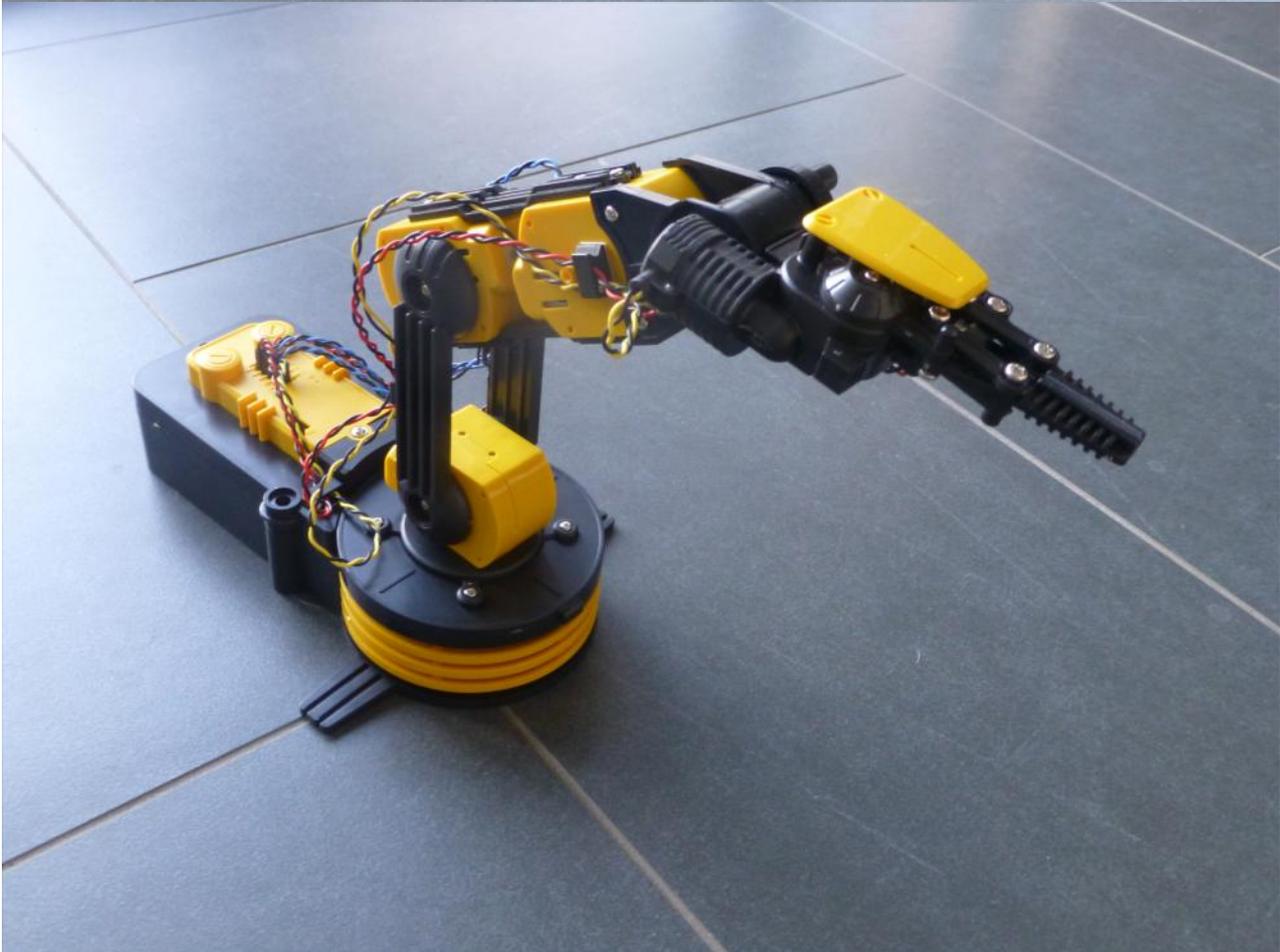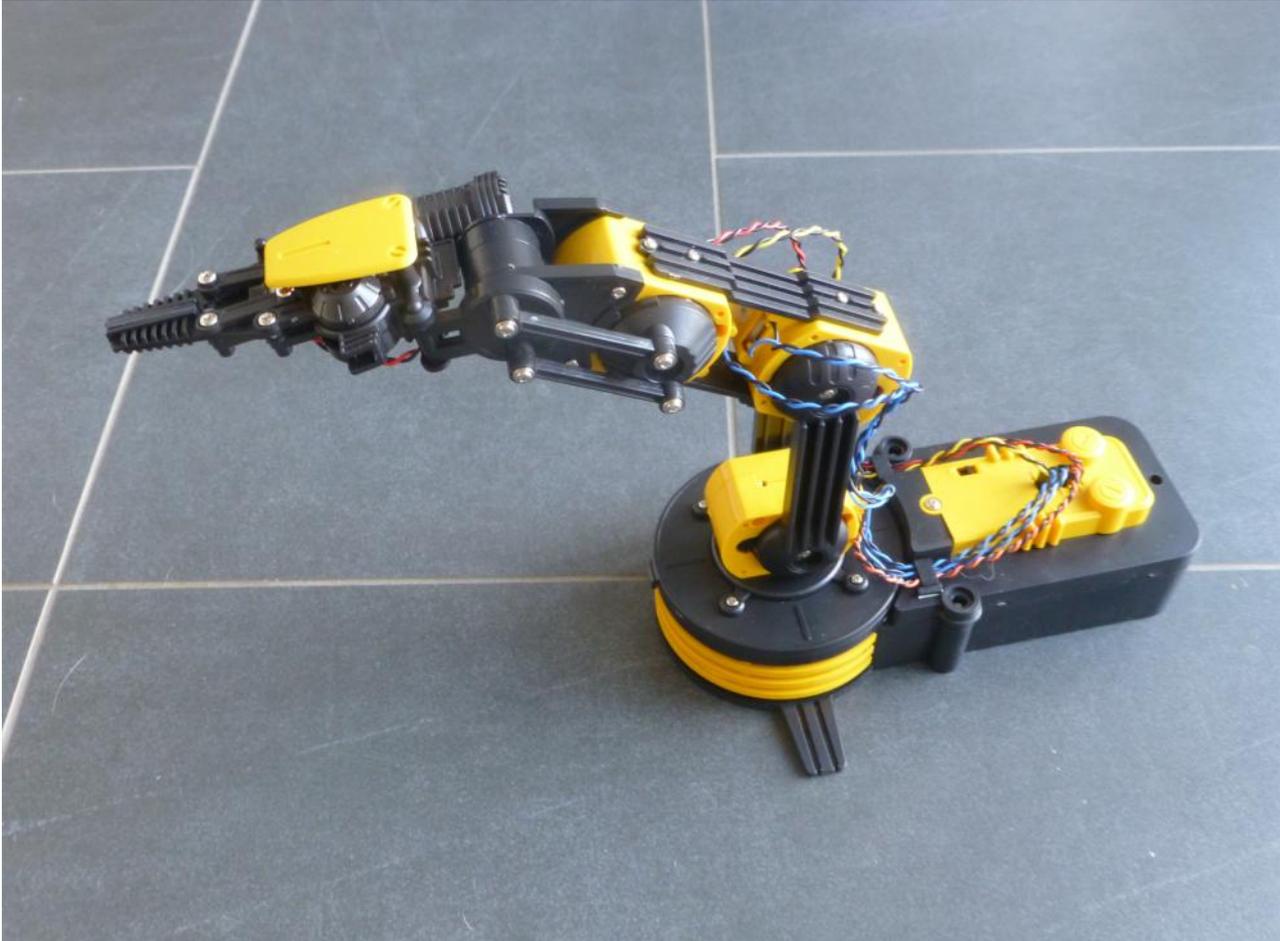# The CIC Taiwan Robot Arm
Sold in the UK by Maplin

