Security System

SPICE Presentation

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S - Situation:

You notice that many homes near you have been broken into.

You leave for vacation in 2 days and you need to figure out a way to prevent that from happening to you.

P - Problems and Possibilities:

Design Brief

- Create an effective automatic security system using arduino that will be able to scare off burglars when house is unoccupied

P - Problems and Possibilities:

Criteria

- Must resolve chosen situation
- Must work fully automatically
- Must have real life application

Constraints

- Due Nov. 5
- Must be made from arduino
- Limited materials

P - Problems and Possibilities:

Problems

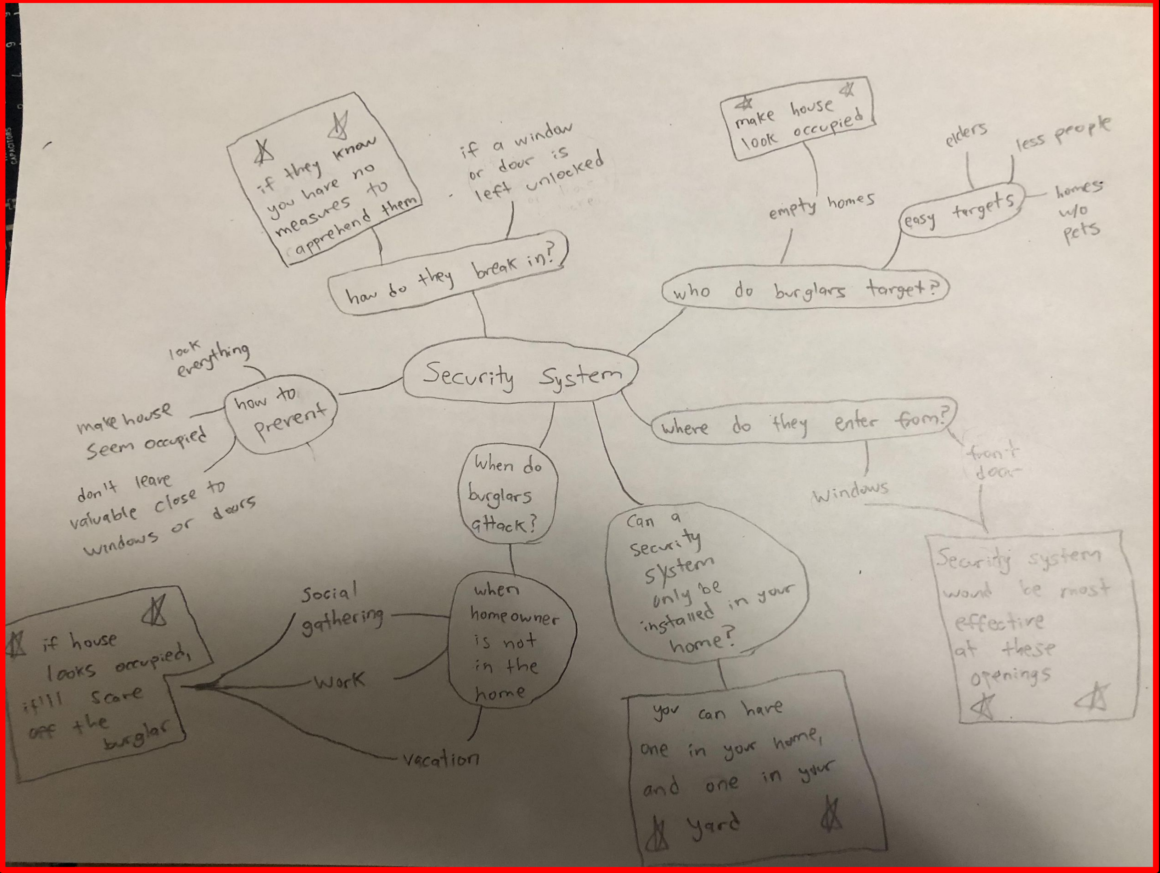
- A house that seems like it has people in it won’t always stop burglars
- False alarms can be set off
- Security system would use up a lot of electricity

