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An Explanation of Major Components of Drawbot

Stepper motor is a device that converts electric impulses into discrete rotational movements called "steps". There are electromagnetic teeth that surround an magnetized gear with a shaft at the center. When a electromagnet is powered and becomes polarized, the gear is forced to rotate in the direction of attraction and away from the repulsion. The direction of rotation is controlled by powering the electromagnets in a proper sequence. The speed of the motor is directly related to the frequency of the electromagnet sequence. Stepper motor is appropriate for Drawbot because the speed of rotation, degrees of rotation, and direction can be precisely controlled by using a microcontroller.

Arduino is the brain of Drawbot. Arduino acts as a microcontroller that controls motors according to the code loaded onto the chip. Arduino UNO with ATmega168 chip is used to operate two stepper motors in Drawbot. Arduino chip functions by sending out digital and analogue output through designated pins to control gates on the motor shield and its H-bridge. Stepper motors can be operated and controlled automatically by using an arduino microcontroller.

Code is loaded onto the microcontroller chip on arduino. Arduino functions based on the code mounted on its chip. The direction, speed, and degree of rotation are determined by the programmed code on arduino chip. Since Drawbot traces out different shapes by controlling the direction, speed, and degree of rotation of two stepper motors, code is an crucial part of

Drawbot. Different codes are used to make Drawbot trace different shapes.

Motor shield acts like the nerve system in human body. It takes outputs from arduino and directs them to proper output gates where stepper motors are wired to the motor shield. H-bridge on the motor shield enables efficient and easy way to control stepper motors. H-bridge is comprised of four integrated switches that open and close in a pattern to power stepper motor's electromagnets in a proper sequence. Motor shield also provide a way to supply external power source to stepper motors that require higher voltage. In addition, Motor shield acts as a protection against possible electric shortages or overheat. Since Drawbot uses two 24V DC stepper motors that require external power supply and arduino microcontroller, motor shield is very helpful in providing efficient and easy way to build a connection between stepper motors and arduino microcontroller.

Power supply is an essential part of Drawbot. It powers arduino microcontroller and motor shield. A 5V DC power adapter is used to power Arduino through its external power connection port. In addition, an adjustable power supply is used to provide 24V DC to the motor shield because 5V output from Arduino is not sufficient to power 24V DC stepper motors. Therefore extra power supply is necessary to provide enough voltage to operate stepper motors.