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Reducing Bird Deaths from Electrocution using a Motion Sensor

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Abstract

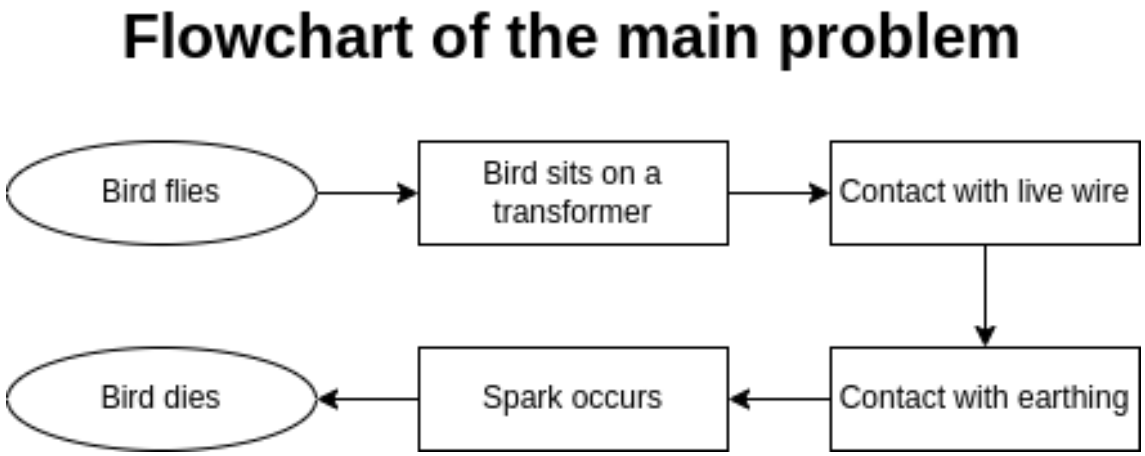
Ecological roles of birds. As with other native organisms, birds help maintain sustainable population levels of their prey and predator species and, after death, provide food for scavengers and decomposers. Many birds are important in plant reproduction through their services as pollinators or seed dispersers.

If there are no birds left on earth, the food web would be totally disturbed. Moreover, trees would not be able to reproduce and seeds would not be dispersed.

Objective

We know that birds are pretty important for the survival of the entire planet, so we tried to track down the biggest reasons for manmade deaths caused to them.

Turns out that every year, about 174 million birds die due to electrocution.
Even saving a fraction of that number would be helpful to the environment so we decided to lower the bird deaths caused due to transformers.



Hypothesis

The goal here was to stop the birds to appear near the source of death, I had some ideas:

- Flashing light with delay to make them avoid the transformer.

  But: flashing light would not be enough as in daylight the flashing light would be almost invisible to most of the birds.

  Note: this hypothesis is wrong ×.

- Beeping sound to make them avoid the transformer.

  But: all birds can hear but the always beeping sound would be irritating to human beings.

  Note: this hypothesis is wrong ×.

- Beeping sound when the ultrasonic sensor detects something.

  But: an ultrasonic sensor can detect anything in front of it and it is unidirectional.

  Note: this hypothesis is wrong ×.

- Beeping sound when living organism movement is detected.

  Finally: this could be successful as when it detects the motion of birds, it produces a beeping sound.

  Note: this hypothesis is right ✓.

Creation

I used an Arduino nano board to create the circuit for easy and cheap development.

