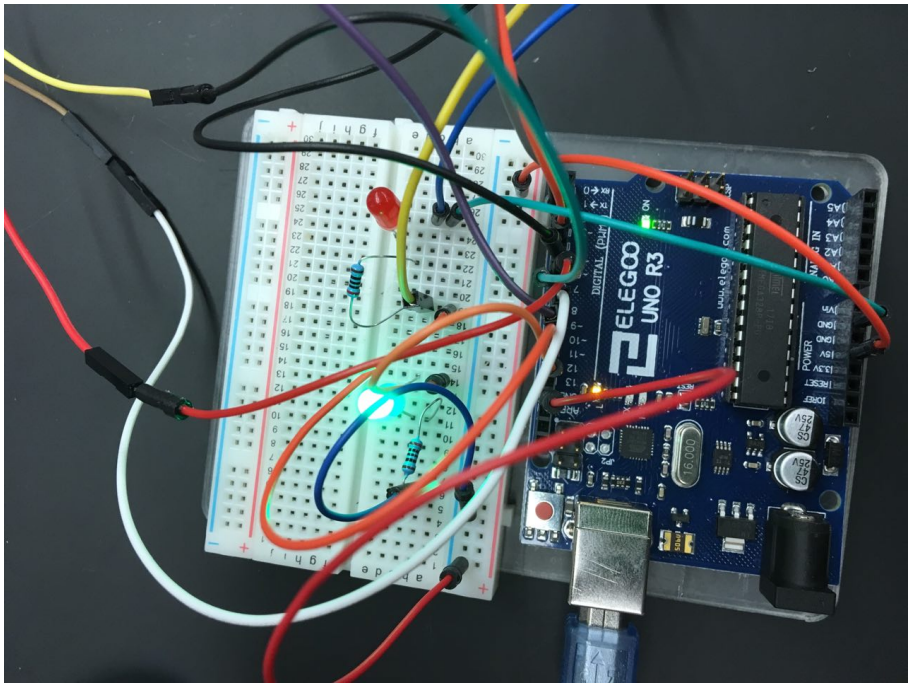
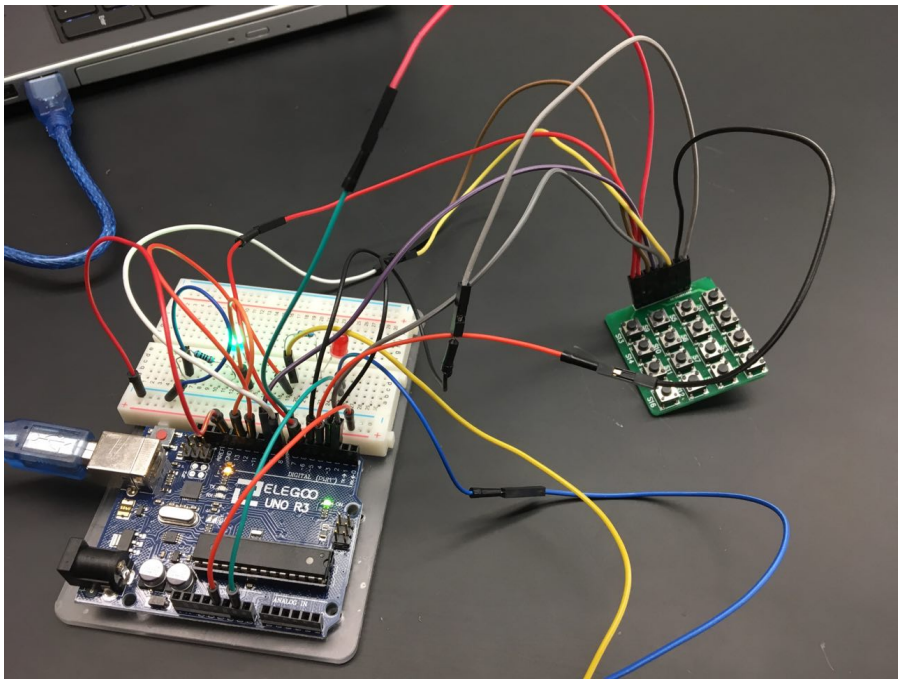
Emergency Alarm System





Problem Statement: When there is a fire or any type of danger people tend to be confused and don't know where to go. The goal of our project is to build a prototype of an alarm system that could potentially make it easier to inform people of where to go in the event of an emergency. This can be used within public places where there is large crowds and more potential for confusion during an emergency.

