a welder which I barely used. After everything, I think that about \$1000 would be a good estimate of the real price of this project.
3. **Plan, research, plan, research:** For me, the majority of this project was dedicated to researching and planning out how I would put together this kart (placement of batteries, motor, etc.). Don't be frustrated if it's been one month and you haven't started to build the go kart. You should plan out the project properly rather than spending loads of money on something you didn't account for. Then, you will be wasting your money and time. Overall, I spent around 200+ hours in total for this project.
4. **Think of something unique:** After you read this Instructable page, please remember that this just serves as a model for a different go kart that you could build. For example, instead of having a motor that accepts a max current of 300 amps (mine), you could get a motor that could make use of 400 amps (even more powerful). At the end the idea is yours.
5. **Final Goal:** Before you start, you want to have an idea of what you want to end up with. Do you want a go kart for offroad? If yes, then you need to get a roll cage with an offroad chassis. Do you want your kart to have a reverse gear? If yes, you need a reverse contactor. You get the idea. Make sure to note down what you want your go kart to look like. That way, you have something to work towards. Think about your budget, how fast you want to go, etc.



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## Step 2: Obtain the Base Frame

When I first got my frame, it was a racing chassis that was used previously for gasoline engines. Before building, make sure to clean up the frame of any corrosion and take out the gasoline components that won't be used in the electric conversion. There are many other frame options from off-road chassis to ones with roll cages. It all depends on your build and final goal.



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### Step 3: Choosing the Electric System Based on Go Kart Features

This step was completed after about a month of research. This was the hardest part for me because I did not know what I needed for an electric system to put on a go-kart. It is also impossible to tell you how to design an electric drivetrain in one page.

Therefore, I have posted sources and pages that were of great help to me. Those resources taught me more about these electrical components and helped me in applying that knowledge to construct my own electric system.

*Brushless or brushed system:* I created a chart to compare both of these systems in order to pick. I picked a brushed system in this case for cost reasons. Brushless motors have higher performance and energy efficiency. Although, they cost more and you end up losing power and speed compared to spending the same amount of money on a brushed motor (which is what I did).

*Lithium or Lead Acid Batteries:* This was a clear pick for me, again, because of the cost margin between the two. I chose lead acid batteries. Lithium batteries

are great but also on the higher end of the financial spectrum for batteries. Lithium ion batteries are known for high discharge rate, which translates to good acceleration when talking about go karts. Lead acid batteries, on the other hand, are cost-effective, but have a battery life nearly half of that of lithium ion batteries.

*Controller:* The name says it all. The controller controls the amount of current it sends to the motor based on the foot throttle input, which is connected to the controller. I wanted a controller that was fairly easy to program and put to use. The controller also had to be compatible with the motor and battery voltages.

	Brushless	Brushed
Kit?	no	yes
Voltage	48	48
Batteries	Lithium	Lead Acid
Controller	Sabvoton	Alltrax
Motor	Motenergy Brushless	ME0708
Other Components	not included	included
throttle	not included	not included
key switch	not included	not included
Websites	Everywhere	evdrives.com
Difficulty to program	Hard	Easy
Achieves goal	Yes	Yes
Regen	Yes	No
longevity	Better	Good
Range	Battery based	Battery based
Acceleration	Same	Same
Continuous	100A	100A
Max Current	300A for 30sec	300A for 1min
Max rotor speed	_____	5000 rpm
Gear Ratios	undecided	undecided
Price (w/o batteries)	~839	887.3
Weight (w/o battery)	26.6 lbs	30lbs