Possibilities

- Coding piezo to make a sound and adding extra led when anything gets close will scare away any burglars
- sensor can be coded to activate the piezo and led if somethings at a certain distance
- Can be switch activated and can also use most energy efficient lighting source to save as much electricity as possible when in use

I - Investigation:

★ ★ = Important ideas to consider for the system


Security System
how do they break in?
if they know you have no measures to apprehend them
if a window or door is left unlocked
who do burglars target?
empty homes
make house look occupied
easy targets
elders
less people
homes w/o pets
where do they enter from?
windows
front door
Security system would be most effective at these openings
how to prevent
look everything
make house seem occupied
don't leave valuable close to windows or doors
When do burglars attack?
when homeowner is not in the home
Social gathering
Work
Vacation
if house looks occupied, it'll scare off the burglar
Can a security system only be installed in your home?
you can have one in your home, and one in your yard

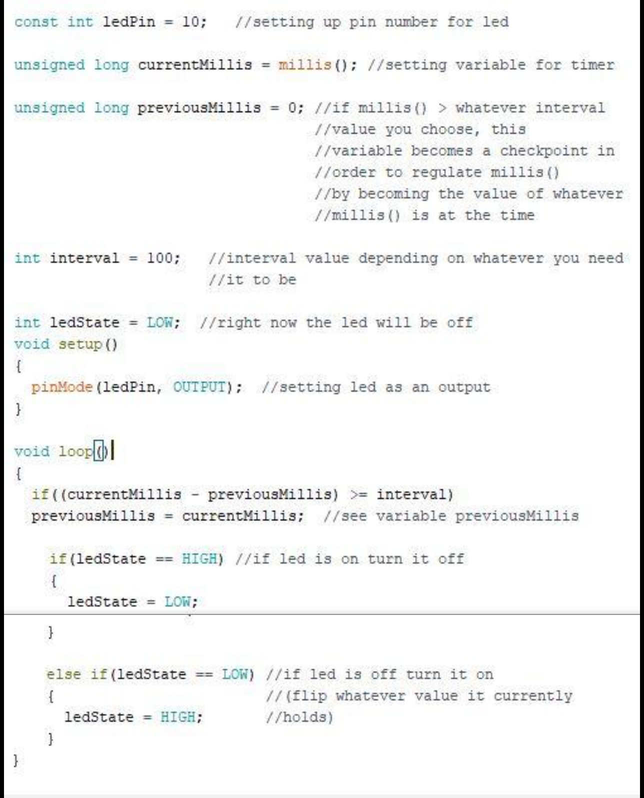
I - Investigation:

- What causes most break ins?
- What can I add to my home to scare off intruders while I'm away?
- How can I make it work fully automatically?
- What pieces will I need?
- What lighting source is most efficient?
- What time does the system need to be started?
- Can this only work on the porch of a house?
- How close is an object allowed?
- How do I make it switch activated?

I - Investigation:

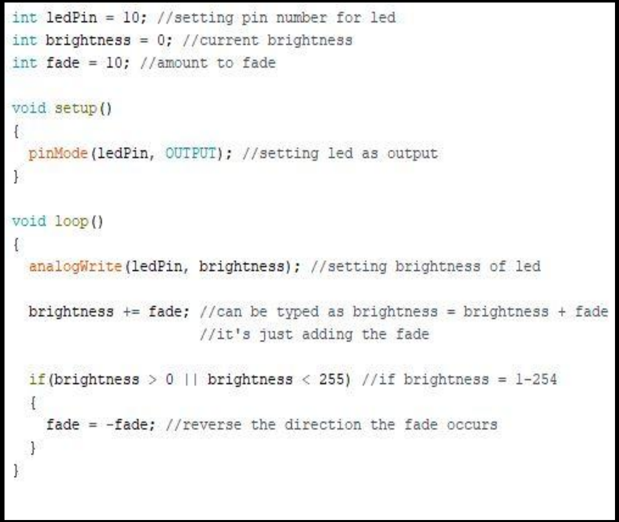
CODE:

