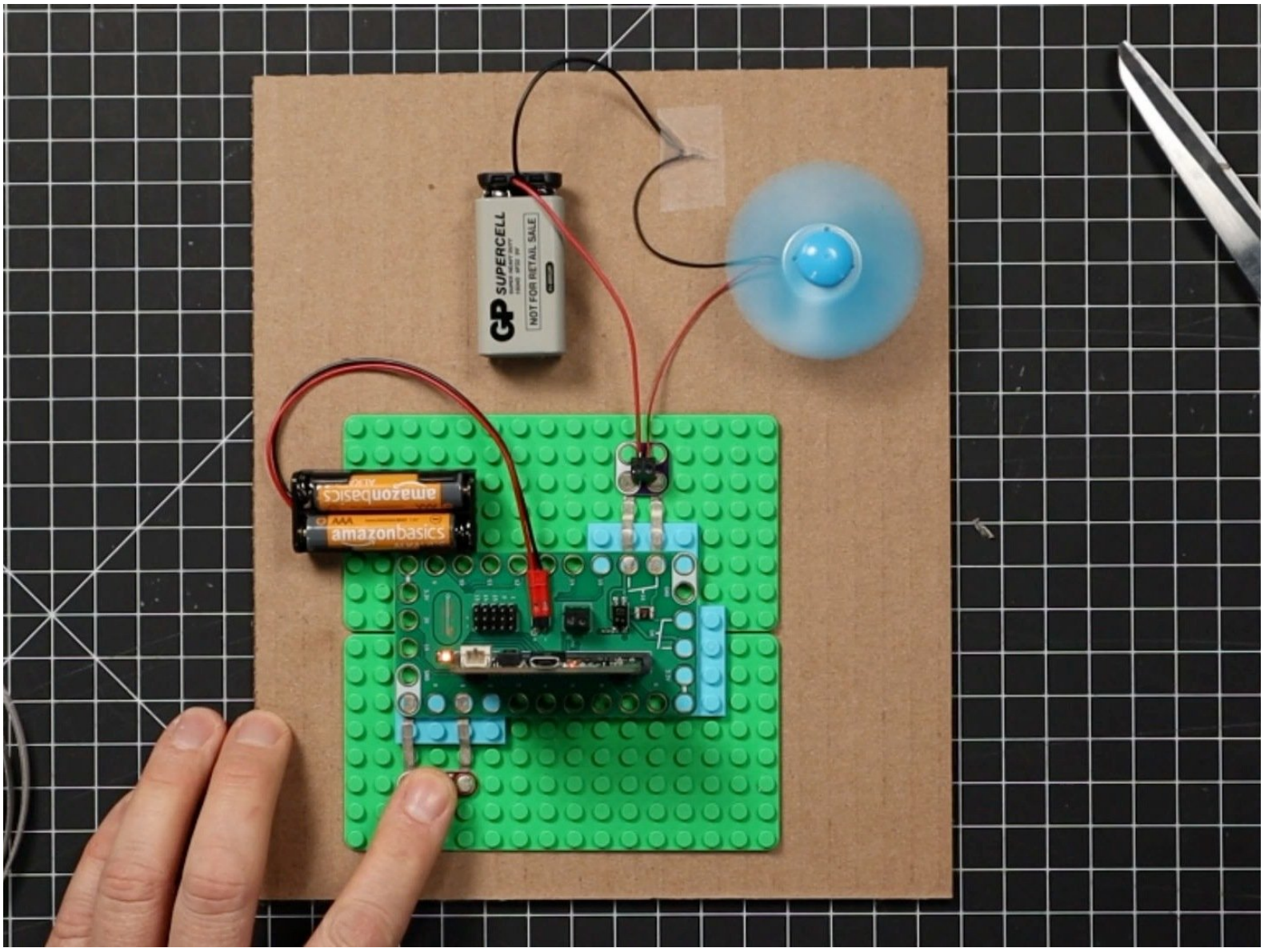
Bit Board V1 Relay

We added a relay to the Bit Board so you can easily control external circuits using the micro:bit.