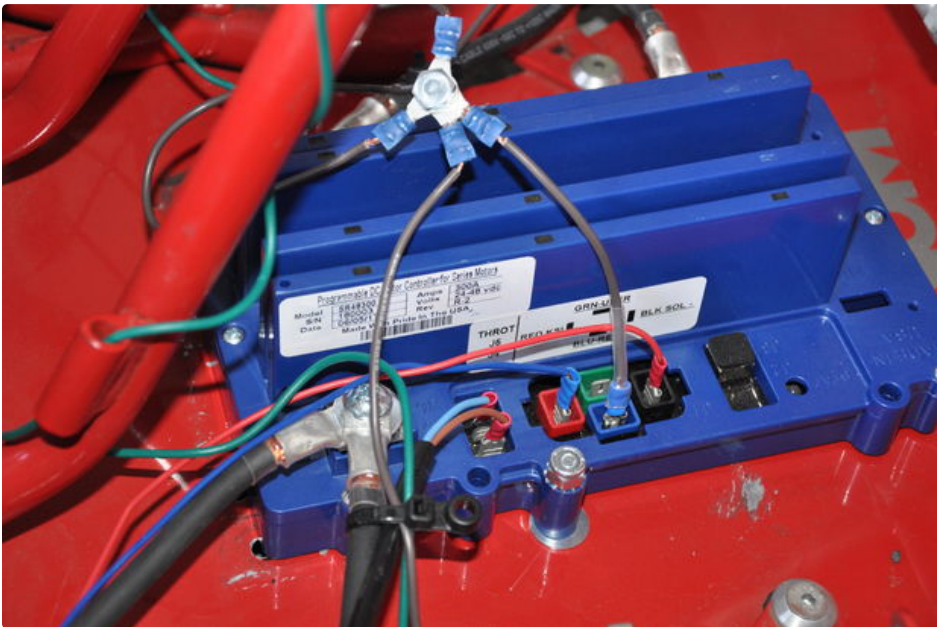
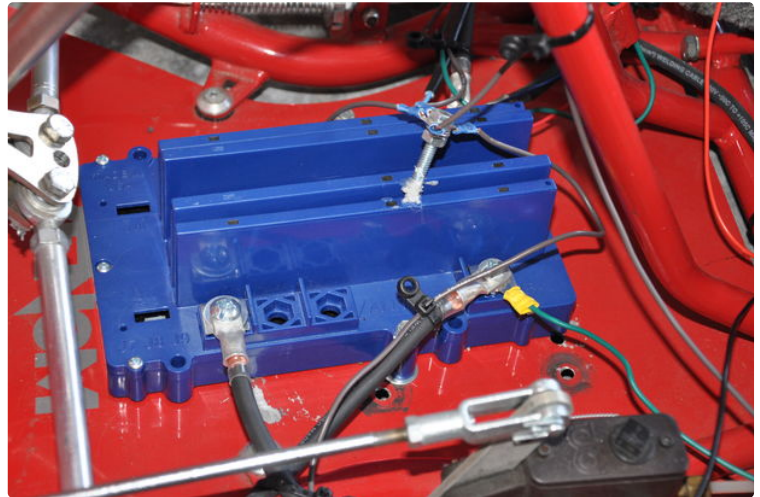
#### Step 4: Get the Electric Components of the Kart

A basic electric powertrain is composed of batteries, a speed controller, and a motor. There are many other safety features and components to enhance efficiency that I have incorporated in my project: solenoids, fuses, diodes, precharge resistors, etc. The system I picked out is one that consists of a 48 volt lead acid battery pack. I chose not to pursue with lithium-ion cells merely based off of the cost of a good lithium pack. In my 48 volt system I have 4 individual 12 volt Interstate batteries. I picked out an Alltrax brushed motor controller which was fairly simple to program and didn't need much programming (almost ready to run as stock). I know that other controllers from Curtis and Sabvoton require a little more programming, which could be a possibility if it interests you. Finally, the motor. No matter how good

the batteries and controller are, if the motor cannot keep up with the current provided by the batteries, you will not be able to get good acceleration from the motor and there is a risk of burning it. I chose a Motenergy motor programmed by the factory for 48VDC with a peak current of 300 amps. *Please note: All components must be compatible for the same voltage. I chose 48 volts in my project. Below I have put links to the online stores where I bought the components.*

[Battery Amazon Page](#)

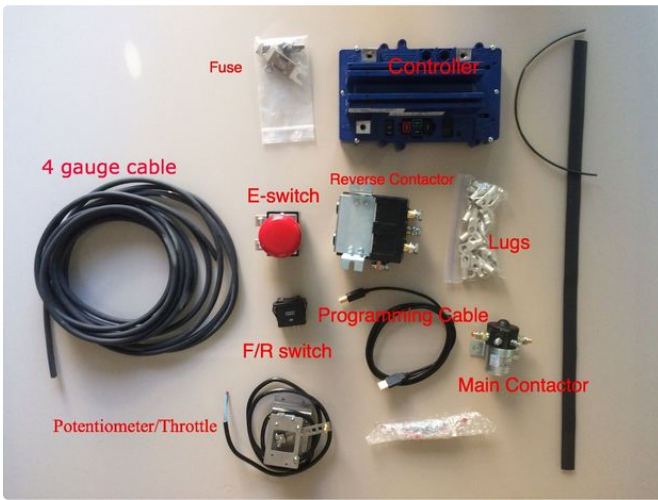
[Motenergy and Alltrax Custom Kit Page](#)



## Step 5: Sourcing the Rest of the Parts

Above is a picture of all of my parts laid out on a table. Most of the parts were sourced from EVDrives or Amazon. The customer support at EVDrives proved to be a great help technically and with purchases.

- The **fuse, reverse contactor, main contactor, and the throttle box** came with the custom kit that I linked in the previous step. The contactors and fuse are sold in 24v, 36v, 48v, based on what system you want to go with.
- The **lugs and 4 guage wire** were bought [here](#). It is safe to buy 4 guage wire in order to make sure that the wiring can handle high current heat.
- I also have included pictures of the tie downs I used for the battery mounts, fuses, shrink wrap, and terminals for the wiring. All of this was bought from my local HomeDepot for cheap.



