

# **OVERVIEW**

# STOMPER (Code: STOMPER)

## DESCRIPTION

The *STOMPER* is a six legged device that is driven by two electric motors through a number of gears. It is controlled by two two-way switches, each controlling the legs on one side.

This project requires the student to build a STOMPER – a simple robotic device. The student will learn and use a variety of skills – in marking out, cutting materials, drilling, assembling and soldering.



#### LEVEL: HOURS TO CONSTRUCT: SKILL DEVELOPMENT:

- Intermediate 16 - 22 hours
- Planning and Design
  - Manufacturing
- Soldering

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- Mechanical
- Electrical
- Testing and Troubleshooting





# **OVERVIEW** – Stomper

### WHAT'S IN THE KIT?

- □ All the mechanical and electrical components required to make the *STOMPER* work including motors, gears and switches.
- A detailed teaching unit with a complete parts list, design suggestions, general construction guidelines and suggestions for testing.



## **ABOUT THE PROJECT**

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

#### DESIGN PHASE

□ Create your own unique *STOMPER* design based on our drawings. This provides scope for students to individualise their *STOMPER* design, particularly the external shape, legs and hand-held control unit, 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
  - consideration should be given to how the materials interface with each other with respect to friction and how this can be addressed by design (eg. introducing nylon washers or bushes, lubricant, etc.)
- □ Evaluate available technologies that can be used, for example:
  - 3D printer
  - o milling machine
  - laser cutter (which allows more interesting shapes than usual)
- $\hfill\square$  Determine the component and hole locations
- Evaluate and experiment with various driving links to the design of those provided
- Evaluate the possibility of a infra-red remote control unit
- $\hfill\square$  Evaluate the ergonomics of the handheld control unit
- □ Take into account weight distribution and ease of operation
- □ Consider the practical aspects of construction and assembly. For example, the length of the wires for the control unit to avoid tangling

#### MAKING / CONSTRUCTION

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

- Prepare a jig to make assembly of gears simpler (recommended) or Construct a tool for pushing the gears and retainers along the shafts
- □ Manufacture and assemble the *STOMPER* side panels they have designed
- $\hfill\square$  Assemble the gears and shafts and motor mounting bracket on the side panels
- $\hfill\square$  Assemble and mount the motors

- $\hfill\square$  Join the side panels
- $\hfill\square$  Cut out and assemble the control unit
- $\hfill\square$  Affix the switches and battery holder to the control unit
- □ Wire up and solder the battery holder, motors and switches
- □ Test and adjust the *STOMPER*
- □ Troubleshoot any problems!

## DOES THE TEACHING UNIT INCLUDE ANY THEORY?

The Teaching unit does not have a THEORY section.

### 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
Multi strand hook-up wire in assorted colours	WIREHU10
2 x AA Batteries (available in packs of 4 or 40)	BATTAA or BATTALK or BATTALK40
Material for the parts manufactured by students (PVC or acrylic sheet, etc.). NOTE: For our prototype, we used PVC sheeting, of 1.5mm, 3.0mm and 4.5mm thicknesses.	
Glue sticks – 11mm – Pack of 5	GLUESTK
1mm thick plastic sheet to prevent gear being damaged when being damaged when drilling (optional)	
A small piece of hardwood (40x60x150mm) with 3mm diameter holes drilled to varying depths to act as a jig (recommended)	
1.5-2mm thick piece of steel to construct a hand tool for assembly (approximately 20mm x 80mm)	

### **RECOMMENDED SPARES**

We recommend the following spares when buying class sets of kits to replace parts damaged or lost by students:

ITEMS	ORDERING CODE
All Spur gears (packs of 10 or packs of 50 available)	GEAR30/10/2.4, GEAR60/10/2.4
All Pinion gears (packs of 10 or packs of 50 available)	GEAR12/2.4
Worm gears (packs of 10 or packs of 50 available)	GEARWORM

## **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	HAMMERCP/HAMMERCL



Ruler and pen	-
Craft knife	CRKNF
Soldering Iron and Soldering iron stand:	SOLDIRN
<ul> <li>a good quality soldering iron, with a fine tip</li> </ul>	SOLDIRNSTD
or	
Soldering station	SOLDSTN
Solder: - 0.71mm 60/40 solder is recommended	SOLD500
Wire strippers	WIRESTR
Side cutters	SIDECUT or
	SIDECUTMIN
Mini Bolt Cutters	BOLTCUTM
Hot glue gun	GLUEGUN
Flat smooth cut file (for de-burring steel rod ends)	
Sanding block and Sandpaper- 180 – 220 grit	
Drill (either powered or a hand drill)	
Drill bit 2.3mm	DB2.3
Drill bit 2.6mm	DB2.6
Drill bit 3.0mm	
Philips Head Screwdriver #1 point for screws	SCREWDRPH1/80
Philips Head Screwdriver #2 point for bolts	SCREWDRPH2/100

## **ADDITIONAL / USEFUL EQUIPMENT**

Heat gun (if using hot glue gun) – for softening hot glue	TH1609
for repositioning or removal of components	or
or	0.
Hairdryer	

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