Written By: Pete Prodoehl



INTRODUCTION

We added a relay to the Bit Board so you can easily control external circuits using the micro:bit. Note that V2 of our Bit Board does not have a built-in relay but you can easily add a Relay Module.

TOOLS:

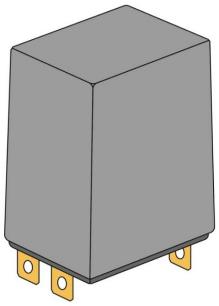
- Computer (1)
- Scissors (1)
- Small Slotted Screwdriver (Flat Head) (1)

PARTS:

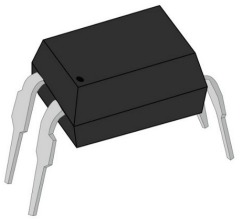
- Crazy Circuits Bit Board (1)
- micro:bit (1)
- Crazy Circuits Screw Terminal Chip (1)

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Step 1 — What is a Relay?



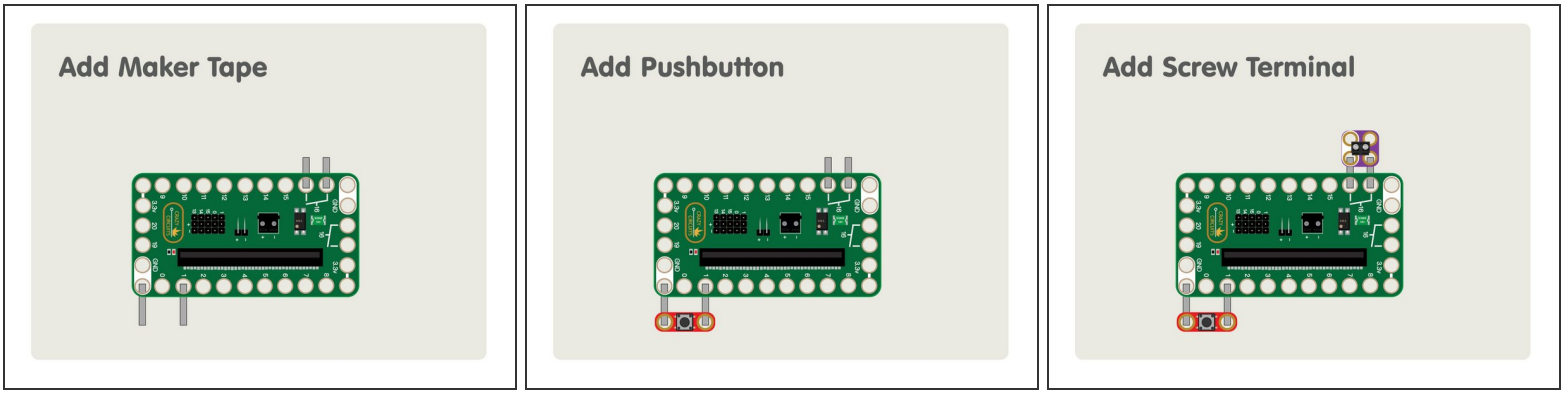
Electromechanical Relay



Optocoupler Relay

- A relay is a basically a switch that can be controlled electrically. Think about how a light switch operates. You use your hand to turn the switch on, and to turn it off. With a switch like a relay you can programatically control it with code based on certain conditions.
- Maybe you want to turn on the switch/relay so it will power on a fan when it gets to warm in your room. With a temperature sensor you can check for a certain temperature and then take action.
- Relays are also used to allow control of a large amount of current with a small amount of current. Car headlights can draw a large amount of current, and could easily melt or damage the switch or wiring that you use to turn them on, so the switch for your headlights controls a relay that can handle the high current of the circuit.
- Some relays are "electromechanical" and use an electromagnet that physically pulls a metal switch closed. Other relay use an optocoupler (or opto-isolators) which consists of an LED and a phototransistor.

