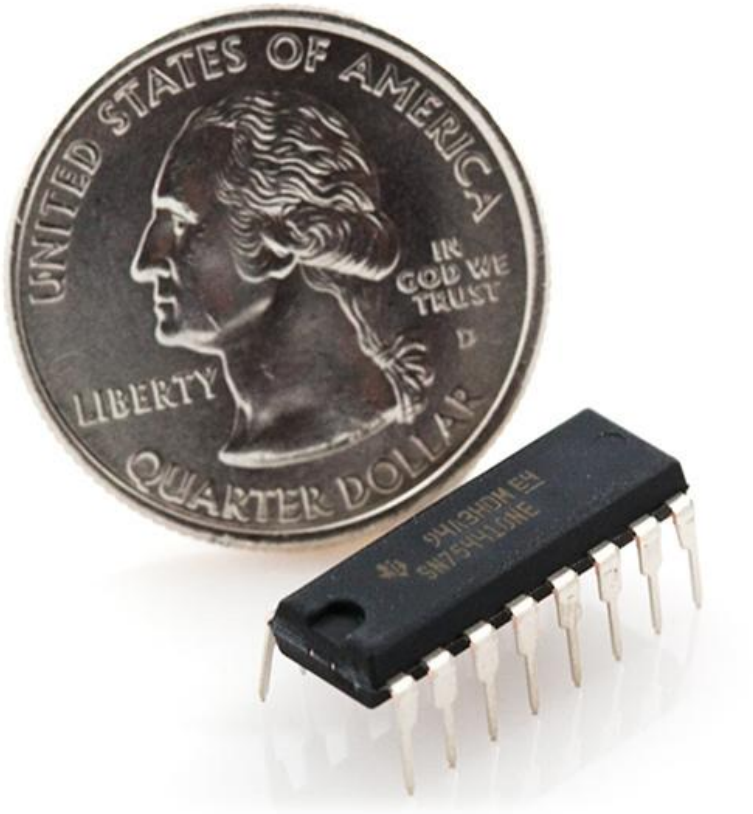
Electronics: SN754410



Today's article focuses on a popular chip that many robotic hobbyists use. Of course I'm talking about the SN754410, or the Quadruple Half H Driver.

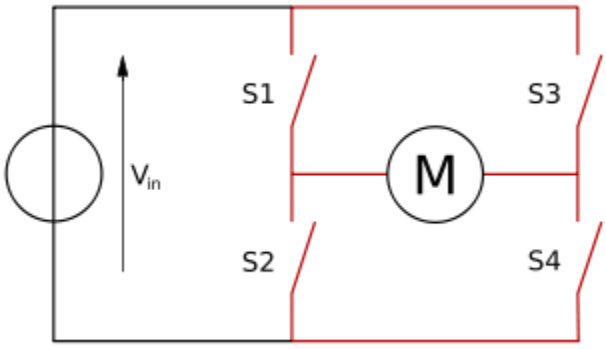


Figure 1: Standard H-bridge Schematic

First things first; what's an H-bridge? As shown in figure 1, an H-bridge is an electronic circuit that allows current to flow in different directions depending on the state of the switches. In fact, the 7 level cascaded inverter project I'm working on is nothing more than levels of H-bridges. When S1 and S4 turn on, the motor's shaft

rotates clockwise, but when S3 and S2 turn on, the motor's shaft rotates counter clockwise. If you want to build your own H-bridge, then you'll most likely implement it using transistors (my recommendation is to use MOSFETs). But, if you're lazy and wish to avoid building the circuit, then you can buy ICs that have one or more H-bridges in one chip. The SN754410 chip is among the plethora of H-bridge chips you can buy with H-bridges already inside.

SN754410 Pins

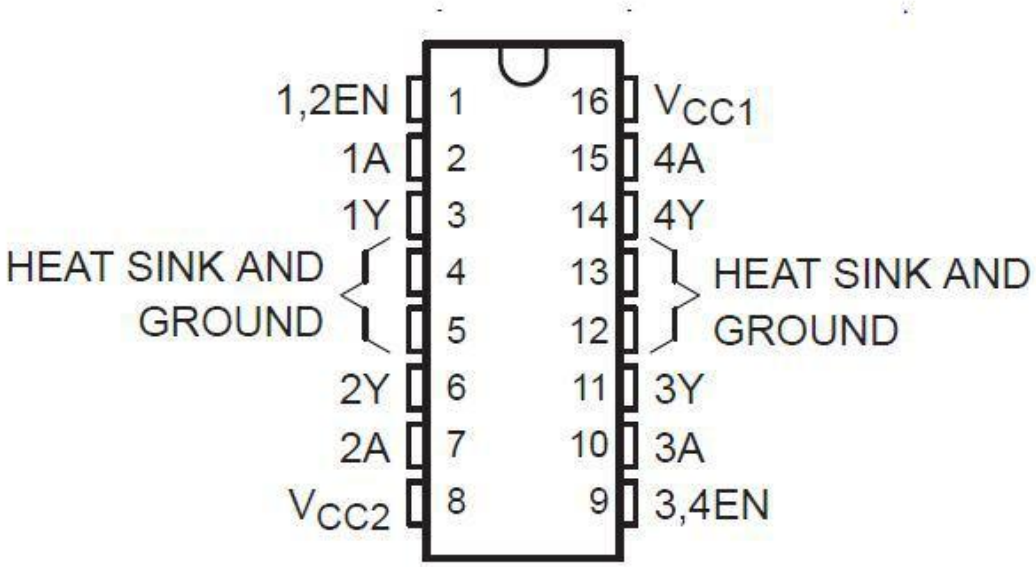


Figure 2: SN754410 Pinout

So let's take a look at the pins of the SN754410, which can be seen in figure 2. I will give a detailed explanation on the purpose of each pin.

