

# OVERVIEW

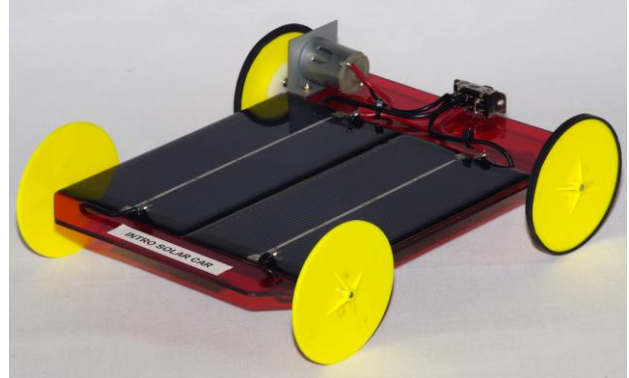
## *INTRO SOLAR CAR (Code: SCRINT)*

### DESCRIPTION

The *INTRO SOLAR CAR* is a four-wheeled vehicle, driven by Scorpio Technology's High Performance electric motor. The power source is two purpose-designed solar panels. Power to the wheels is transferred from the motor by gears. This car will run on a smooth level surface from 25% sunlight upwards.

Each Solar panel produces 2.0 Volts and 0.9 Amps, and they can be connected in series or parallel.

By building and experimenting with this car students will gain a significant insight into renewable energy, and also the advantage of low friction wheels.

**LEVEL:**

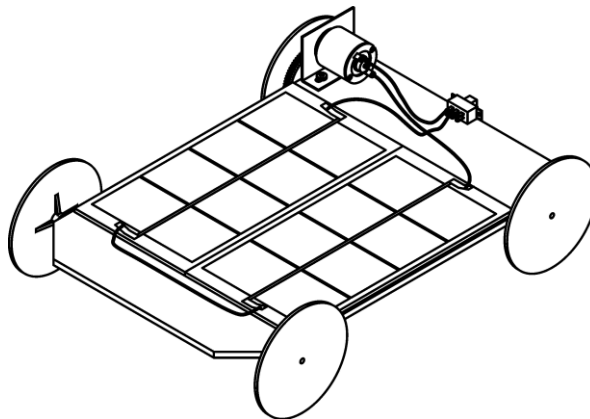
Intermediate

**HOURS TO CONSTRUCT:**

6 - 10 hours

**SKILL DEVELOPMENT:**

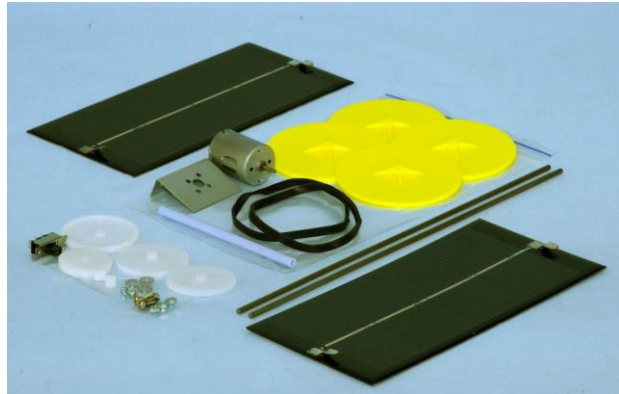
- Planning and Design
- Manufacturing / Assembly
- Soldering
- Mechanical
- Basic Electric Circuits
- Electrical
- Record keeping
- Investigation and Testing
- Testing and Troubleshooting
- Alternative Energy



# OVERVIEW – Intro Solar Car

## WHAT'S IN THE KIT?

- All the mechanical and electrical components required to make the *INTRO SOLAR CAR* work including the solar panels, motor and switch.
- A detailed teaching unit with a complete parts list, design suggestions, general construction guidelines and suggestions for testing the solar cars.



## ABOUT THE PROJECT

The major features of this project are the planning, design, construction and assembly stages of a simple solar vehicle.

### DESIGN PHASE

- Create your own unique *INTRO SOLAR CAR* design based on our drawings. Focus on component relationships, rather than dimensions. This provides scope for students to individualise their *INTRO SOLAR CAR* design and increase their engagement in the project.