Step 2 — Build Your Circuit



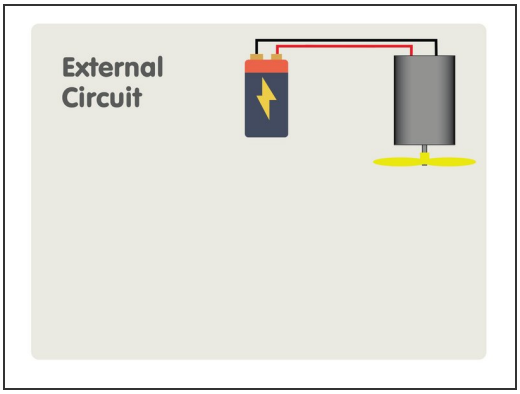
- We'll first build our circuit that will take input from a button and turn on the relay.
- Using Maker Tape connect a pushbutton to **Pin 1** and **GND**. This will be used to tell the micro:bit to turn the relay **on**.
- Connect Maker Tape to one set of the relay connections on the Bit Board, and then add a Screw Terminal.

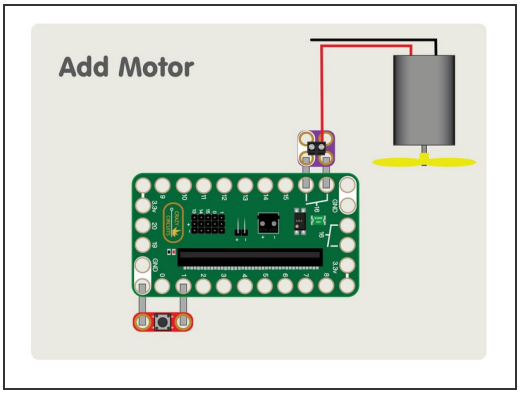
⚠ Don't have a Screw Terminal Chip? Check out our guide for Tape to Wire Connections.

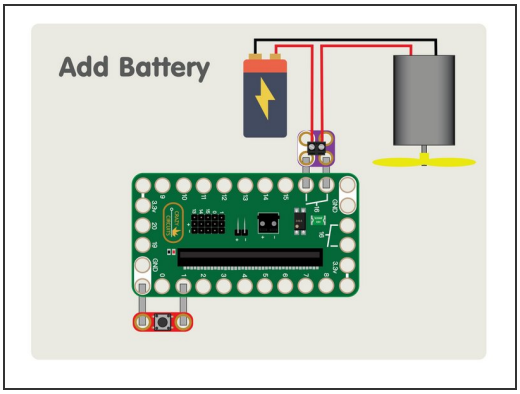
ⓘ Since the relay is a "smart switch" we could use a sensor, or potentiometer, or anything else you can connect to the Bit Board as an input as a trigger. You could even set the relay to turn on and off just using code.

We used a Screw Terminal to make it easy to connect our external circuit, but you can always use the Tape to Wire method as well.