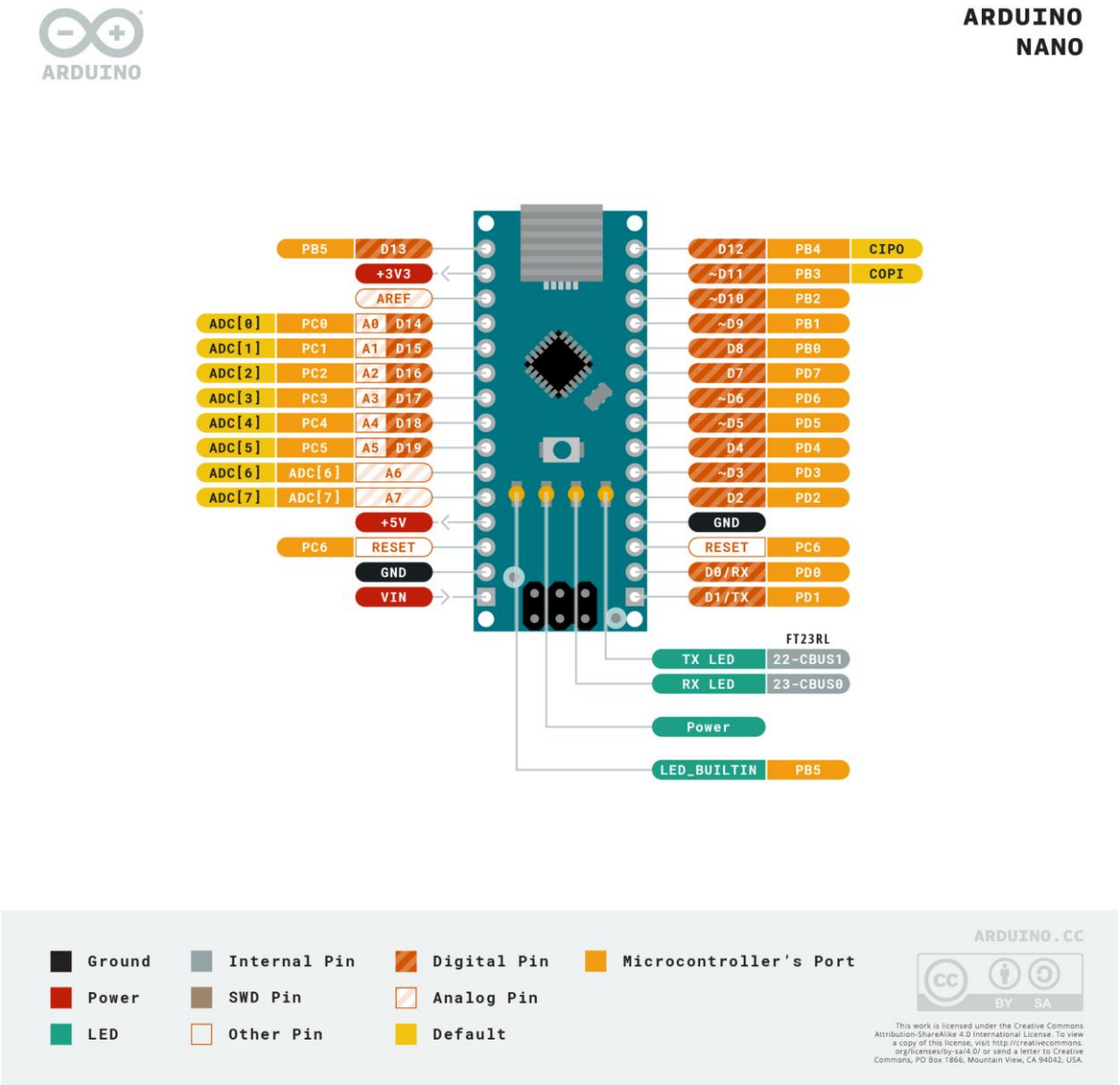


Fig. 1. Arduino Nano Pinout, *https://docs.arduino.cc/hardware/nano*

The Arduino Nano is Arduino's classic breadboard-friendly designed board with the most diminutive dimensions.

And a PIR (Passive InfraRed) sensor to detect motion.