## Step 6: Gather Tools and Materials to Start Building

Some optional but *extremely helpful* power tools include (hand tools could be used as well):

- MIG Welder
- Angle Grinder
- Sockets
- Corded Drill
- Jigsaw
- Wire Cimper/Cutter
- Plywood
- U bolts for the frame
- Nuts/Bolts
- Tie Downs
- Wire terminals
- Wire and cable(4 AWG and some small wire)
- 64 tooth sprocket
- Motor L-bracket

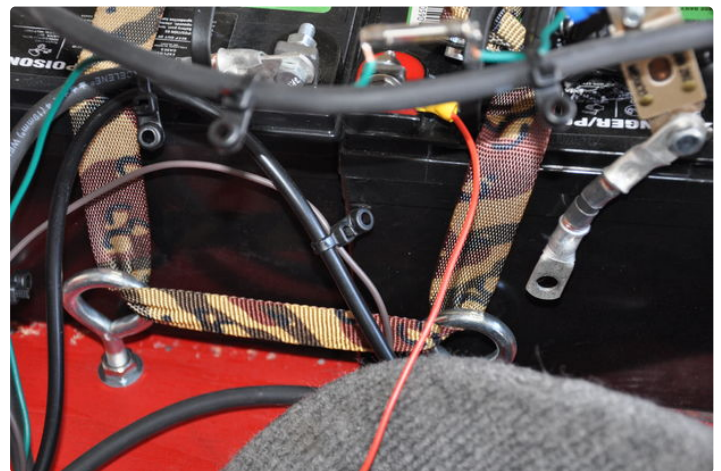
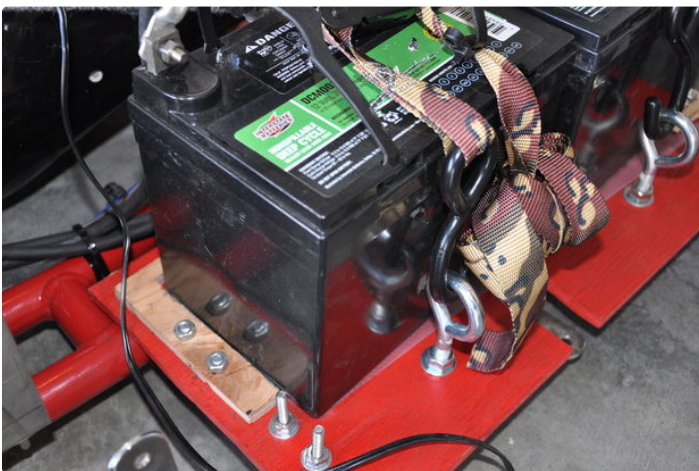
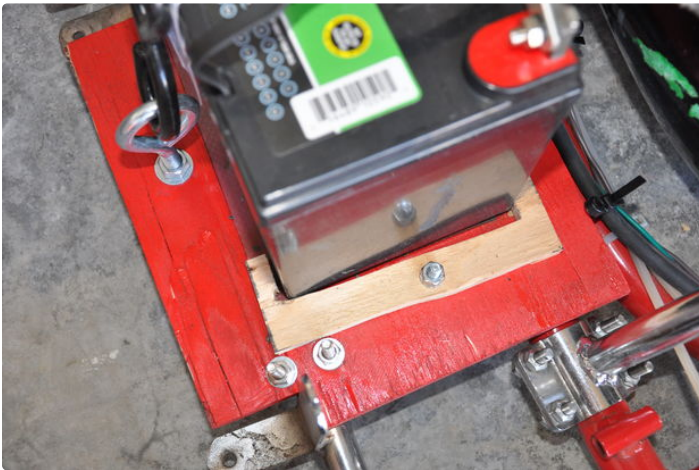
### Materials:



## Step 7: Build Battery Mounts

Now it's time to start building! You need to have some way to mount the batteries securely. I used a piece of plywood on either side of the kart and then use tie downs to strap them down. I ran the tie down through some eye hooks on the plywood. A much better way to do it would be by using a metal container and then

welding it to the frame directly. Regardless how you do it, try to distribute the weight equally so that you don't lose steering control or grip on the rear wheels. At the end, I painted the plywood red to match the frame color.