Step 3 — Build Another Circuit

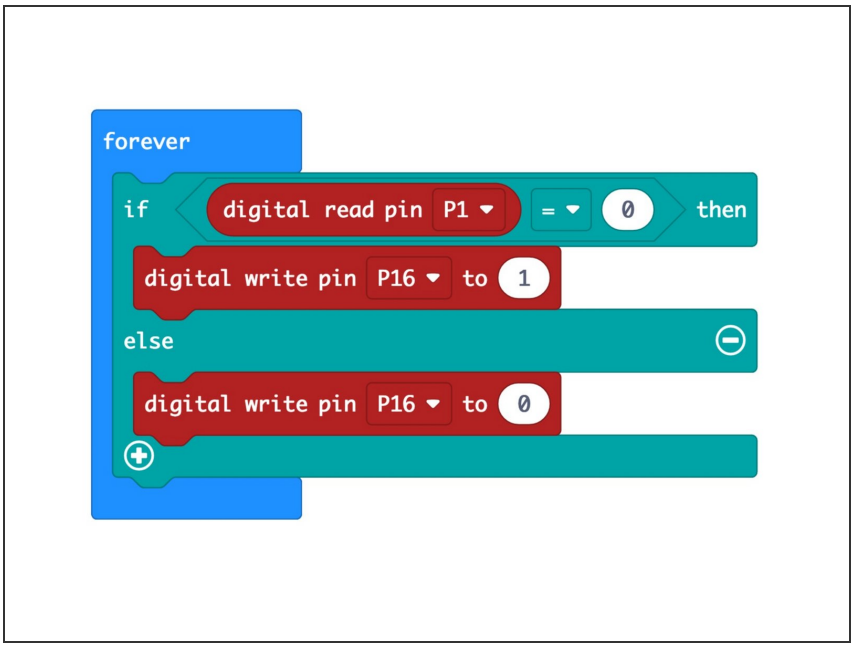






- Our external circuit consists of a battery and a small DC motor with a fan blade attached to it.
- This circuit can exist completely on its own, and the only thing really missing is a switch to turn in on and off, so we'll add one by connecting one side of the circuit to our relay.
- Once we have our motor and battery added and we've connected the wires to the Screw Terminal, we're ready to turn it on!

Step 4 — Trigger the Relay

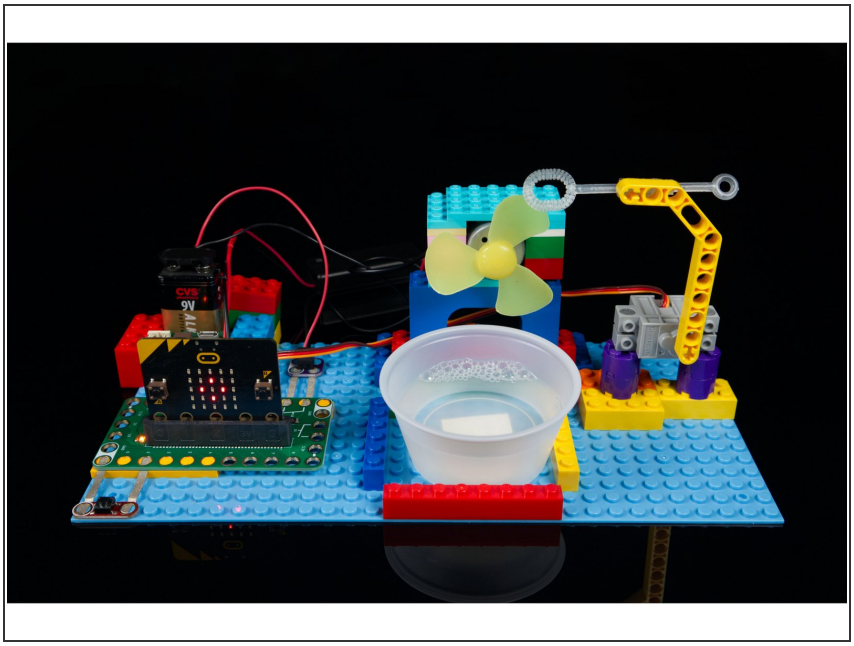


- We like to use makecode.microbit.org to program our micro:bit. It uses a simple drag and drop block interface.
- As you can see in the image, the code is very simple! If you don't want to type it you can get it here: https://makecode.microbit.org/_EzFXpxLy2...

This code is pretty much the same as you would use to turn on an LED. In fact, *it is turning on an LED*, since the optocoupler in the relay uses one to complete the circuit.

Setting Pin 16 to 1 will turn on the relay, and setting it to 0 will turn off the relay. Our "smart switch" really is that simple!

Step 5 — Take it Further



- So what can you do with the Bit Board relay? We built a Bubble Machine that can entertain children and dogs!
- Maybe you want to check a bucket's water level and turn on a pump to remove water if it gets to full. You can do that with a relay.
- Perhaps you want to turn on a set of battery-powered fairly lights when you enter your room? You can use an ultrasonic sensor and a relay to make that happen!
- Think of the Bit Board Relay as a smart switch you can control... it's up to you to come up with some wild ideas. :)