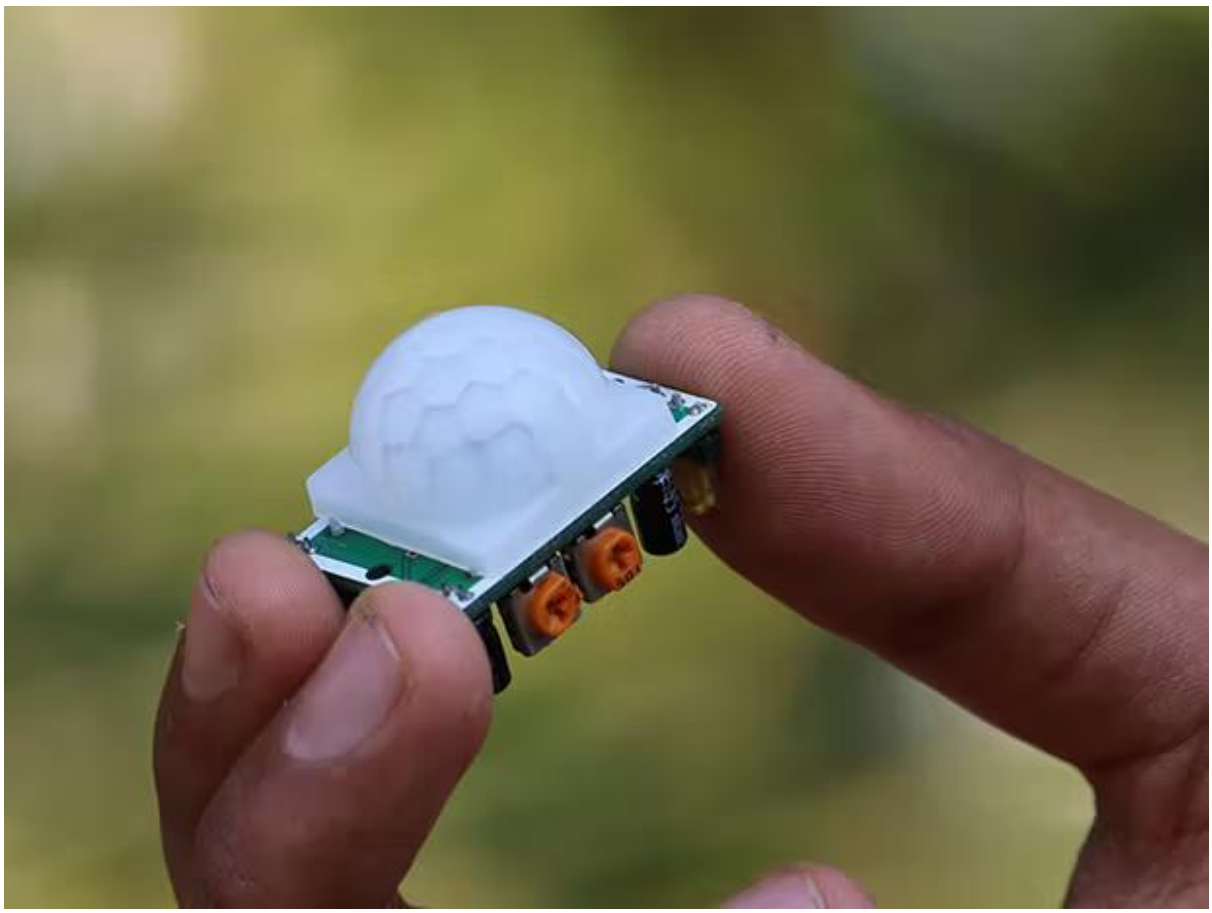
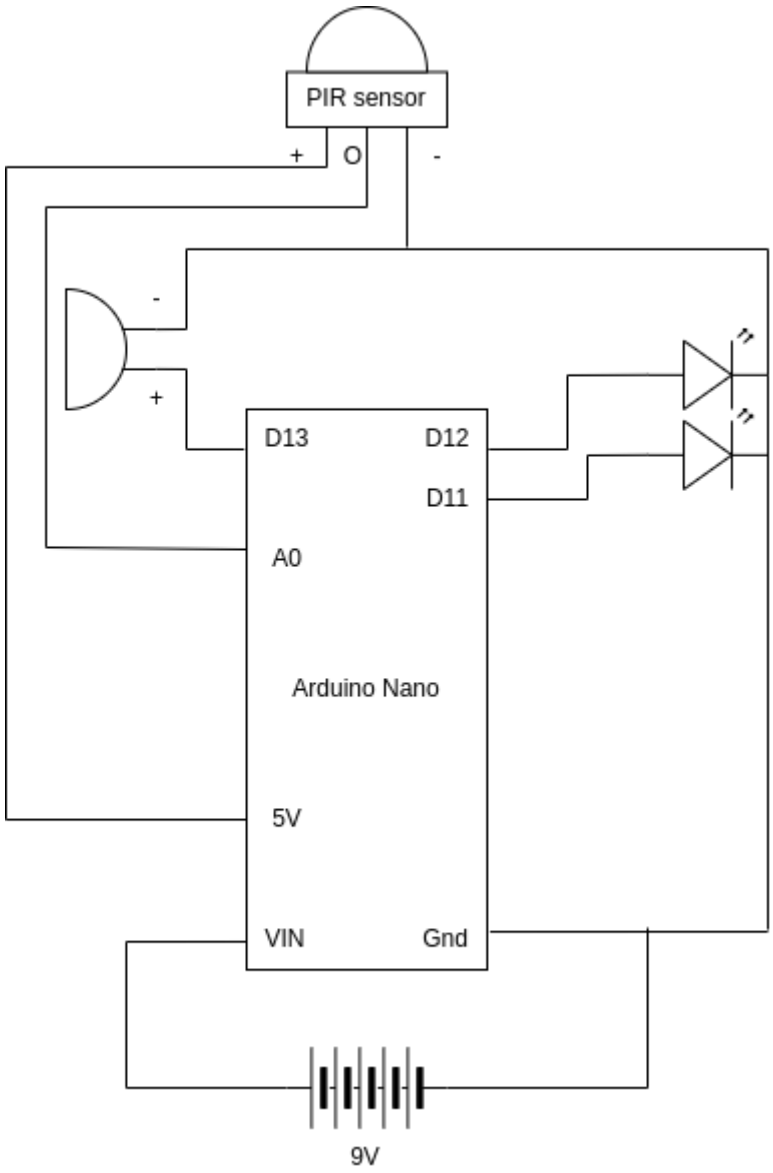