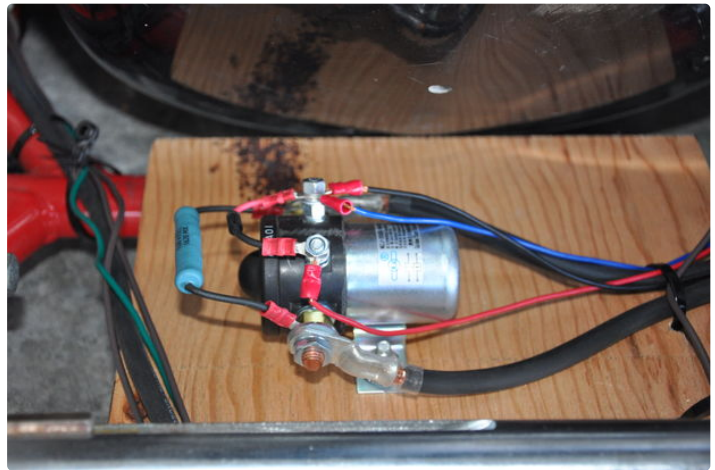
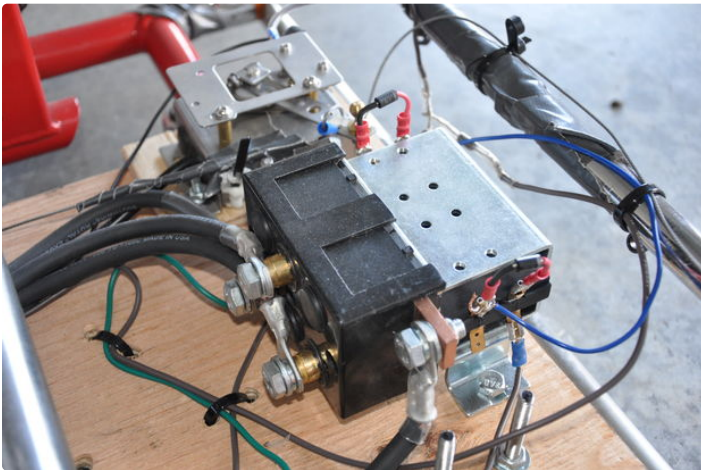
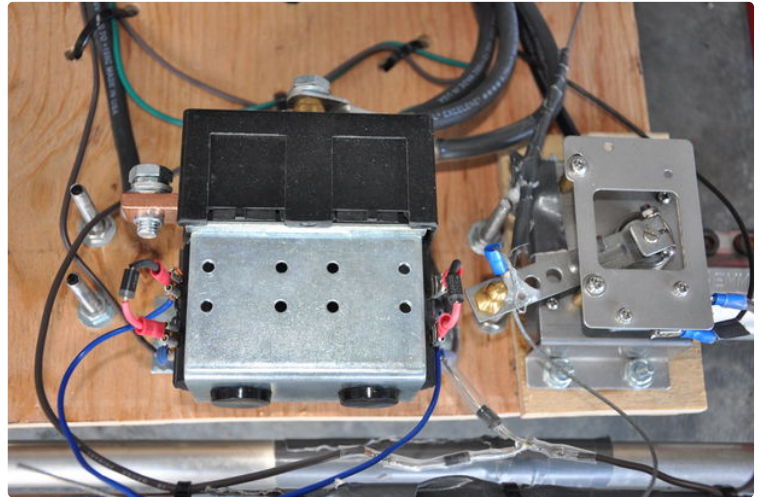
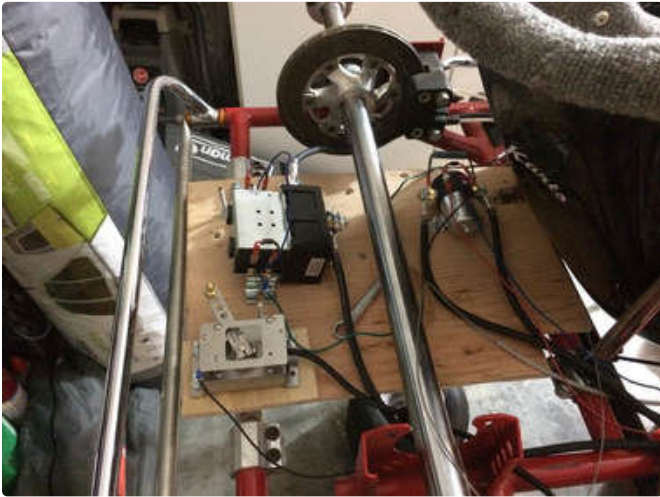
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## Step 8: Bolt Down the Contactors and Throttle

**NOTE:** The main contactor is the one shaped like a cylinder while the reverse contactor is shaped like a box and has half of it covered with black plastic.

For this particular go kart I had a lot of space on the back of the seat underneath the rear axle. So, I decided to put my contactors and throttle over there. I again used 3/8" plywood and then bolted it down to the pipe frame using some U-bolts. I used U-bolts to secure the plywood. Then, I bolted the reversing and

main contactor and throttle in convenient places away from the axle to avoid any moving parts. Before bolting down everything, make sure you have enough wire and cable to wire up all of the components. And for the throttle, I would recommend to place it at a position that is lined up with the gas pedal cable. That way there is no slack or turns when you connect the gas pedal cable to the throttle hand.

