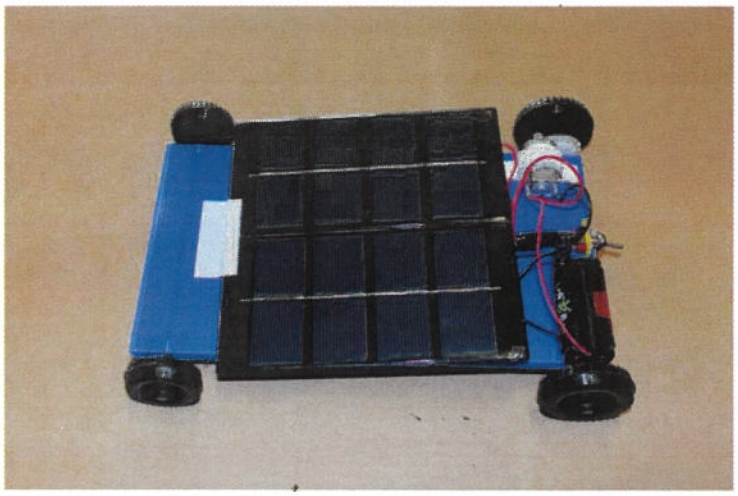
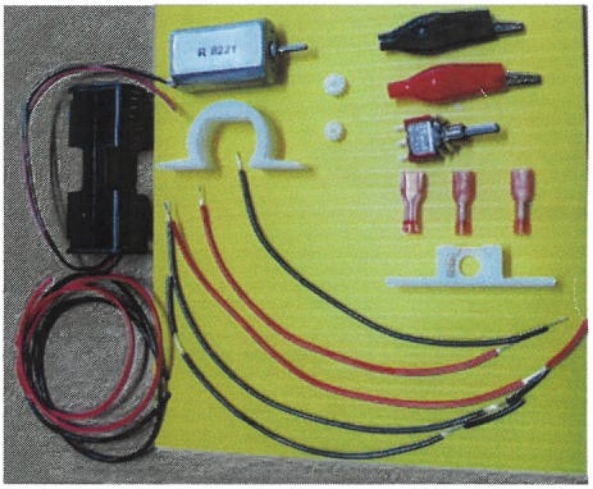
Hunter Valley Mini EV Challenge
High School Solar Car

Each Kit includes
2 Solar Panels - 2v 700mA
8 Wheels 4 x 50mm, 4 x 40mm
2 Axles(short & Long) & 4 Axle Collars
1 Motor - F18 & 3D printed mount
3 Large Spur Gear 60T, 54T & 48T
2 Small Pinion Gear for the motor 12T & 10T
5 Pieces of wire + spare wire
1 Chassis(Coloured Coreflute)270mm x 140mm
1 Battery pack(2 x AA)
1 Two Way Switch,centre off+3D printed mount
3 Red Spade Connectors for switch
2 White tape, to hold panel & battery pack
2 Alligator clips for solar panels
5 Double sided tape





Aim of this kit.
This kit has been designed to allow experimentation and variation. To build a four wheeled car you do not need eight wheels but if they are different sizes this may effect the speed or the look of the car? Initially you can twist or push fit all the components to make it work. However to improve the durability and engineering you may need the tools below to make a really strong and fast car.
Take care with fibreglass axles. You can get small splinters of f/glass if you touch the ends with your hands. Please use the block sets provided.

Tools you may require.

The tools you may need to help put your car together are a pair of pliers, screwdriver and although not necessary a soldering iron can help make connections more permanent and secure. Wire strippers will help with cutting and stripping the wires. Pliers or crimpers can help with connections. We provide the block of wood and dowel.

