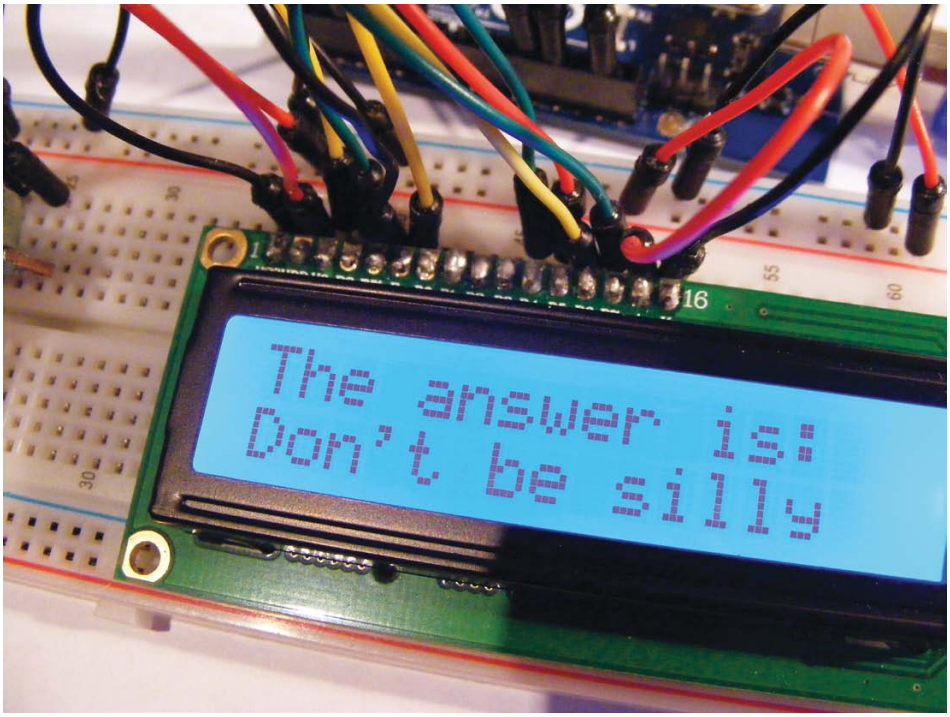
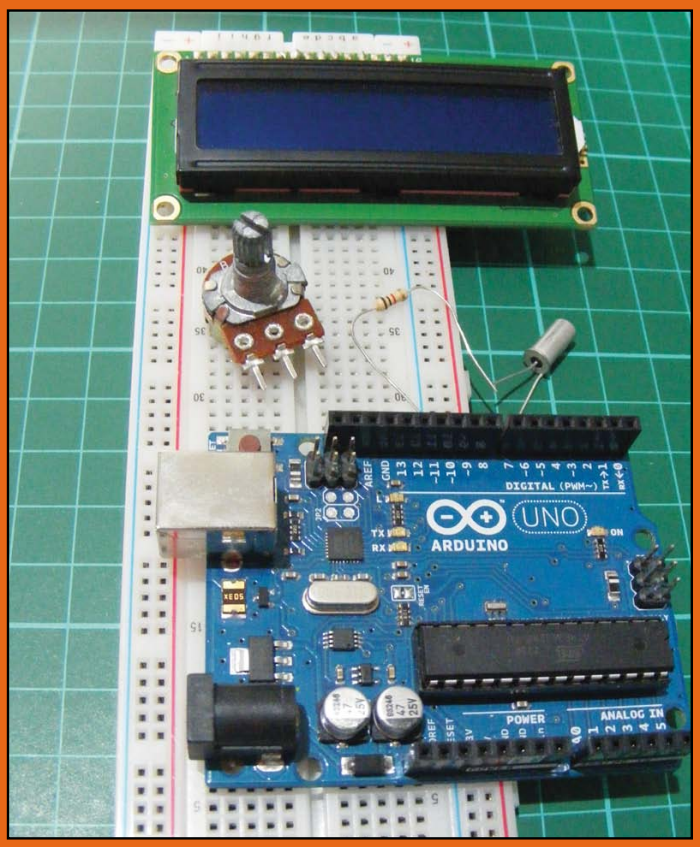
PROJECT 14: FORTUNE TELLER

IN THIS PROJECT, WE'LL CREATE AN ELECTRONIC VERSION OF A CLASSIC FORTUNE-TELLING DEVICE: THE MAGIC 8 BALL.