Blink w/o delay



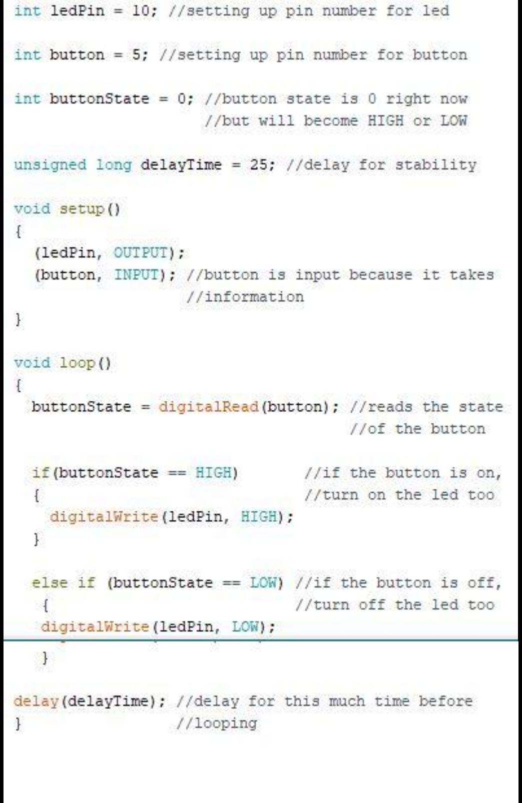
```
const int ledPin = 10;    //setting up pin number for led

unsigned long currentMillis = millis(); //setting variable for timer

unsigned long previousMillis = 0; //if millis() > whatever interval
                                  //value you choose, this
                                  //variable becomes a checkpoint in
                                  //order to regulate millis()
                                  //by becoming the value of whatever
                                  //millis() is at the time

int interval = 100;   //interval value depending on whatever you need
                      //it to be

int ledState = LOW;  //right now the led will be off
void setup()
{
  pinMode(ledPin, OUTPUT);  //setting led as an output
}

void loop()
{
  if((currentMillis - previousMillis) >= interval)
  previousMillis = currentMillis;  //see variable previousMillis

    if(ledState == HIGH) //if led is on turn it off
    {
      ledState = LOW;
    }

    else if(ledState == LOW) //if led is off turn it on
    {                        //(flip whatever value it currently
      ledState = HIGH;       //holds)
    }
}
```

Fade



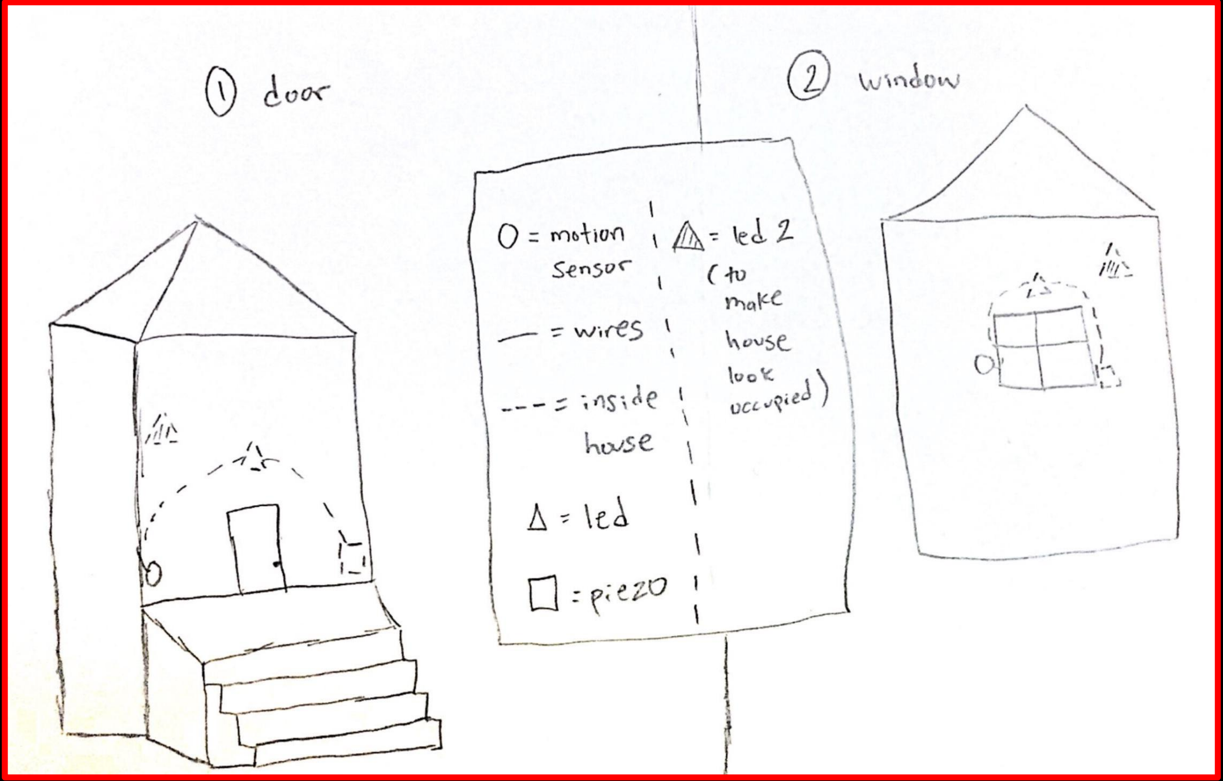
```
int ledPin = 10; //setting pin number for led
int brightness = 0; //current brightness
int fade = 10; //amount to fade

void setup()
{
  pinMode(ledPin, OUTPUT); //setting led as output
}

void loop()
{
  analogWrite(ledPin, brightness); //setting brightness of led

  brightness += fade; //can be typed as brightness = brightness + fade
                      //it's just adding the fade

  if(brightness > 0 || brightness < 255) //if brightness = 1-254
  {
    fade = -fade; //reverse the direction the fade occurs
  }
}
```

