Security Alarm System

1. Introduction: The security alarm system using a PIR (Passive Infrared) sensor, buzzer, and Arduino Uno is designed to enhance security by detecting motion within its sensing range. It alerts users by triggering an alarm (buzzer) upon detecting movement, providing an efficient and cost-effective security solution.

2. Components:

- Arduino Uno
- PIR sensor module
- Buzzer
- Resistors (if needed)
- Connecting wires
- Power supply

Arduino Uno: The microcontroller board processes input from the PIR sensor and controls the activation of the buzzer to create an alarm.

PIR Sensor Module: The PIR sensor detects infrared radiation emitted by moving objects within its detection range. It generates a signal when motion is detected and sends it to the Arduino for processing.

Buzzer: The buzzer generates an audible alarm or alert when activated by the Arduino. It provides an audible indication of motion detection.

Resistors (if needed): Resistors may be used for voltage regulation or current limiting based on the specifications of the components used.

Connecting Wires: These wires establish connections between the various components, ensuring proper communication and functionality of the circuit.

Power Supply: It provides the necessary electrical power to the Arduino, PIR sensor, buzzer, and other components in the circuit.

3. Circuit Diagram:
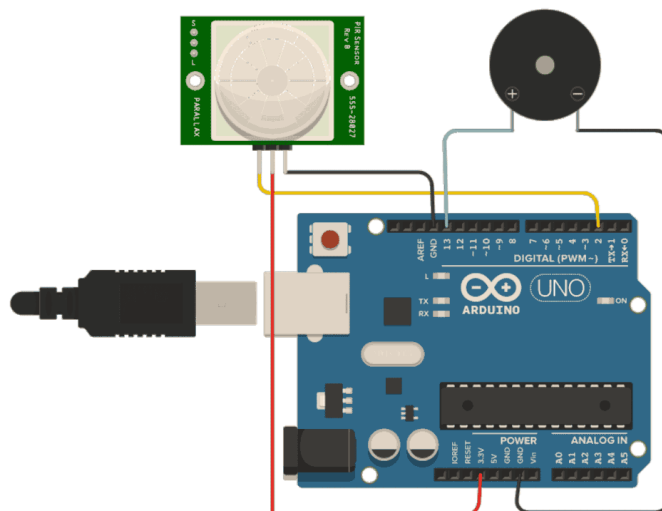
4. Code:

```
// PIR Sensor pin connected to Arduino at pin 2
int PIRsensor = 2;
// Buzzer pin connected to Arduino at pin 13
int buzzerPin = 13;

void setup() {
  pinMode(PIRsensor, INPUT); // using PIR sensor as input
  pinMode(buzzerPin, OUTPUT); // using buzzer as output
  Serial.begin(9600);
}

void loop() {
  int motionDetected = digitalRead(PIRsensor);
  if (motionDetected == HIGH) {
    // If motion is detected
    Serial.println("Motion Detected! Activating Alarm...");
    tone(buzzerPin, 1000); // Activate the buzzer (adjust frequency as needed)
    delay(5000); // Delay before re-checking for motion
    noTone(buzzerPin);
    delay(100);
  }
}
```

5. Working:

- The PIR sensor continuously monitors its surroundings for any movement.
- When motion is detected, the PIR sensor sends a signal to the Arduino.
- The Arduino processes this signal and activates the buzzer to sound the alarm.
- After a specified duration, the alarm stops, and the system waits for the next motion detection event.

6. Procedure Step-wise:

- Assemble the circuit based on the provided diagram.
- Upload the provided Arduino code to the Arduino Uno.
- Connect the PIR sensor and buzzer to the Arduino as per the circuit diagram.
- Power up the system and test the PIR sensor by introducing motion within its range.
- Observe the buzzer for activation upon motion detection.

7. Applications:

- Home security systems
- Office security setups
- Warehouse security
- Motion-based alert systems

8. Future Scope:

- Integration with a camera system for visual confirmation upon motion detection.
- Incorporating GSM modules for alerting users via SMS or calls.
- Enhancing the alarm with different tones or patterns for specific alerts.