Problem Justification:

1. People could get hurt or die.
2. Can cause a big crowd.
3. Once people are trapped it's hard to save them because everyone will fight to be saved first and the risk of danger will increase exponentially.
4. People panicking and get confused of what to do.
5. When there is a school shooting people start crying because they don't know what to do.

Problem Research:

Title: "Mass-Casualty Events at Schools: A National Preparedness Survey"

Citation: Mass-Casualty Events at Schools: A National Preparedness Survey
: James Graham, Steve Shirm, Rebecca Liggin, Mary E. Aitken, Rhonda Dick
Pediatrics Jan 2006, 117 (1) e8-e15; **DOI:** 10.1542/peds.2005-0927

Abstract: Recent school shootings and terrorist events have demonstrated the need for well-coordinated planning for school-based mass-casualty events. The objective of this study was to document the preparedness of public schools in the United States for the prevention of and the response to a mass-casualty event. A survey was mailed to 3670 school superintendents of public school districts that were chosen at random from a list of school districts from the National Center for Education Statistics of the US Department of Education in January 2004.A second mailing was sent to non-responders in May 2004. Descriptive statistics were used for survey variables, and the test was used to compare urban versus rural preparedness.

Summary: The article was a study to document how prepared public schools were for prevention and response to disasters. The results were that the schools have that took the survey out of the 3670 schools most of them did not have an evacuation plan and this article is related to our project because we are trying create an alarm system with direction so schools don't have to worry about an evacuation plan.

Title: "Computer vision based method for real-time fire and flame detection"

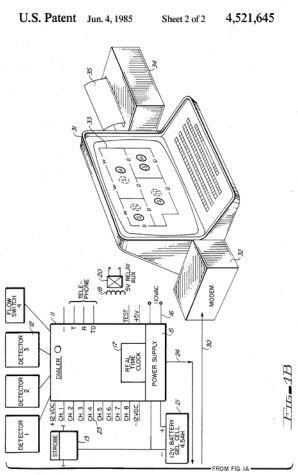
Citation: Pattern Recognition Letters, ISSN: 0167-8655, Vol: 27, Issue: 1, Page: 49-58
Publication Year:2006

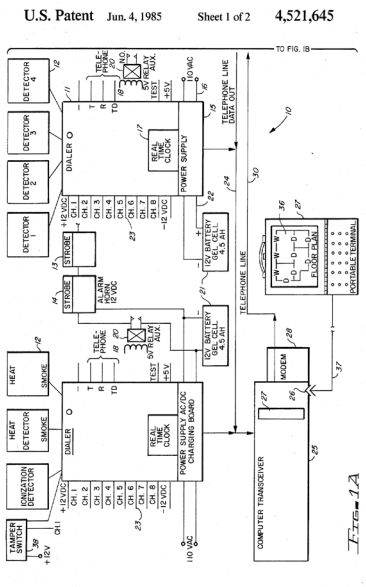
Abstract: This paper proposes a novel method to detect fire and/or flames in real-time by processing the video data generated by an ordinary camera monitoring a scene. In addition to ordinary motion and color clues, flame and fire flicker is detected by analyzing the video in the wavelet domain. Quasi-periodic behavior in flame boundaries is detected by performing temporal wavelet transform. Color variations in flame regions are detected by computing the spatial wavelet transform of moving fire-colored regions. Another clue used in the fire detection algorithm is the irregularity of the boundary of the fire-colored region. All of the above clues are combined to reach a final decision. Experimental results show that the proposed method is very successful in detecting fire and/or flames. In addition, it drastically reduces the false alarms issued to ordinary fire-colored moving objects as compared to the methods using only motion and color clues.

Summary: A video surveillance will sense the fire when its moving towards it and directions will appear on the screen. Then when it senses it moving it will automatically ring.