PARTS REQUIRED

- Arduino board
- Breadboard
- Jumper wires
- 16x2 LCD screen (Hitachi HD44780 compatible)
- Tilt ball switch
- 50k-ohm potentiometer
- 1k-ohm resistor

LIBRARIES REQUIRED

- LiquidCrystal

1 Setup

First you will need to download, unzip, and install the Arduino Integrated Development Environment (IDE) from `https://www.arduino.cc/en/Main/Donate` (does not need admin privileges).

2 How it works

The Magic 8 Ball, a novelty toy created in the 1950s, is made of a hollow sphere in which a 20-sided die floated in alcohol. When you ask the ball a question and shake it, one side of the die floats up and displays your answer in the ball's window. For this project, you'll use a random number generator (a computer version of rolling a die) that will generate a number between 0 and 8 to simulate shaking the ball. In this project you will ask a question, and then press the pushbutton on the circuit to get your answer.

The potentiometer is a variable valued resistor that controls how much electricity will flow to the LCD screen. More electricity = brighter LCD, less electricity = dimmer LCD.

`QUESTION`

How does an LCD screen work? How does a potentiometer work, and when might they be useful? (hint: think of visual and audio related devices)

3 Building The Circuit

The schematics for the circuits you will be building is below. The first schematic is for the LCD screen part, and the second is for the pushbutton. You should substitute the pushbutton circuit where the tilt switch is in the first schematic.

TILT BALL SWITCH	ARDUINO
Leg 1	Pin 6 via 1k-ohm resistor
Leg 2	GND

6. Connect your breadboard rails to the Arduino +5V and GND for power.
7. Confirm that your setup matches Figure 14-3, and upload the code in "The Sketch" on page 122.

