Skill Demo 8: Using transistors and relays

NAME_____   GTID_____

Goals:

Enable control of larger electric devices using a microcontroller through using a transistor to flip a relay. Create a touch sensor by using cascaded transistors (a Darlington Pair) where the first amplifies the signal going to the second. Understand the pinouts, use, and prototyping with transistors and relays. Use the web to find specifications and pinouts of parts.

Read Practical Electronics for Inventors 2000 edition: 129-154

Background:

All videos from Skill Demos 1-7
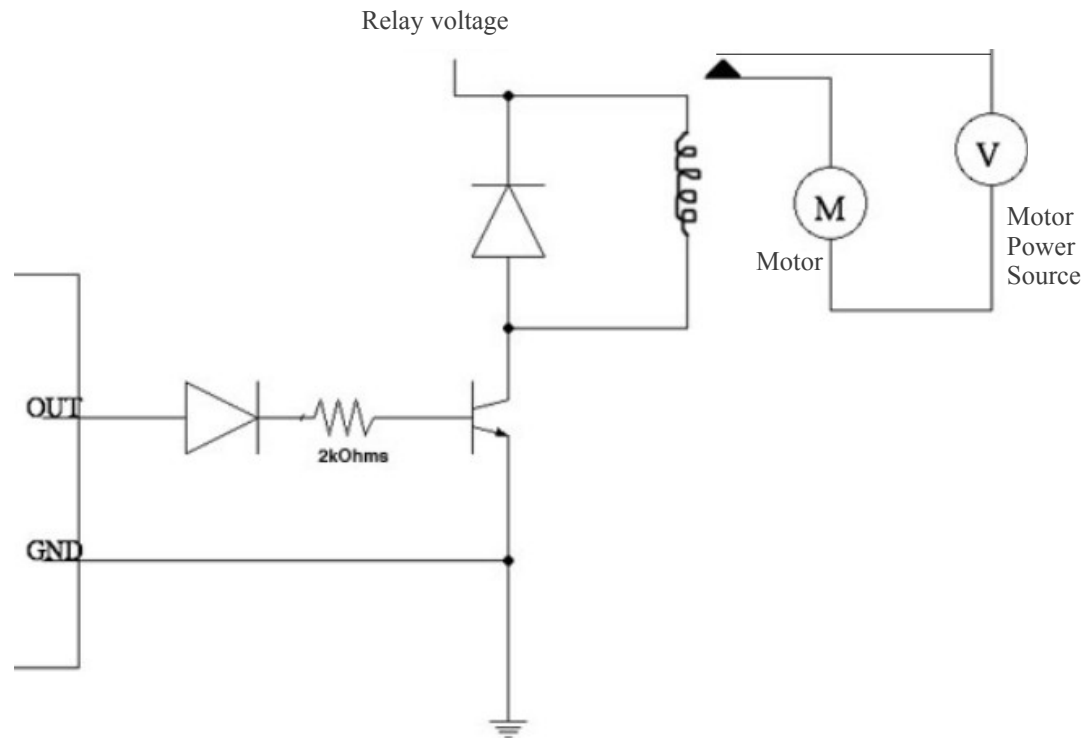CS 3651 - APIA - switches+relays - Part 1/2
CS 3651 - APIA - switches+relays - Part 2/2
CS 3651 - APIA - transistor as switch
CS 3651 - APIA - Using a Darlington Pair to make a touch sensor

Tools/supplies:

two transistors
1 relay
various resistors
diodes
LED
Teensy
laptop
breadboard
USB cable

Demonstrate your ability to control a relay from a microcontroller using a 2n2222 npn transistor so that you have enough current to power the relay's coil. You will have to use the Internet to discover the pinouts and specs of the parts we supplied. For convenience we've bought relays whose coil voltage is 5V (but it could have been 9 or 12V). Measure the voltage drop from

1. The base of the transistor to its emitter: _____

2. The transistor's collector to its emitter: _____

3. Across the relay: _____

4. Explain the use of the two diodes:

Initials_____   Date_____   Time_____

Create a touch sensor using a Darlington Pair (two cascaded transistors). Specifically, create a circuit so that when a finger is placed on the two electrodes, the LED lights up. Note that the first transistor (T1) acts as an amplifier while the second one (T2) acts as a switch.
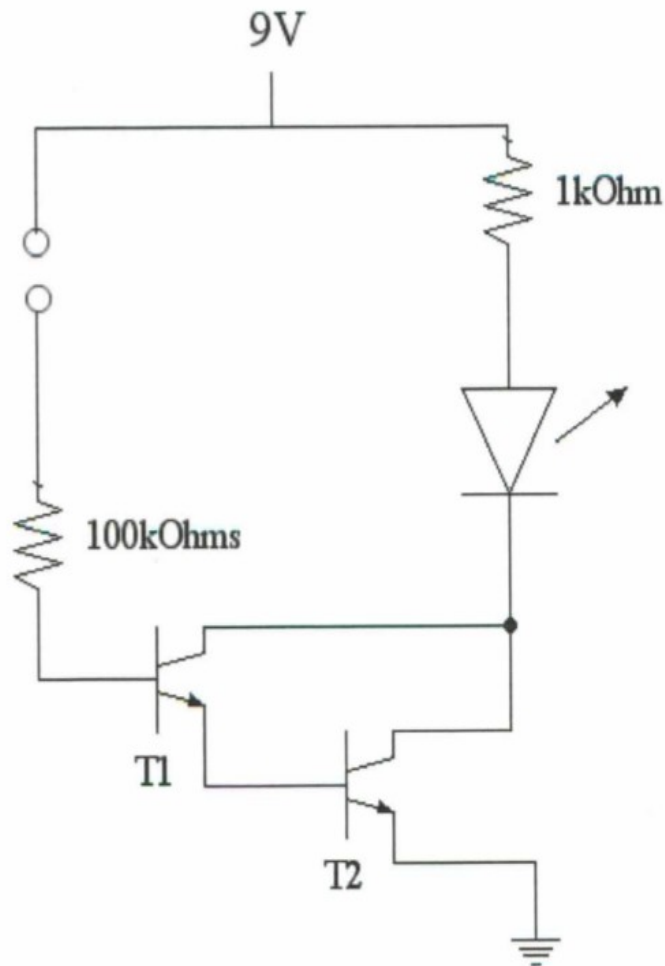
Measure the current at

5.The base of transistor T1: _____mA

6. The base of transistor T2: _____mA

Initials_____   Date_____   Time_____