Writing the Quantum Key Distribution Code

```
// Arduino code for simulating Quantum Key Distribution

int ledPin = 13; // Pin for LED
int buttonPin = 2; // Pin for Button
int keyLength = 10; // Length of the encryption key

void setup() {
  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT);
  Serial.begin(9600);
}

void loop() {
  // Generate a random key
  String key = "";
  for (int i = 0; i < keyLength; i++) {
    int bit = random(2); // Generate a random bit (0 or 1)
    key += String(bit);
  }

  // Display the generated key
  Serial.println("Generated Key: " + key);

  // Simulate QKD using LEDs and Buttons
  if (digitalRead(buttonPin) == HIGH) {
    digitalWrite(ledPin, HIGH);
    delay(500);
    digitalWrite(ledPin, LOW);
    delay(500);
  }
}
```