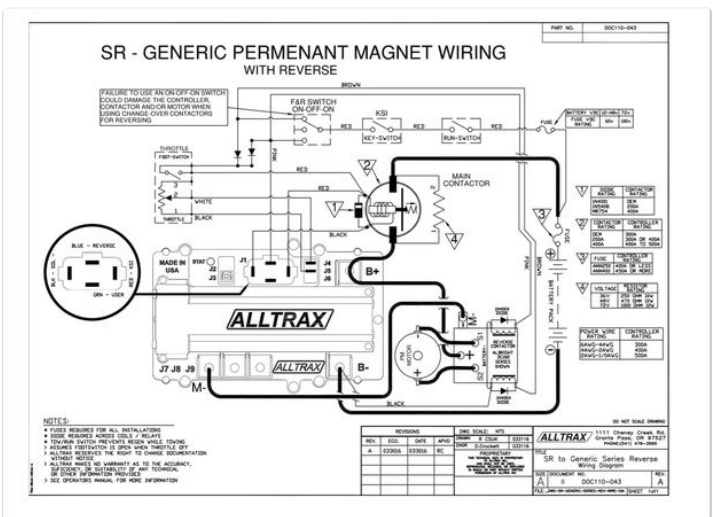
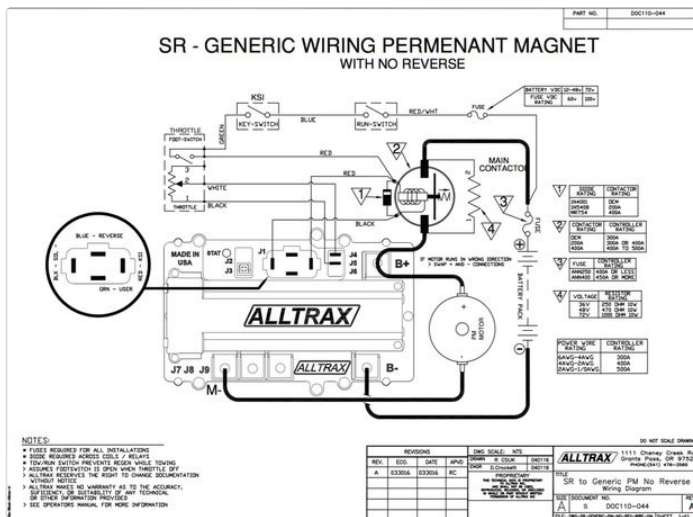




## Step 9: Wiring Everything Together

In order to create a 48 volt battery pack I connected the 4 - 12 volt batteries in a series connection. This means the positive end of one battery to the negative end of another and go on until the pack is finished. **DO NOT** complete the circuit by connecting all of the batteries in a loop, this will create a big **explosion**. Connect the contactors, fuses, motor, and controller as part of the bigger circuit that will be able to handle 300 amps. The smaller circuit will consist of the key switch and the forward/reverse rocker switch that connect to the Alltrax controller. Use good, strong metallic wire terminals to ensure high conductivity. Crimp the wires firmly to avoid loose connections and corrosion in the lugs and wire ends. I have attached a wiring diagram that replicates the design and layout

of the wires and cable that I used to connect all of my electrical components. Remember, many of these components are not necessary such as the fuse and reverse rocker switch... they are just additional features on the go kart that make it safer to use, i.e. in any case of a short circuit to the frame, the fuse can stop a surge of current from passing that is over 300 amps. **CHECK ALL CONNECTIONS BEFORE TURNING ANYTHING ON.** Electricity is dangerous so make sure that everything is properly connected and that there are no possibilities for a short circuit. It may be worthwhile to get someone knowledgeable on electric circuitry to help check it out for you.



