

Smart Home System

Building and programming an electronic system with a night-light and motion-activated burglar alarm.



Teaching
Excellence
Framework

SILVER Challenge:

Important: All programming will need to be done using the blocks and text option on TinkerCAD – you can program in blocks but we need the text for uploading to your Arduino (instructions for uploading are provided on the next slide).

Program a night-light:

- One of the LEDs needs to turn on when the LDR detects low levels of light.
- Have this LED glow brighter as it gets darker

Connecting and Downloading to Arduino:

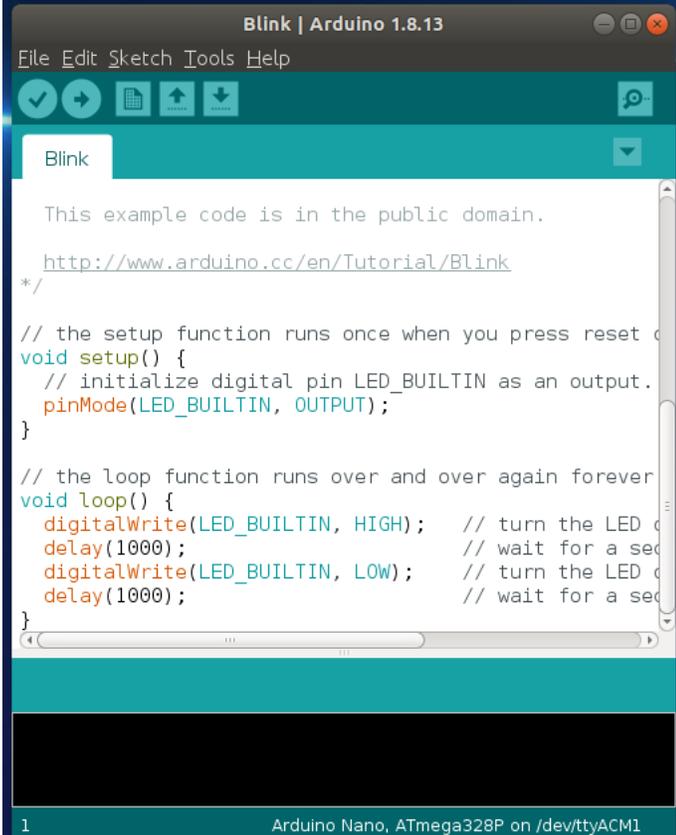
Important: Do not upload any programs to your Arduino until your circuit has been checked and tested by a member of staff.

Step 1: Copy and paste the text code into Arduino IDE.

Step 2: Click on the tick in the top left to 'compile' code.

Step 3: Plug your Arduino into the computer.

Step 4: Click on the circle with an arrow to transfer.

A screenshot of the Arduino IDE interface. The window title is "Blink | Arduino 1.8.13". The menu bar includes "File", "Edit", "Sketch", "Tools", and "Help". The toolbar shows a checkmark icon (compile), a right-pointing arrow (upload), and a download icon. The sketch name "Blink" is displayed in the top left. The main text area contains the following code:

```
This example code is in the public domain.

http://www.arduino.cc/en/Tutorial/Blink
*/

// the setup function runs once when you press reset
void setup() {
  // initialize digital pin LED_BUILTIN as an output.
  pinMode(LED_BUILTIN, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the positive voltage)
  delay(1000); // wait for a second
  digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the pin LOW (no voltage)
  delay(1000); // wait for a second
}
```

The status bar at the bottom indicates "1" and "Arduino Nano, ATmega328P on /dev/ttyACM1".

GOLD Challenge:

Adding the burglar alarm:

- When the ultrasound detects movement nearby, the piezo speaker sounds an alarm.
- This alarm system should be turned on and off with the push-button.
- The second LED lights up when the alarm system is turned on.

Extension Challenge

Changing the burglar alarm to a 'Santa Detector':

- Change the program so that instead of a buzzer sound when movement is detected, it instead plays a festive tune.

Try this tune:

G - D - E - F - F - F - E - E - E - D - D - E - D - G - E - E - E - E - E - G - D - E - F -
F - F - E - E - E - G - G - F - D

Extension Challenge