Button



```
int ledPin = 10; //setting up pin number for led

int button = 5; //setting up pin number for button

int buttonState = 0; //button state is 0 right now
                     //but will become HIGH or LOW

unsigned long delayTime = 25; //delay for stability

void setup()
{
  (ledPin, OUTPUT);
  (button, INPUT); //button is input because it takes
                   //information
}

void loop()
{
 buttonState = digitalRead(button); //reads the state
                                    //of the button

  if(buttonState == HIGH)        //if the button is on,
  {                              //turn on the led too
   digitalWrite(ledPin, HIGH);
  }

  else if (buttonState == LOW) //if the button is off,
   {                           //turn off the led too
   digitalWrite(ledPin, LOW);
   }

delay(delayTime); //delay for this much time before
}                 //looping
```

I - Investigation:



Approximate sketch of how the system should work and be placed

C - Construction:

Ideas:	Application:	Functionality:	Complexity:	Link to Tinkercad:	Total:
Led turns on when something's too close and piezo gets faster the closer an object is	7	5	7	https://www.tinkercad.com/things/0jttFMmWsGE-important-sound-gets-louder-the-closer-you-get-security-system/editel?sharecode=1L5xYHcT56r5FVTyboifxwVvJmSa2DcKSpY48tsLYIA	19/30
Led and piezo turns on when something's too close and second led stays on during the day	10	9	9	https://www.tinkercad.com/things/2FF6wK9tInP-important-security-system-circuit-/editel?sharecode=k9yMBnhC1Tm_AIqM6DU-fVn_C3FX1SXygGpIpIpJQYY	28/30