The CIC Taiwan Robot Arm
Sold in the UK by Maplin

This very popular robot arm kit is supplied in the UK by Maplin at a current list price of £49.99 but is usually on offer at around £30.   For those wanting to learn a bit about how a robot works, particularly young teenagers this is **a very good buy at the offer price**.   It is a comprehensive kit with accurate plastic components and adequate, visual only, instructions. Five to ten hours would be typical build times.   There are many small parts and no spare screws so care is required.

The PC software meets 'marketing' aims rather than user interface efficiency but works well.   It allows the arm to be controlled in either a real-time 'BASIC' mode or in a 'PROGRAM' mode.   There are five motors and gearboxes controlling the gripper, wrist, elbow, shoulder and waist motions. As there is significant backlash in the joints the assembled arm feels sloppy. Control is by timing motor runs with a displayed 0.1 second resolution. The DC (6V) motors are either switched 'on' or 'off' and the inertia of the motors and mechanics results in a significant response lag and overshooting.   This positioning error is inherent as there is no position or more advanced (PID) feedback. It is particularly noticeable in the vertical motions, where gravity slows the lifting motion and speeds up the lowering. So, if the same motor run-time is used for both a 'down' and a return 'up' motion, there is a positioning error of several mm. This means that if the sequence is repeated several times, the arm finishes up lower and lower.   However, the error can be compensated for to some extent by using longer times for the 'up' motions.

Having practiced positioning the arm a few times in BASIC mode, programs can be assembled in the PROGRAM mode and saved to be rerun. Unfortunately, the instructions are not saved in easily-editable, user-friendly text (.txt) files as are many industrial machine control files using G-Code but are coded into a proprietary bytewise data (.dat) format. Never-the-less, these files can be loaded as ASCI strings into a text-type notepad and edited. I have extracted the format required for each motor and the following sheet illustrates these in the form of examples. Using these single line commands it is easy to assemble a sequence of required motions, without constructing files by driving the arm in the error-prone PROGRAM mode. The sequences can be edited, as you go, by saving, loading and running the files. Adjustments to timing can be made to correct for the gravity errors noted above and repetitive sequences assembled by cutting and pasting in the editor.

Although some of my comments above might seem critical and put you off. In fact, **this kit provides excellent fun and learning at a great price** and can be enjoyed by both adults and children, particularly when working together.

Bill Graham

The T-Exchange 5th January 2015

CIC Taiwan Robot Arm - Basic Movement Commands

Firstly open a short (.dat) file that you have made in PROGRAM mode directly into 'Notepad' from the Windows-Start>Accessories> menu.   You will see pieces of code like that shown below under each CIC... heading.

*This CIC.... piece of heading text is required at the start of each file.
You will see that each line is displayed as eight comma-separated values. The first five indicate which motor is being called, the duration and the direction of motion. The next two values are more obscure and need to be included exactly as shown. The apparently odd values of 1, 2, 4, 8, 16, 32, 64 and 128 you will understand if you convert them to binary........The last value needs to be identical to the first (time in centiseconds) without any minus sign.*

M1 Gripper
Open then Close 0.3 sec. each

CIC TAIWAN-ROBOTARM
-3, 0, 0, 0, 0, 2, 0, 3
3, 0, 0, 0, 0, 1, 0, 3

M2 Wrist
Up then Down 0.5 sec. each

CIC TAIWAN-ROBOTARM
0, 5, 0, 0, 0, 4, 64, 5
0, -5, 0, 0, 0, 8, 128, 5

M3 Elbow
Up then Down 0.4 sec. each

CIC TAIWAN-ROBOTARM
0, 0, 4, 0, 0, 16, 16, 4
0, 0,-4, 0, 0, 32, 32, 4

M4 Shoulder
Up then Down 0.6 sec each

CIC TAIWAN-ROBOTARM
0, 0, 0, 6, 0, 64, 4, 6
0, 0, 0,-6, 0, 128, 8, 6

M5 Waist
Twist Left then Twist Right 4 secs each way from centre

CIC TAIWAN-ROBOTARM
0, 0, 0, 0, 40, 0, 1, 40
0, 0, 0, 0,-80, 0, 2, 80
0, 0, 0, 0, 40, 0, 1, 40

WRG - T-Exchange 6th Jan 2015