Fig. 2. PIR sensor, *https://create.arduino.cc/projecthub/diy-partners/how-pir-sensor-work-9f76b6*

A PIR or Passive InfraRed sensor works by detecting changes in heat signatures in its surrounding using two pyroelectric sensors mounted on it. It is widely used in home security systems and automated doors.

Circuit Diagram



Components required:

1. Arduino Nano x 1
2. Buzzer x 1
3. PIR sensor x 1
4. LED x 2
5. 9V battery x 1

Arduino Code

```
int n;
int o;
void setup()
{
    pinMode(13,OUTPUT);
    Serial.begin(9600);
    Serial.println("TAKING SENSOR INPUT:");
    delay(50);
    pinMode(11,OUTPUT);
    pinMode(12,OUTPUT);
}
void loop()
{
    o=analogRead(A0);
    o=map(o,550,0,0,100);
    if(o<20)
    {
        digitalWrite(13,HIGH);
        digitalWrite(12,HIGH);
        digitalWrite(11,HIGH);
        Serial.println("motion detected");
    }
    else
    {
        digitalWrite(13,LOW);
        digitalWrite(12,LOW);
        digitalWrite(11,LOW);
        Serial.println("motion ended");
    }
    delayMicroseconds(1);
}
   /*E.O.F.*/
```

Fig. 3. get the code here, *https://gist.github.com/rpd-512/64d944bb3dda2c1c360b83dd40b0cc17*

Observation and data collection

Birds on the balcony

Time	Birds on Day1 (without any device)	Birds on Day2 (with the device)
10:00 am	2	3
10:30 am	4	0
11:00 am	3	0
11:30 am	5	0

We put the instrument on our balcony and analysed the data and found that when the device was placed, about 2 to 4 birds were seen every 30 minutes but after we placed our device, not a single bird was seen.

This proves the effectiveness of the device. Hence this will also be effective on real electrical transformers.

Conclusion

This project can save millions of birds every year from getting electrocuted. Birds are a gift from mother nature and everything has an alternative except of course the gifts from our beloved motherly earth.

Works cited

Birds mortality at Concentrated Solar Power (CSP) plants | REVE News of the wind sector in Spain and in the world

Research, vol. 32, no. 15, 2014, pp. 232–265, https://www.evwind.es/2014/08/20/birds-mortality-at concentrated-solar-power-csp-plants/47013

About the author

I am Rhiddhi Prasad Das, a 16-year-old from India passionate about computer science and technology. I see a dream of a utopia created by my own hands, a world without suffering, a world of dreams and I am working towards it with everything I have got. Besides Computer science and IoT, I am also a talented pianist.