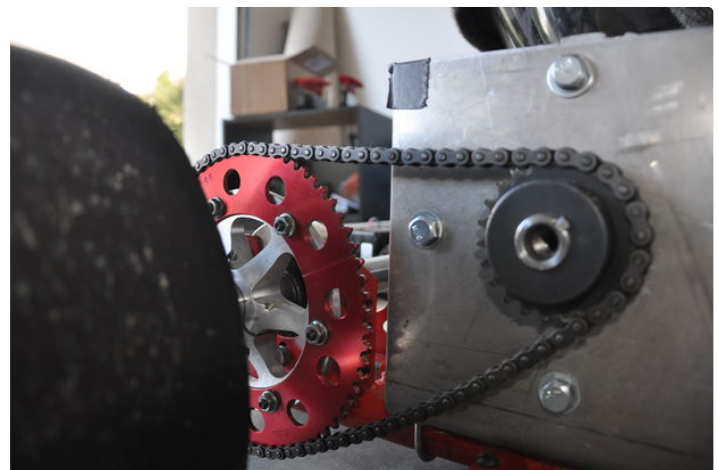
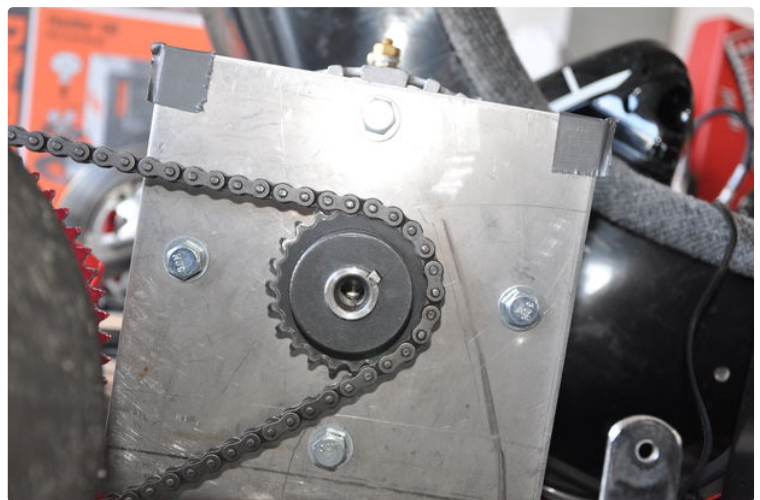
## Step 10: Mechanical Work

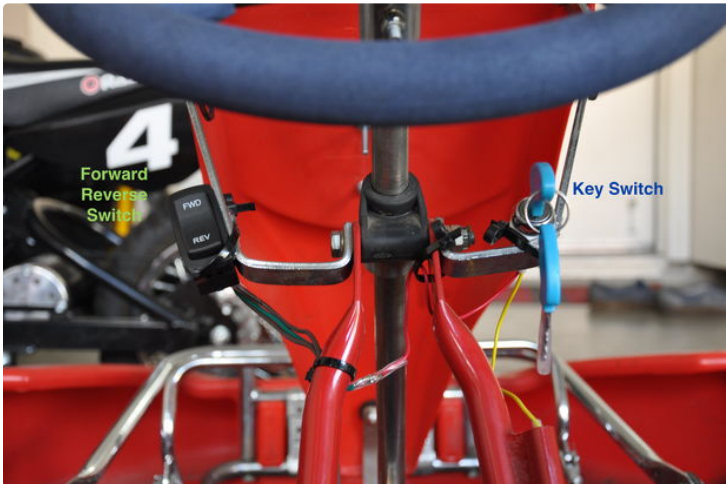
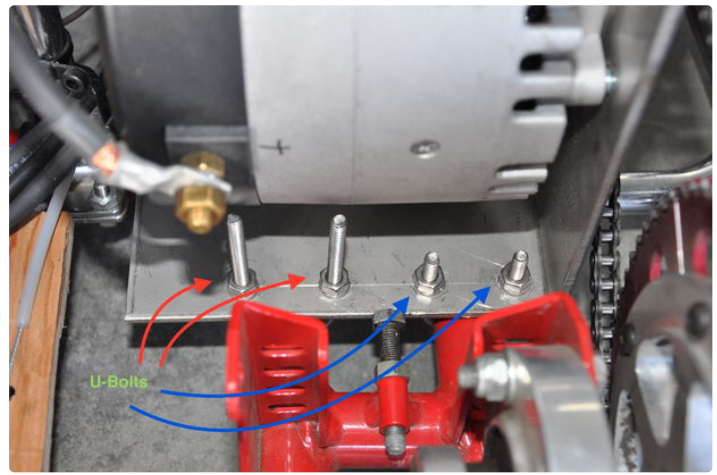
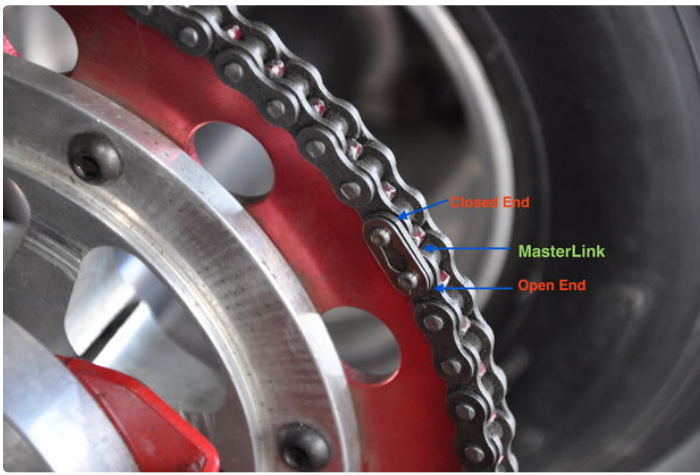
Finally, once the electric components have been put together, you just need to finish putting together the kart. In order to mount the motor, I avoided a costly purchase of a motor mount. Instead, I bought a cheap L-bracket that was machined to the motor specs. It was an aluminum bracket that a local machining shop happened to have at disposal. For many of the parts to build this go kart, there may be people or shops that are willing to help you out with them. Since the motor bracket secured with U-bolts that could slide along the rails, I was able to adjust chain tension (this is very convenient and ends up saving a lot of time). I used a #35 chain and my gear ratio (rear to drive) was about 3:1, which ended out being perfect in terms of the balance between torque and top end. Specifically, I believe my rear sprocket ended up being 64 tooth and my drive sprocket is 23 tooth.