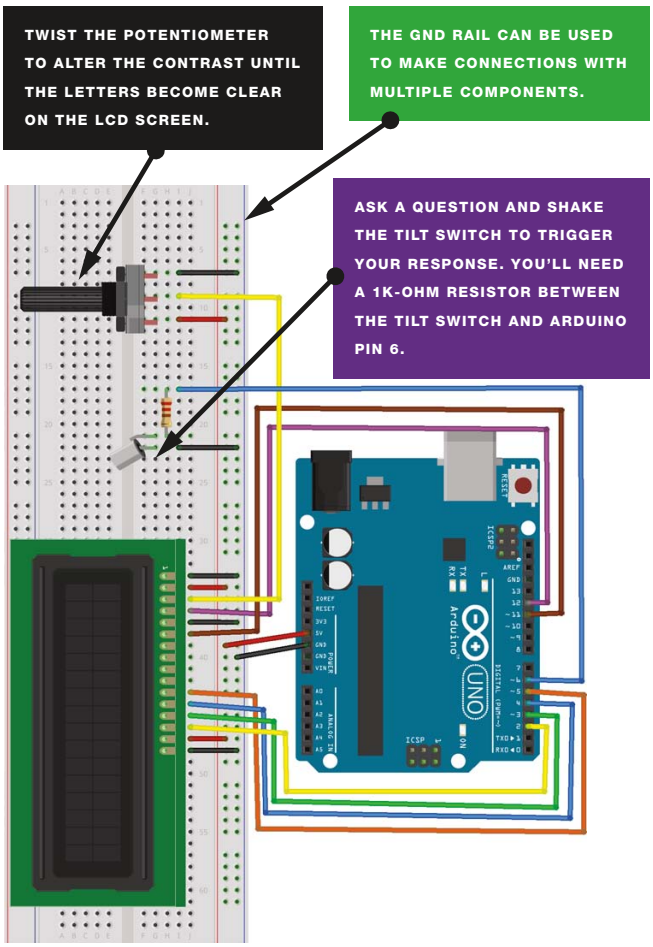
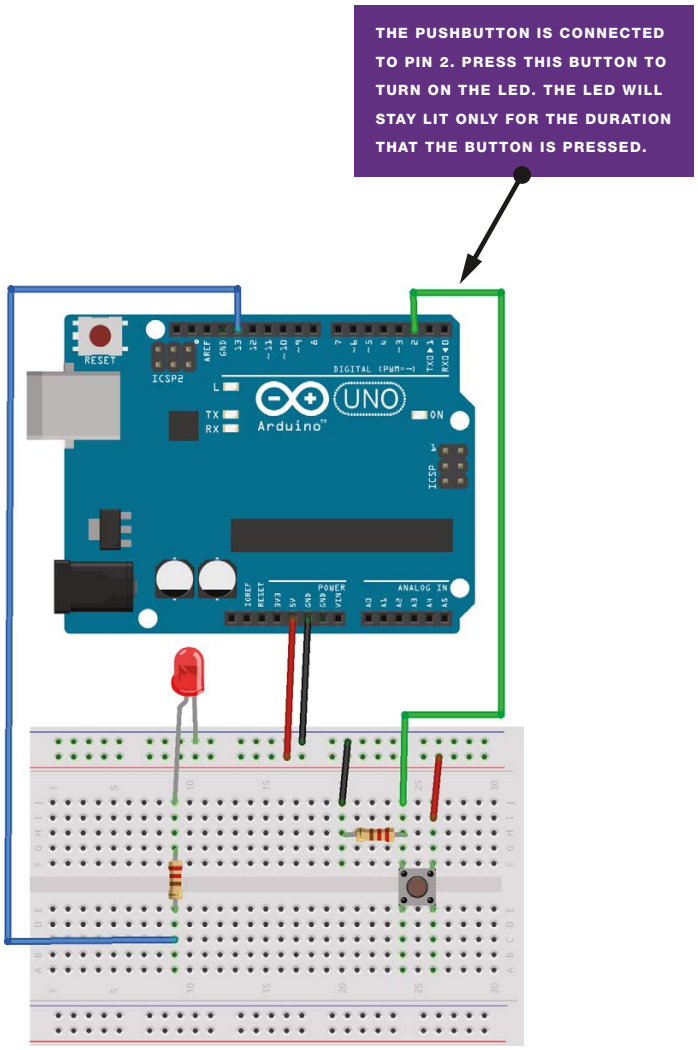


FIGURE 14-3: The circuit diagram for the fortune teller

FIGURE 1-4: Circuit diagram for the pushbutton-controlled LED



4 Programming the Arduino

The base code for programming the Arduino is provided. Using the Arduino IDE, open the `.ino` file.

`PAUSE`

The IDE allows you to do 4 things: edit the code, verify the code is correct (i.e. does not contain

syntax errors), upload the code to the Arduino, and view the diagnostic output of things as they run on the Arduino.

Uploading to the Arduino is easy! Just click the Upload arrow in the IDE.

5 The fortune teller code

The fortune teller comes with a stock set of responses, you may want to change them to be something more to your liking. You can modify what is between the quotes in the `lcd.print()` lines of the code. `lcd.print()` is a *function*, meaning that it is a helper that you can ask to do something for you. In this case, you are asking it to tell the LCD screen to print something specific for you.

The main part of the code is the `switch()` statement, which controls what the fortune teller's response will be. Each time a new random number is generated (i.e. the computerized die is rolled), the resulting number is put into one of the 8 "boxes" of the switch statement. The switch statement acts as a set of boxes at a candy store: each type of candy that comes it for an employee to stock has to be put in its correct box, and the contents of the boxes can't be mixed, or the customers will be unhappy. The `switch()` statement does the same thing in the code!

6 Extending The Code

Once you have the fortune teller working to your liking try the following:

- Increasing the number of fortunes from the original 8 to 10 (for example).
- Change the code so that you have to HOLD the pushbutton while asking your question, and then release it to get the answer.