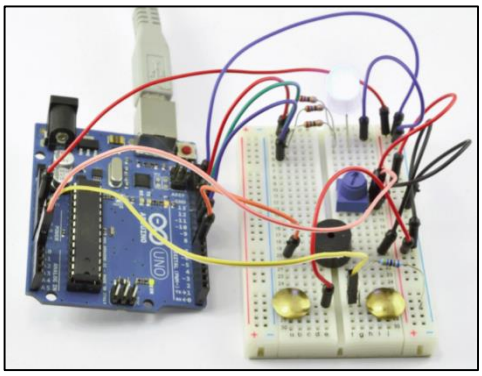
LIE DETECTOR

Are you sure that your friends are telling the truth? There is easy way how to find it out.



This lie detector uses an effect known as *galvanic skin response*. As a person becomes nervous his or her skin resistance decreases. We can measure this resistance using an analog input and use an LED and buzzer to indicate an untruth.

We use a multicolor LED that will display:

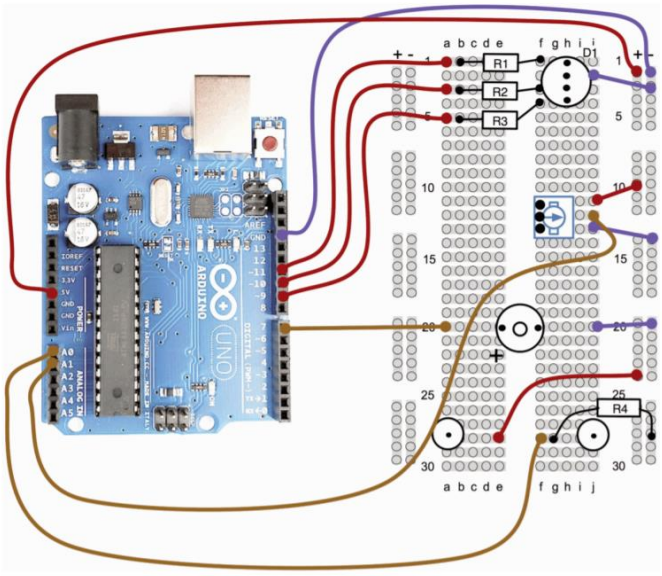
-red → lie
-green → truth
-blue →lie detector should be adjusted by twiddling the variable resistor

COMPONENTS AND EQUIPMENT

	Description	Appendix
	Arduino Uno or Leonardo	m1/m2
R1-3	270 Ω, 0.25 W resistor	r3
R4	470 kΩ, 0.25 W resistor	r9
R5	10 kΩ trimpot	r11
D1	RGB LED (common cathode)	s7
S1	Piezo buzzer	h21
	Thumbtacks	
	Solderless breadboard	h1
	Jumper wires	h2

HARDWARE

The subject's skin resistance is measured by using the subject as one resistor in a potential divider and a fixed resistor as the other. The lower the subject's resistance, the more analog input 0 will be pulled toward 5V. The higher the resistance, the closer to GND it will become. The piezo buzzer, despite the level of noise these things generate, is actually quite low in current consumption and can be driven directly from an Arduino digital pin.



The variable resistor is used to adjust the set point of resistance, and the touch pads are just two metal thumbtacks pushed into the breadboard.

SOFTWARE

The script for this project just has to compare the voltage at A0 and A1. If they are about the same, the LED will be set to green. If the voltage from the finger sensor (A0) is significantly higher than A1, the variable resistor will indicate a fall in skin resistance, the LED will change to red, and the buzzer will sound. On the other hand, if A0 is significantly lower than A1, the LED will turn blue, indicating a rise in skin resistance.

The buzzer requires a frequency of about 5 kHz to drive it. We accomplish this with a simple for loop with commands to turn the appropriate pin on and off with delays in between.

Putting all together

Load the completed sketch for Project 26 from your Arduino Sketchbook and download it to the board.

To test the lie detector, you really need a test subject because you will need one hand free to adjust the knob. First, get your subject to place two adjoining fingers on the two metal thumbtacks. Then turn the knob on the variable resistor until the LED turns green. You may now interrogate your victim. If the LED changes to either red or blue, you should adjust the knob until it changes to green again and then continue the interrogation.

```
int redPin = 11; // todo paste in
                 // modified sketch
int greenPin = 10;
int bluePin = 9;
int buzzerPin = 7;

int potPin = 1;
int sensorPin = 0;

long red = 0xFF0000;
long green = 0x00FF00;
long blue = 0x000080;

int band = 10;
  // adjust for sensitivity

void setup()
{

  pinMode(redPin, OUTPUT);
  pinMode(greenPin, OUTPUT);
  pinMode(bluePin, OUTPUT);
  pinMode(buzzerPin, OUTPUT);
}

void loop()
{
  int gsr = analogRead(sensorPin);
  int pot = analogRead(potPin);
  if (gsr > pot + band)
  {
    setColor(red);
    beep();
  }
  else if (gsr < pot - band)
  {
    setColor(blue);
  }
  else
  {
    setColor(green);
  }
}


void setColor(long rgb)
{
  int red = rgb >> 16;
  int green = (rgb >> 8) & 0xFF;
  int blue = rgb & 0xFF;
  analogWrite(redPin, red);
  analogWrite(greenPin, green);
  analogWrite(bluePin, blue);
}

void beep()
{
  // 5 Khz for 1/5th second
  for (int i = 0; i < 1000; i++)
  {
    digitalWrite(buzzerPin, HIGH);
    delayMicroseconds(100);
    digitalWrite(buzzerPin, LOW);
    delayMicroseconds(100);
  }
}
```