1. Tighten the motor plate to the frame so that it will not move when in motion.
2. Align the rear sprocket with the drive sprocket
3. Put the chain over and use the chain link to connect the two ends of the chain
4. Ensure that the chain has no more slack than 1/2" up and down.

**NOTE:** When you connect the chain, make sure to position the master link such that the open end is facing the clockwise direction. I have included a picture of this.

Click on images to see details.





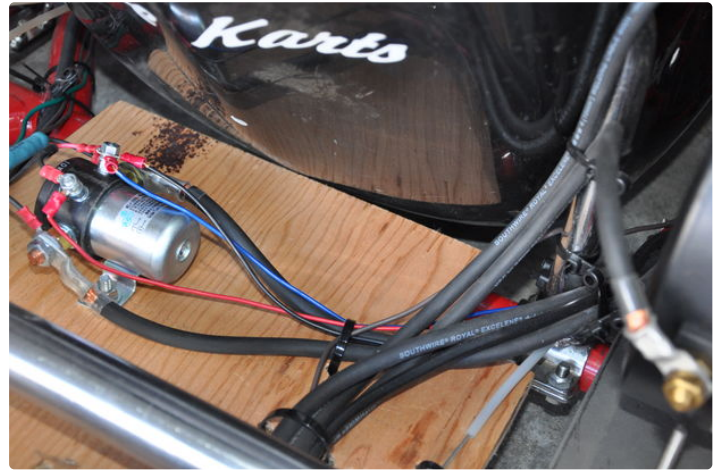
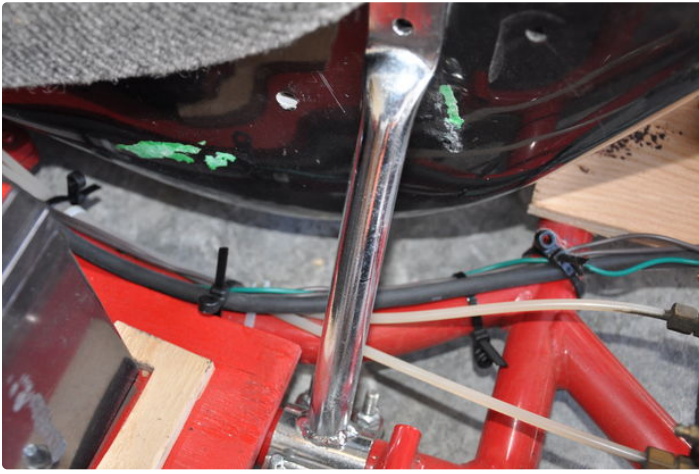
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## Step 11: We're Done! Let's Ride!

Before you take the kart out to ride:

- Put the wheels on and make sure that they are not worn out!
- Make sure that the wiring is securely strapped to the frame (preferably by zipties or locks/hooks).
- Check to make sure there are no possibilities for a short in your electric circuit... that would be really bad and your go kart would be destroyed.
- Take the time to cross check everything. Better to be safe the first time, don't rush into it. Once everything is done, go ahead and start riding!

Hopefully you learned something from the project. More than the product, you probably will have appreciated the experience and pitfalls during the build. Be proud of yourself, nice job!! I have included a video of my kart in motion with me giving a thorough explanation live time (please give it a like and comment). Again, this page didn't cover a majority of electric go kart and the technical side. There's just so much to learn. I would recommend looking towards past go kart projects from other people in case if you need more references to start from. And again, please feel free to contact me for any questions (technical or just about my creation) about my kart or a build of your own.



<https://www.youtube.com/watch?v=-PpibFe8O3M>

## Step 12: Additional Info...

Some **resources** I used that helped me throughout the way:

1. [Endless Sphere](#) (many projects and info regarding vehicle projects)
2. [Battery University](#) (everything batteries)
3. [DIYGoKarts](#) (everything go-kart related)

F.Y.I. The Alltrax controller comes pre-programmed to the setting that you order it with. So, it is not necessary to program it. But, if you want to make it

customizable, the controller is programmable with a free Windows application. The program allows you to set the max current to the motor, the torque and speed curves, etc. This came out to be especially useful after the first time I took my go kart for a ride. The batteries started getting pretty hot to the point that one of the terminals melted. This meant that I was flooring the gas pedal too much. So, I adjusted this by limiting the controller to 200 amps. This was *extremely useful* because now I have no problems with the batteries overheating!



hey Srikar,  
can i get a copy of pdf. (usama0601.98@gmail.com).  
i want to make one for my university project.



