

Concentric Stepper Motors  
Surface Plasmons Experiment  
Advanced Laboratories  
UCD School of Physics

Two stepper motor modules, type “GS-200” made by S.G.S.-Thomson, are used to derive the required waveform for the windings on each motor. The motors are connected via DIN connectors.

A stepper motor moves one step, which corresponds to a rotation of the motor drive shaft through some angle, on a digital pulse transition to its clock line. Additional digital signals are used to enable and select the direction of the motor.

The two stepper motors used in this experiment are controlled by digital signals to the control lines, compatible with the Digital IO lines on the National Instruments USB 6008 modules. The different control lines are colour coded to indicate which signal they carry. Below is a table showing the digital signals required to control the motors.

Control Line	Action
Blue: Enable both motors (E)	1: enable 0: disable  Motors should be enabled before direction selected.
White: Direction of both motors	1: clockwise (CW) 0: counterclockwise (CCW)  After selecting direction a delay of 100 ms must follow.
Green: Clock1 (Ck1)	Advance motor 1 one step on transition from 1 to 0  A short delay (~ms) is required between each transition.
Orange: Clock2 (Ck2)	Advance motor 2 one step on transition from 1 to 0  A short delay (~ms) is required between each transition.

The general operation of the motors is:

- Enable motors
- Select direction
- Delay of 100ms
- Send series of clock pulses (1s and 0s alternately) with appropriate delay to move desired amount.
- Disable motors

The motors are connected to the turntable via gears and the angle the turntable rotates with each motor step must be calibrated.