Patent 1

Title: Fire Alarm System
Inventor: Robert A. Carroll



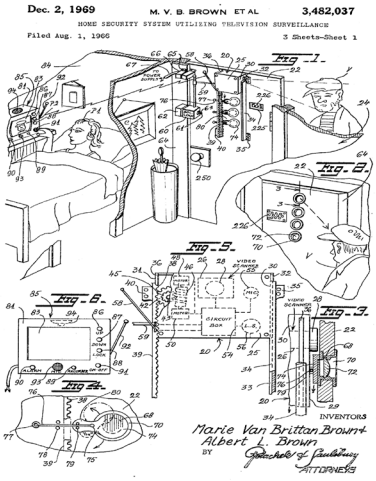


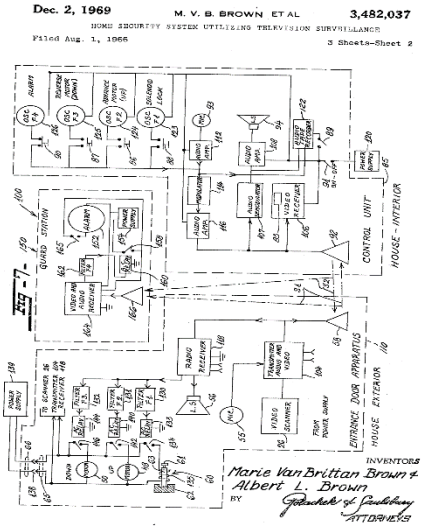
The detectors are connected to an automatic dialer to transmit the actuation of the detectors to local alarms as well as to a building microcomputer that has positions of the alarms and the floor plans. This allows the microcomputer to automatically call nearby fire stations since it's also connected to nearby phone lines. In addition, it has a lower installation cost than conventional systems. Alarm can be tampered with which can cause it to falsely communicate with nearby fire stations.

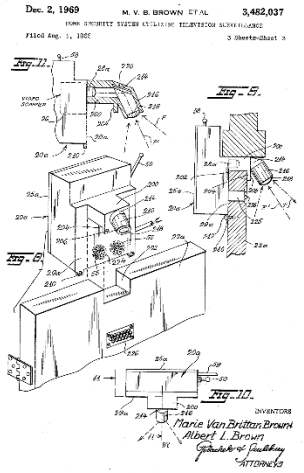
Patent 2

Title: Home security system utilizing television surveillance

Inventors: Marie Van Brittan Brown,Albert L Brown







There is a video scanning device mounted at the entrance of the door in order to scan a visitor standing at the door. There is an audio system which allows the owner of the

house to speak with the person that is at the door which can also record conversations for future reference. It does not include any alarms for if there's a burglar when you aren't home. It is only controlled by the owner when they are inside of the house.

Design Specification:

Form: Square, length 12, width 12
Performance: it will show a **RED** line pointing to the side where the emergency is coming from saying **DO NOT ENTER**, On the other hand it will show a **GREEN Line** pointing to the nearest exit.