Hi Srikar,  
Great job on the build, can I get a copy of your PDF?



Sure, email?



rhyso@live.com.au thanks Srikar in advance keep up the great work



I couldn't find something good on Craigslist, but I did find a good chassis on Racing Junk. Do you think I can work with this: [https://www.racingjunk.com/Partial-Karts/182880462/Birel-AR28-Jr-Sportsman-Go-Kart-Chassis-2008-ROLLER.html?category\\_id=&search=go+kart+chassis&quickSearch=1&np\\_offset=1&from=search](https://www.racingjunk.com/Partial-Karts/182880462/Birel-AR28-Jr-Sportsman-Go-Kart-Chassis-2008-ROLLER.html?category_id=&search=go+kart+chassis&quickSearch=1&np_offset=1&from=search)



Also, which throttle did you use? It looks like a pb-6 throttle.



Yes, I believe it was a PB-6.



Thank you!



Yes, the Birel chassis work perfectly fine. However, this roller seems to have a little less room compared to the Emmick Venom chassis I have. Regardless, there are many ways to work around that, and I think that this would be a good buy for you as you haven't been able to find many others...



Do you mean that there is less room for me to sit and ride or do you mean that there is less room to place my engine and other parts?



There would be less room to place your engine and parts.



Ok.



Hey if you ever want to upgrade from your current battery solution, try Prius battery cells on eBay or somewhere.



Sure, thank you!



Can I get a f copy of your build



email?



Thanks, I will look into adding that in! My email is: drozin01@bvsd.org.



Did you send the pdf of instructions? If yes, for some reason I have not received an email.



Poderia me mandar em pdf, trabalho excelente meus parabéns  
Gmail: italo.heron92@gmail.com



Sure, do you have a preferred email or way I can get the PDF to you?



Hi can you please email it to me  
nzexile@hotmail.com  
cheers



How much time will it take for charging and how much time will it run?



You really Great srikar, I have seen more videos till now but no body provide this much of documentions till now. All the best for future endeavors. I have few quires and also I need some customs changes Pls drop a mail to me once kmurali.krishna00@gmail.com



So... I have to wait before I build one... I have the plans set up and everything. Actually, I will have a racing kart, and I found a brushless 72V 550A motor kit for about \$2500 which is a really good deal. But this guide helped so much. I also found a LiFePO4 battery pack which totals with 240Ah for quite cheap also. Thanks again.



Cool, good luck. Lemme see it when you finish the build.



ok. Thanks



I am thinking of making a simple electric go kart, but I need some help on the chain system.

Here is the base:

<https://jet.com/product/detail/69257ef1a09f49d99c4...>

And here is my motor kit:

<https://www.ebay.com/p/E-bike-Brushless-Motor-Cont...>

This really inspired me to build an electric go-kart (ego-cart?) Thanks.



Looks cool. So, first off, remove the engine and everything from the back of the go kart. And with the motor that you're buying, it looks like you might need to get or create a mount that would raise the motor in order to run the chain vertically kind of like how the stock go kart is. I can't really see how they have the chain set, but from what I understand, if the motor's sprocket that you get with it doesn't match the bigger sprocket that was on the stock kart, then you might have to just do the chain system yourself. Here's what I suggest: Get a split sprocket that matches the pitch of your motor sprocket and then bolt it down where the original sprocket used to be. Align the motor sprocket with the bigger sprocket. Then, get the matching chain and lock it on. Hope that helps.



Thanks



Where might one find such a frame? I've wanted to make one of these myself for years, but I think getting a prebuilt frame would save a lot of time and energy.



Yes, getting a prebuilt frame will for sure save you not only time beforehand but also when you are getting ready to put the kart together. I got this frame for a hobbyist who happened to have a couple of preowned race kart frames on hand. You might consider Craigslist or local go kart racing companies.



First, awesome! .....Second.....awesome!!!!



This is so cool !!!



My son races gas engines.

I am impressed with how you spent your summer time creatively. TOP KART is working with Purdue to make a competitive electric kart. You should send them your video maybe Purdue could be in your academic future.

You should be super proud of yourself.



Thanks...Yeah, I was considering the Purdue race. Will probably do it starting in the middle of the year.



That was a great video - you and the cart are bad ass ! (^8}



Thanks!



That looks really fun. About how long did it take you to make it start to finish?



Hey,

Including the research to learn source out the right parts it took me about 4 months. I started around the time school was ending and I worked through the 2 months of break I had. During those 2 months I spent a lot of the days on it. Although, since this was one of my major build I figured that maybe it took longer than someone who had experience would. Overall, I invested about 200 hours into it with research.