

Major Components of System: *What are they and Why are they Necessary?*

- 1. Arduino:** An Arduino is a simplified microcontroller board. The original design includes all the electronic components necessary to power and communicate with the microcontroller; these components are a regulator, a clock crystal, an USB-to-serial interface, and a SPI programming interface for replacing the bootloader. An arduino is seen useful because of its inexpensiveness and accessibility. Since it is an open source program, anyone can add to the arduino language (C++). In addition, an arduino's program can act as the "brain power" to the system, allowing more control on motor movement that cannot be achieved manually.
- 2. Stepper Motor:** A stepper motor is a brushless DC electric motor that can divide a full rotation into a large number of steps. The motor's position can be controlled precisely without any feedback mechanism as long as the motor is carefully sized to the application. The outlying wires can be formed in one of the following ways: 4, 5, 6, and 8. An advantage of having a stepper motor is that one can achieve finer motion (or more precise motion) since the stepper motor's motion is divided by a finite amount of steps. In other words stepper motors is ideal for positioning, from its ability to control its torque.
- 3. Powersupply:** A power supply is a device that supplies electrical energy to one or more electric loads. The term is most commonly applied to devices that convert one form of electrical energy to another, though it may also refer to devices that convert another form of energy such as mechanical, chemical, or solar. A power supply is important in first applying the power/voltage necessary to a specific system. In addition a powersupply is

able to restrict or control the applied voltage to a system. This function is really important so the motor does not receive overcapacity voltage and burn itself out. In addition having a stable reading allows the user to be aware of the voltage being applied, thus helping in creating a safe environment for the system.

- 4. Motorshield:** The Arduino Motor Shield allows you to easily control motor direction and speed using an Arduino. It also allows you to be able to power a motor with a separate power supply of up to 12V without burning the Arduino out. In other words, the motorshield acts as a voltage protection for the Arduino. In addition the motorshield has several terminals so one can connect stepper motors to an external voltage source. The motorshield creates all of the connections necessary for the Arduino to execute its code and provide some protection.
- 5. Code:** A code is a rule for converting a piece of information into another form. Code is vital because with it will program the Arduino to do something we desire, as without these external “instructions,” the Arduino will not function on its own. The code is usually written externally, in a computer using Arduino 1.0, using C++ and is transferred to an Arduino through a USB cord. The code itself is usually a series of arguments just as in any other kind of computer programming language. The open source nature of writing such information for the Arduino allowed others to develop and evolve the possibilities of the usage of the small microcontroller.