-Durability: 3-4 years

-maintenance:
- Recharge batteries
- Change light beams
- Yearly tests on system

-Standardization

Material:
- Plastic
- Glass
- Sensors
- Power source
- microcontroller

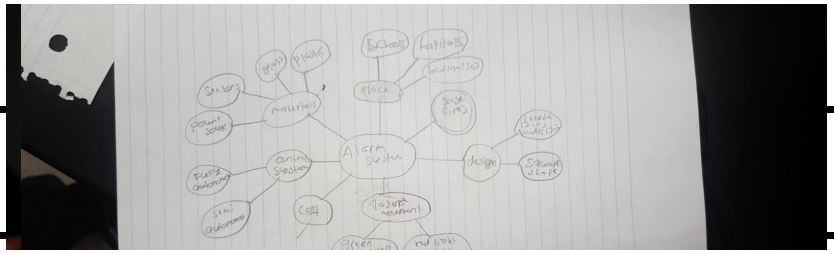
Cost: $80

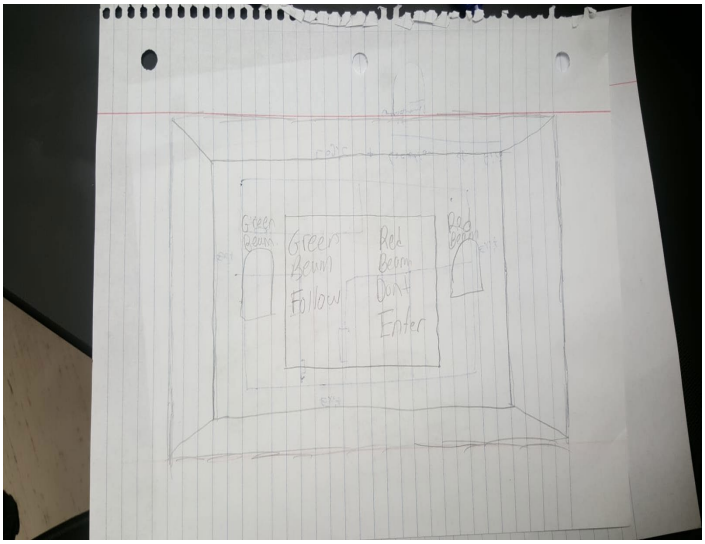
Aesthetics
- Looks like a square-shaped detector.

Ergonomics
- Helps people leave building more efficiently in the event of any kind of catastrophe.

Customer Needs and Wants
- Needs: An emergency detector that can warn people in the case of an emergency.
- Wants: A detector that points directly to the safe areas and areas you shouldn't enter during an emergency.

Sketches:





Materials Needed:

Material	**Where to buy**	**Cost**
Plastic cover	Walmart or home depot	$10
LED lights	Amazon	$30
microcontroller	Amazon	In stock
wire	Amazon	In stock

Switch	Amazon	In stock

Construction Method.

1. First we brainstormed what our project would do and how would we need to create it to be successful.
2. After that we gathered all the materials needed.
3. We worked with LED lights, a switch with several buttons, and a piezo buzzer in order to create our project.
4. We then installed the two LED lights into the breadboard making sure the wiring was correct and that none of the light bulbs would use too much power.
5. After that we integrated a switch into the board which we connected to several pins in order to get the value of each button that is pressed on the switch and send it to the serial monitor.
6. We also added a piezo buzzer that was connected to the same power source as the red LED light so they can both trigger when the alarm turns on.
7. Lastly, we programmed the red LED light using Arduino IDE to trigger when a certain button was pressed on the switch, which in turn would send a frequency to the piezo buzzer allowing the alarm to sound. In addition, we programmed the alarm to shut once the off button was pressed on the switch causing the green light to turn on.

Code:

```
#include <Keypad.h>
#include <SoftwareSerial.h>
const byte ROWS = 4;
const byte COLS = 4;
char hexaKeys[ROWS][COLS] = {
  {'1', '2', '3', 'A'},
  {'4', '5', '6', 'B'},
  {'7', '8', '9', 'C'},
  {'*', '0', '#', 'D'}
};
byte rowPins[ROWS] = {9, 8, 7, 6};
byte colPins[COLS] = {5, 4, 3, 2};
Keypad customKeypad = Keypad(makeKeymap(hexaKeys), rowPins, colPins, ROWS, COLS);

//green light
int led1 = 12;

//red light
int led2 = 11;

void setup()
{

  pinMode(12,OUTPUT);
  pinMode(11,OUTPUT);
  //pinMode(1,OUTPUT);
  Serial.begin(9600);
}
void loop()
{
  char customKey = customKeypad.getKey();

  if (customKey == 'A')
  {
  Serial.println(customKey);
  digitalWrite(11, HIGH);
  digitalWrite(12, LOW);

  while (customKey != '3')
  {
   customKey = customKeypad.getKey();
   tone(11,1000);
```

```
   delay(20);
   noTone(11);
   delay(20);
  }

  delay(1000);
  digitalWrite(12, HIGH);
  digitalWrite(11, LOW);
  }

}
```

CONCLUSION:

In the end our project worked as we anticipated. The alarm system was able to sound and turn red in the event that the switch was pressed. Initially, we wanted to add more LED lights to make the idea more tangible, but our microcontroller didn't have enough power for this. This project definitely improved our teamwork and perseverance when solving a problem. Although we had trouble with the planning aspect of our project, we still successfully built a prototype of our idea for an alarm system.