During the **Design phase**, students will need to:

- Evaluate the suitability of various materials, such as PVC, acrylic, plywood or balsa wood
- Consider if the school has manufacturing processes they could use, such as laser cutting (which allows more interesting shapes than usual), 3D printing, milling machines, etc.
- Determine which gear ratio will be used from the selection of spur and pinion gears provided
- Investigate the possibility of adding steering (front wheel steering, radio control, etc.)
- Determine if forward/reverse operation is desired (additional components will be required such as an additional two way slide switch)
- Take into account weight distribution and ease of operation
- Consider the practical aspects of construction and assembly. For example, clearance for the wheels

### MAKING / CONSTRUCTION

Once the Design process has been completed, the students will be able to start **building their design**. They will:

- Make and assemble the *INTRO SOLAR CAR* platform they have designed
- Mount the 2 x solar panels, motor, switch, axles and wheels on to the platform
- Wire up and solder the solar panels, motor and switch
- Test and adjust the *INTRO SOLAR CAR*
- Troubleshoot any problems!

# OVERVIEW – Intro Solar Car

## DOES THE TEACHING UNIT INCLUDE ANY THEORY?

The Teaching unit has a THEORY section that covers

- How solar panels (photovoltaic cells) work
- Temperature effects on the power produced by solar panels
- The effect of joining 2 solar panel arrays in parallel
- How to calculate speed and acceleration
  - o average speed
  - o acceleration
  - o end velocity

In addition:

- In the Testing section there is information on: How the sunlight angle can affect sunlight level on a solar panel
- The Design section looks at Energy use and Energy losses

## WHAT ELSE IS NEEDED?

The following items are required in addition to the kit and must be supplied by the maker – some are available from Scorpio Technology, but need to be ordered separately:

ADDITIONAL REQUIREMENTS	ORDERING CODE
Material for the platform (plastic and plywood are both suitable) – refer the Design section for more	---
Multi strand hook-up wire in assorted colours	WIREHU10

**NOTE:** other items such as a small sliding switch, steering components etc will only be required if you choose to incorporate them in your design (Refer Section 3: Design).

## TOOLS REQUIRED

The following tools are required. Some are available from Scorpio Technology, and can be ordered separately if required:

REQUIRED TOOLS	ORDERING CODE
Assorted hand tools (depending on materials used)	---
Hammer	HAMMERC/HAMMERCL
Ruler, tape measure and pen	-
Craft knife	CRKNF
Hacksaw with a fine toothed blade (18 TPI upwards)	---
Scroll saw or hand saw	---
Soldering Iron and Soldering iron stand: – a good quality soldering iron, with a fine tip	SOLDIRN SOLDIRNSTD
<b>or</b> Soldering station	SOLDSTN
Solder: – 0.71mm 60/40 solder is recommended	SOLD500
Wire strippers	WIRESSTR
Side cutters	SIDECUT or

## **OVERVIEW – Intro Solar Car**

	SIDECUTMIN
Drill (either powered or a hand drill)	---
Drill bit 3.0mm	DB3.5
Screwdrivers: <ul style="list-style-type: none"> <li>○ Phillips head #1 point for screws</li> <li>○ Phillips head #2 point for bolts</li> </ul>	SCREWDRPH1/80 SCREWDRPH2/100
Spanner or Multitool for 3mm nuts	--- or MULTITOOL
Single sided tape / fabric tape / masking tape	TAPESS / TAPEGFW / -
Double-sided adhesive tape (or can use hot glue)	TAPEDS
Hot glue gun	GLUEGUN
Glue sticks – 11mm – Pack of 5	GLUESTK
Flat smooth cut file (for de-burring steel rod ends)	---
Sanding block and sandpaper – 180 – 220 grit	---
Disposable Gloves – Latex or Nitrile (for handling fibreglass)	468405 / 468417
Safety glasses	LWSN150

### **ADDITIONAL / USEFUL EQUIPMENT FOR TESTING**

Multimeter with probes or banana plugs	MULTIM / MULTIM1527
A calibrated solar panel or Sunmeter - to use with a multimeter to show the percentage of sunlight at any given time	SOLAR10 Or SUNMETER10
Stopwatch	STOP
Tape measure – 30m (or whatever length desired)	TAPEM30



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Issued: 29 February 2024

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