1,2 EN(Pin 1) and 3.4 EN(Pin 9) : For the SN754410, you can connect up to two DC motors to the chip, which I'll explain where you connect the motors to on the chip later on. However, to turn on either motor, 4.5-5.5V must be applied to the EN pins. For example, applying 5V to 1,2EN will turn on the motor on the 1, 2 EN side and applying 0 volts to the 1,2EN will turn the motor on the 1,2EN side off. It's possible to apply a PWM (pulse width modulated) signal to the EN pins to control the speed of the motor. Although it will dissipate a lot of power for your motor control project, you can place a pull up/down resistor at the EN pins to prevent the pins from 'floating'. In digital logic, floating pins will cause some unexpected behaviors for your device. The pull up/down resistor will make sure the EN pins have a default state.

1A/2A (Pin 2/Pin 7) and 4A/3A(Pin 15/Pin 10): Any pin that has an A in the name is where you put your digital logic into the chip. The 1A/2A pins controls the motor

connected to left side of the chip while 3A and 4A controls the motor connected to the right side of the chip. The digital logic you put into the chip will determine whether you're the shaft of the motor rotates clockwise, counter clock wise, or stays in position. For the logic pins, it sees a high state when 4.5-5.5V is applied, while it sees low state when 0V is applied.

1Y/2Y (Pin 3/Pin 6) and 4Y/3Y(Pin 14/Pin 11): These pins are where you connect your motors to. 1Y and 2Y are responsible for controlling the motor on the left side of the chip, while 4Y and 3Y controls the motor on the right side of the chip. It's recommended to add a .1uF capacitor to both motors as it will cut down on the motor's noise, which could harm the main controller of your project.

VCC1 (Pin 16)/VCC2(Pin 8): These pins are used to power the chip. Unlike other chips, you cannot power both pins using the same power source. VCC1 should receive 4.5-5.5V since this power the logic gates inside the chip. VCC2 is used to power the motors and can receive up to 36V.

Ground Pins (Pins 4,5,13, and 12): Simply connect these pins to ground (0V) of your power supply.

Example Circuit

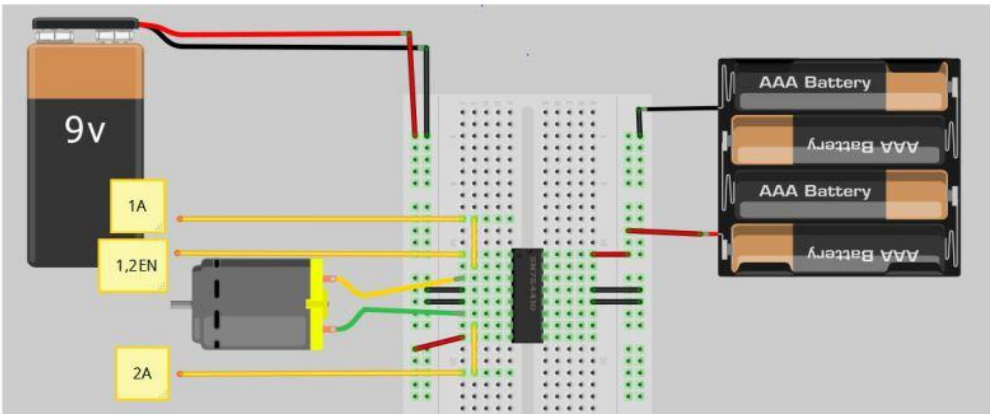


Figure 3: SN754410 example circuit

Figure 3 shows a simple example circuit of the SN754410 running a small DC motor. Please keep this in mind; 9V is a poor power source. Sure, it has a high voltage, but suffers from a small current rating (around 500-750mah). By having a small mah rating, the battery will discharge at a fast rate.The only reason I include a 9V battery in this picture is to show the different power sources necessary to power the chip.

SN754410 Recommendations

Despite the fact this chip can accept motors that require up to 36V, the current it can handle is very limited. This chip can handle up to 1A per side, which can be really limiting. Sure it can handle most of the Pololu's Metal Gearmotors and all of

the Tamiya motors without any problems, but you'll run into problems for beefier motors that requires a higher current. If you need an H-bridge that can run high amperage motors, you can either build one yourself (trust me, it's pretty straight forward) or look into the L298.

Source: http://coolcapengineer.wordpress.com/2012/08/14/electronics-sn754410/