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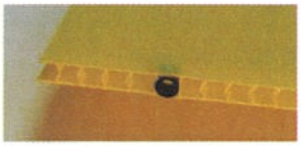
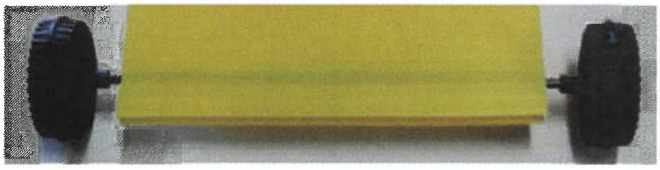
Steps to put your Model Car Together

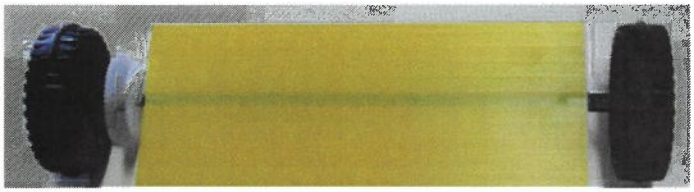
These steps are only one way to put the car together, its up to you to experiment.

1. First, lets set up the chassis. We have included eight wheels and you can select and test which ones will be appropriate. There are two axles, the motor will drive one and the other will be free running. The axles go through the corflute and to stop the loose fit you can use the small axle collars placed inside the corflute to act as bearings. See the picture. To push the axle into a wheel use the wooden dowel with a hole in it to firmly push the axle into the wheel (Use the shorter axle). See picture. Slide the axle through the corflute and place the same size wheel on the other side.





The longer axle will need a spur gear on it so the motor can drive the axle. To push the axle into one of the large gears you will need both wood pieces. See picture. Place the spur gear over the hole on the flat block and push the axle into the gear. The axle should just protrude through the gear and then you can push it onto a wheel. Place the two collars into the corflute and then slide the axle through the corflute and push a wheel onto the other side of the axle. You can just do one spur gear at a time or you can load up the axle with more than one. You might need to adjust the position of the spur gear to stop wobble from left to right.



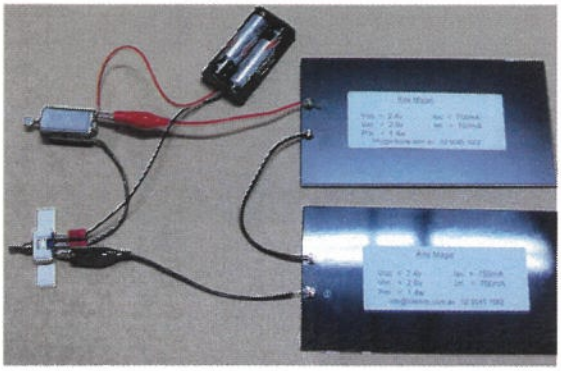
2. Test that your platform rolls smoothly across a flat surface. Also test to see if it goes in a straight line. The engineering side of this build is most important.

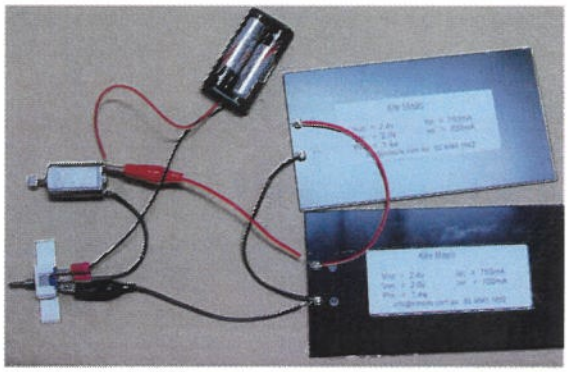
3. You now need to build the circuit but before you do the motor needs to have the pinion gear pushed onto it. There are two gears for the motor, a 10 and 12 tooth gear. Again testing will be required to decide which gear is best. Place the small gear onto the bench and then push the motor into the gear. Be careful not to push on the back of the motor where the two connection points for the wires are as they can be pushed into the motor and it wont work.

4. You now need to set up the wiring and might find it helpful to connect all the elements together and test them before you secure them to the chassis. This will also allow you to see where to best place the components.

