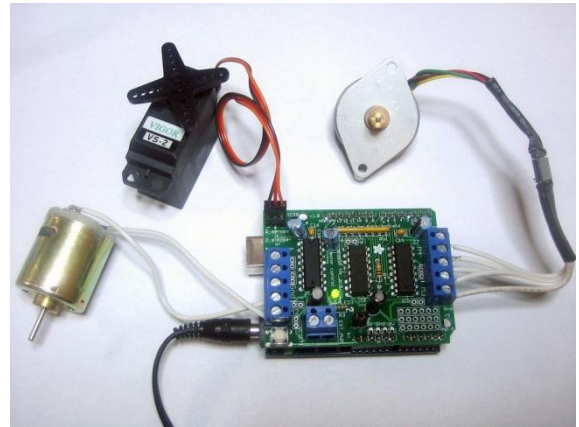


Explaining the Stepper Motor

A stepper motor rotates in fixed, equal intervals. Furthermore, its programmable nature makes it versatile; the stepper motor is used in printers, banking systems, sorters, and much more. Such a myriad of applications mandate the understanding of its use.

Stepper motors move when given an external voltage. This voltage acts to charge one of the electromagnets that lie within the motor, causing a change in magnetic polarity and the production of a magnetic flux. The teeth within the rotor then become momentarily polarized, causing the teeth to move “one step” to orient itself with the charged electromagnet. An inner gear will then simultaneously move “one step,” providing the motion that makes stepper motors so useful.



In order to manipulate a stepper motor, it is imperative to manipulate the current flowing through the motor. Firstly, the proper activation order of the electromagnets must be found; current must be experimentally run through the stepper motor’s wires until the order with which the wires must be charged is found. Furthermore, the reverse charging of these wires will provide a step-by-step movement of the motor in reverse direction. Hence, current

must be directed into these wires in such an order to get the motor to move either clockwise or counterclockwise.

The flow of current into the wires is controlled by the motor shield; the motor shield and stepper motor must be connected. The flow of current can easily be verified by the LED attached to the motor shield. The LED will light up as a current runs through it, and this current will then be directed directly to one of the stepper motor's wires. In order to control the voltage flow, the motor shield utilizes a set of on/off switches. Based on the binary output given by these switches, the motor shield will then direct the voltage into a corresponding wire. The state of these switches is controlled by an arduino.

The arduino that controls the motor switches is directly connected to the h-bridge of the motor shield. This arduino runs code that provides the motor shield with instructions on how to set its switches. In particular, the code used for running a stepper motor must include stepper speed, orientation, and count. Hence, the arduino respectively instructs the speed of changing switches, whether the ordered charging of the stepper motor is forward or reversed, and the number of switch changes that are undergone. As a result, the arduino ultimately allows for the easy manipulation of the entire stepper motor system.