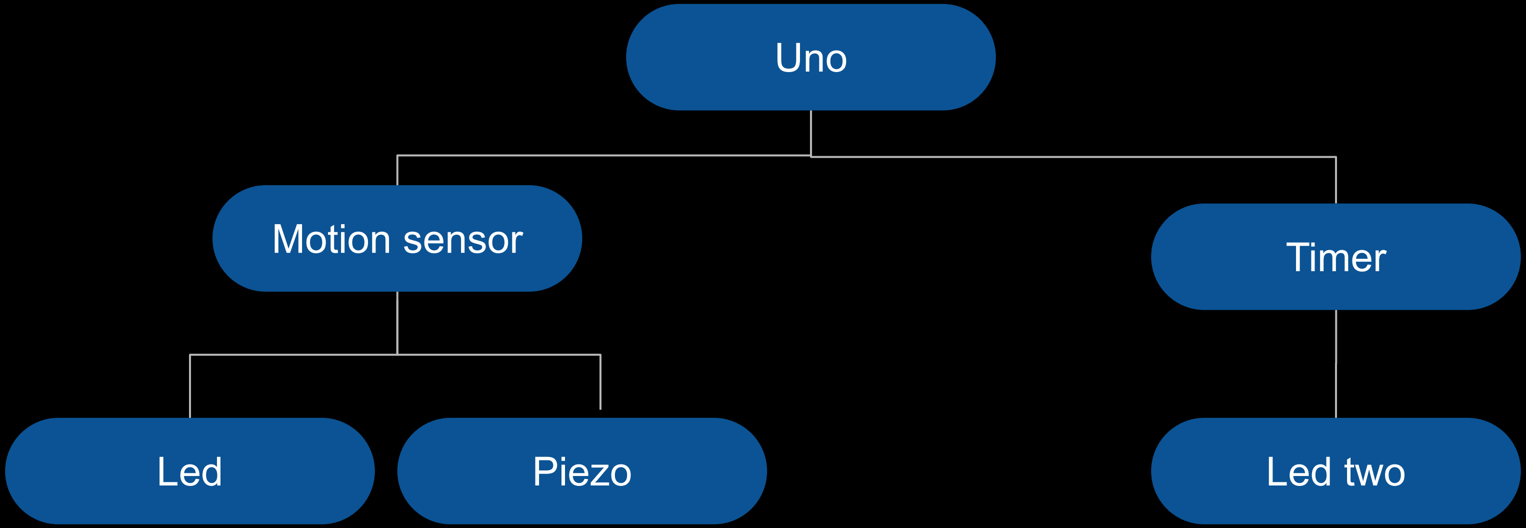
C - Construction:

RATIONALE:

After thorough research and going through several ideas, I have decided to create a switch activated security system that detects motion within a certain range and creates the illusion of an occupied home mainly because it’s the most applicable, functional, and complex design.

C - Construction:

CODE:



E - Evaluation:

What went wrong?

E - Evaluation:

- Must resolve chosen situation ✗
- Must work fully automatically ✗
- Must have real life application ✓

- Due Nov. 5 / Nov. 6 ✓
- Must be made from arduino ✓

I - Investigation:

What part of the code is the problem in?

What are ways to make my timer reset after 24 hours?

Is it even possible to fix this issue?

How will the system run the way it is right now?

C - Construction:

What code I had to add:

```
if(currentMillis > (x + 8640))
{
  zero += 8640;
  thirtySixHundred += 8640;
  eightySixHundredFourty += 8640;
  x += 8640;
}
```

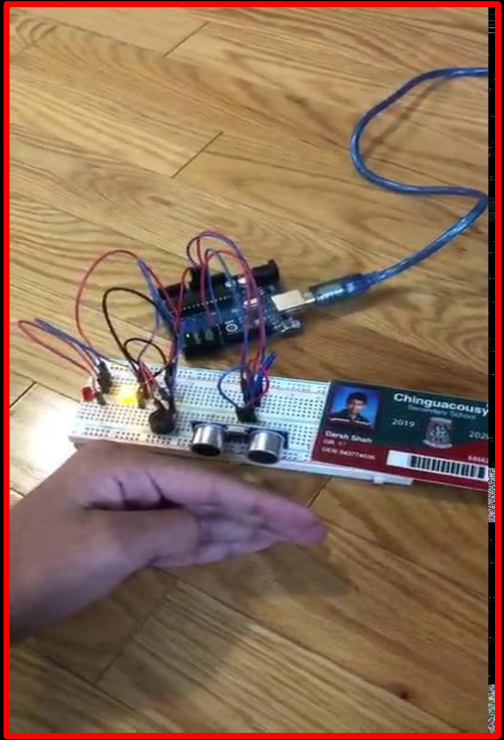
What variables I had to change:

Changing the code to only have 3 times throughout the day:

1. Night (0) - night before
2. Morning (3600)
3. Night (8640)

C - Construction:

This code is able to run forever!



E - Evaluation:

- Must resolve chosen situation ✓
- Must work fully automatically ✓
- Must have real life application ✓
- Due Nov. 5 / Nov. 6 ✓
- Must be made from arduino ✓

Bibliography:

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