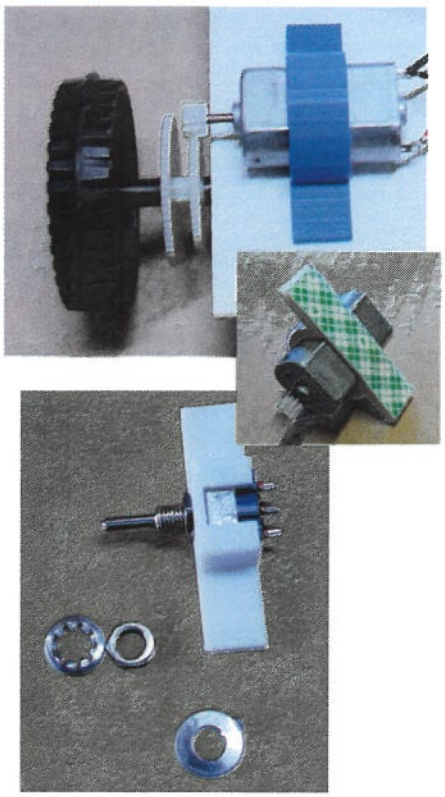
5. On the last page of these instructions is a wiring diagram. You will need to read and understand it so you can connect up the circuit. There are two ways to connect the solar panels, series and parallel and they give different outputs for voltage and current. You will need a small flat screwdriver for the solar panels connections and either pliers or crimpers for some of the connections.

6. First set up the wiring with the connections just twisted together. This will allow you to test the different ways to set up the car, series or parallel. The motor and switch have connection lugs that have holes in them. Cut the wires to the correct length and strip the ends using a wire stripper or a pair of pliers. With the wires twisted at the ends you should be able to poke them through the holes and make the connections. If fine wires are poking out and touch each other you can create a "short circuit" and the car wont work. You need to take some care. We have provided alligator clips for the solar panels so you can make easy changes to test series and parallel output of the solar panels.





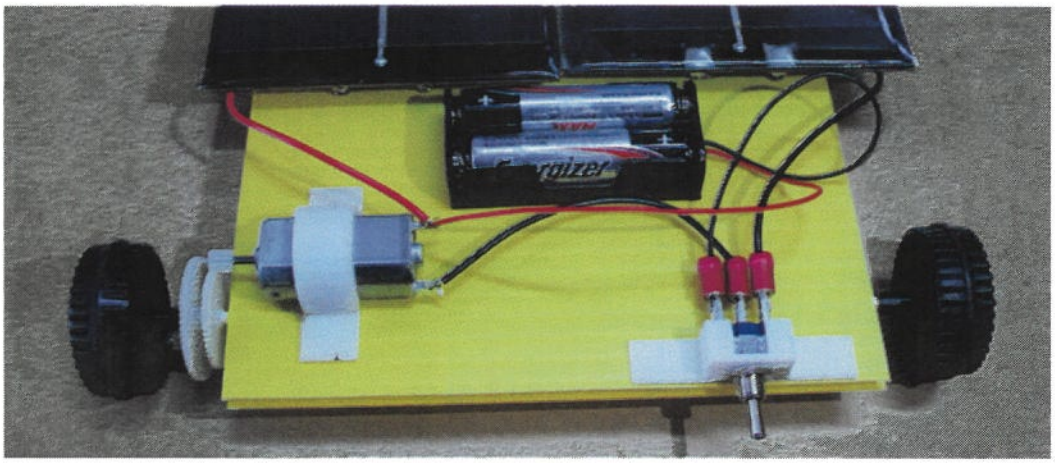
7. To place the motor on the chassis you will need the 3D printed motor mount. Slide it over the motor and it should hold in place. With the car on the bench now place the motor so it lines up with the large (60T) or small (48T) spur gear. Roll the car backwards and forwards to make sure it turns the pinion gear on the motor. Now place one of the double sided tape across the motor mount. Refer to picture right. Peel off the green side and place the motor just where you tested it before. The gears need to line up but don't need to be too tight.



8. Now you need to position the switch.

9. Now with all the major components in place you will need to complete the wiring. The two types of wiring either series or parallel which are detailed on the attached sheet. Also we have included a battery pack for low light conditions. The battery pack needs to be installed so that batteries can be used if the event has poor weather.

10. Once you have done some testing you might want to solder some of the connections. If your car goes the wrong way (forwards or backwards) you can change the wires on the motor and it will go the other way (reverse the red and black wires). We have included 3 small electrical connectors that might help secure the wiring to the switch.



11. If you want to race the car down the track you will need to set up a method of keeping the car on the track. Some form of guide will be needed. This part is up to your imagination and is really important to help make your car go as fast as possible.

Warning

When you put the batteries in the holder please ensure you do not touch the two leads from the battery holder together. The batteries will get very hot and smoke. Also make sure you do not have any short circuits in your wiring. If you are unsure do not place the batteries in the holder until you get help or advice. This can be dangerous.

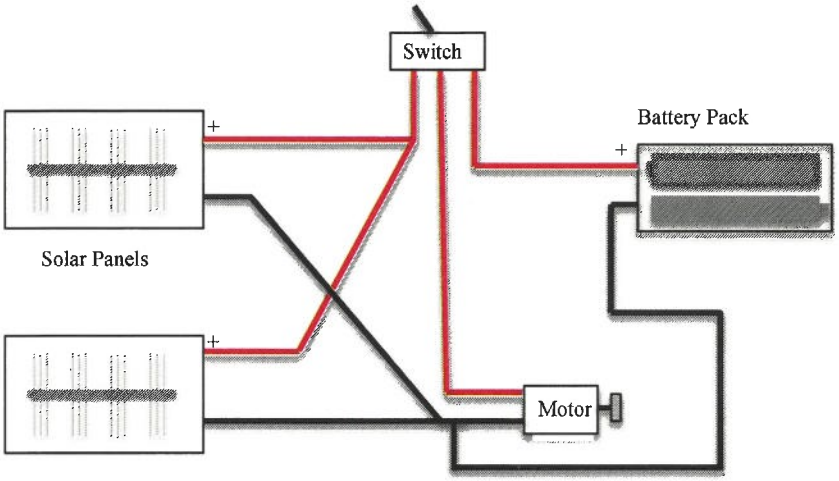
Some Tips and Ideas.

1. IF you are using the kit to enter an event, please read the rules for the current year.
2. The kit and these instructions are just a guide to making a car which will work. You are free to make your car any way you like as long as it fits inside the rules.
3. Testing the car with different gear ratios and different light conditions is most important.
4. The biggest mistake is incorrect alignment of the motor to the gears on the axle. If they slip or move you will end up with no movement.
5. Electrical connections need to be secure. Once you have the car set up correctly solder the connections so you wont have problems on the day but you will need to allow for changes.
6. If you have any questions or feedback we would love to hear from you.

All the best and above all have fun.

Solar Car Kit – Wiring circuit diagram

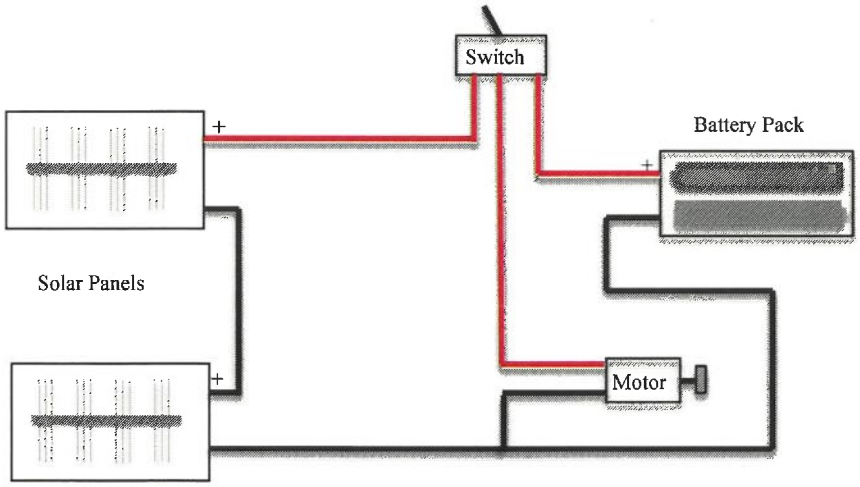
Solar Panels in Parallel



With the panels connected this way what is the output to the motor?

_____ Volts _____Amps

Solar Panels in Series



With the panels connected this way what is the output to the motor?

_____ Volts _____Amps

Use a multimeter to test these two circuits. Also test under different sun conditions. Remember to record your data.

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