



Fire Detecting Alarm

By: William Zhao | Edited by: Aaryan Patel | Layout by: Ahmed Nadeem

Age: 14 | Vancouver, British Columbia

Every year, Canadian fire departments respond to an estimated 24,000 home structure fires, resulting in an average of 377 deaths and 3,048 injuries, costing over \$10 Billion and damaging almost 5280 acres of land. According to the National Fire Protection Association, the number one cause of house fires is unattended cooking/kitchen accidents. Pots and pans can overheat and cause a fire very easily if the person cooking gets distracted and leaves cooking unattended. About seventy percent of house fire deaths occur in homes with no smoke alarms or no working smoke alarms. A working fire alarm in a home reduces the risk of dying in a fire by 50%. Approximately 890 lives could be saved annually if all homes had active smoke alarms. In this paper, I will explain how my fire alarm will reduce the chances of a house fire.

MATERIALS AND METHODS

My invention is a fire-detecting alarm designed for kitchen and cooking uses. The materials it uses are all from Microbit, a pocket-sized computer that introduces you to how software and hardware work together. The alarm is powered with 6 double-A batteries. It has a flame sensor, which also detects gas in the air, a buzzer to alert the user, and an LCD module to display information and status. When a person starts to cook, the LCD will display "safe" meaning there is no fire. When the flame sensor detects a fire, there will be a timer counting down from 10 seconds on the LCD. The reason I put a timer is that sometimes people accidentally overcook something but they are still there to turn off the fire. When the timer hits zero, the alarm knows that the fire is unattended so the buzzer will beep 3 times, if the alarm still detects a fire, it will continue beeping until the sensor detects no fire. I first tested my alarm with a lighter. I tested at different angles to see which angle had the best sensitivity. I also tested it in different rooms like the basement and upstairs and recorded the time it took for the flame sensor to detect the fire.

RESULTS AND DISCUSSION

After testing my flame detector multiple times I found out that my flame sensor was more sensitive than I thought it was. Since I used a lighter to test my design, every time I pull the trigger to let the fire out, it will let out gas into the air. And even though there was no fire, the flame sensor still detected the gas in the air. This is a good result because gas leaks are very dangerous when cooking because small amounts of natural gas can produce large amounts of heat which can cause fires and even explosions. One advantage of my alarm is that it can be placed anywhere. Some fire alarms need to be wired to an electrical circuit, each with a battery backup. My alarm is more portable and doesn't need a plug-in power source. One disadvantage is that my alarm has many wires sticking out and is fragile. In the future, I would like to 3D print a case that stores all the components of my alarm so it is easier to move around and it would look better. Testing it outside was quite interesting. On

sunny days, it took almost less than a second to detect the fire because of the heat. On windy days, the wind blew the fire out so it was tough for the sensor to detect fire.

CONCLUSION

As new fire detectors emerge, people should take advantage of the new fire technology to protect their homes. Relying on current fire alarms, chances are better than 50/50 that a fire alarm had failed to warn in 15 years. Fire alarms in the future should provide better information to the user as well as be combined with other equipment like security or a notification system through the user's phone. By using Microbit sensors, not only does it sense fire almost every time, but it also doesn't need regular maintenance so it is cheaper to maintain. With my alarm working in almost any condition, it will improve fire and life safety through better use of technology.

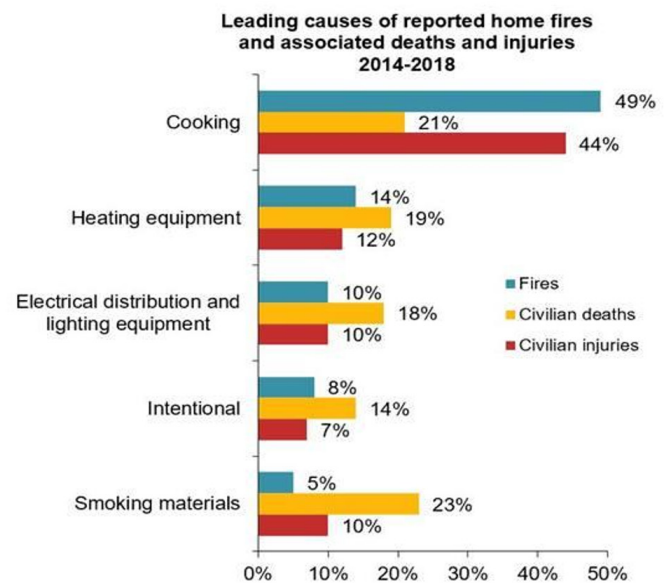


Figure 1: CAPTION



This work is licensed under: <https://creativecommons.org/licenses/by/4.0>



REFERENCE

House Fire Statistics and Facts (Data from 2021): The Zebra. House Fire Statistics and Facts (Data from 2021) | The Zebra. (n.d.). <https://www.thezebra.com/resources/research/house-fire-statistics/#:~:text=A%3A%20An%20estimated%20358%2C500%20home,start%20from%20the%20laundry%20room.>

Department of Health. Functioning Smoke Alarms Are Highly Effective in Preventing Fire-Related Deaths. (n.d.). Retrieved November 13, 2021, from https://www.health.ny.gov/prevention/injury_prevention/children/toolkits/fire/smoke_alarms_effective_preventing_deaths.htm.

ABOUT THE AUTHOR - WILLIAM ZHAO

My name is William Zhao and this is the story about my life so far. I was born on April 30, 2008, in Canada. I went to Deer Lake School when I was in grade 1 all the way to now. My favorite classes are math, applied design, and science. I went to Robokids when I was 4 years old. I learned how to code, build lego robots, and 3D designing things. I joined many coding competitions and won the judges award, best code, and the champions award. I really like playing sports such as basketball, soccer, and football. Thank you for reading this.

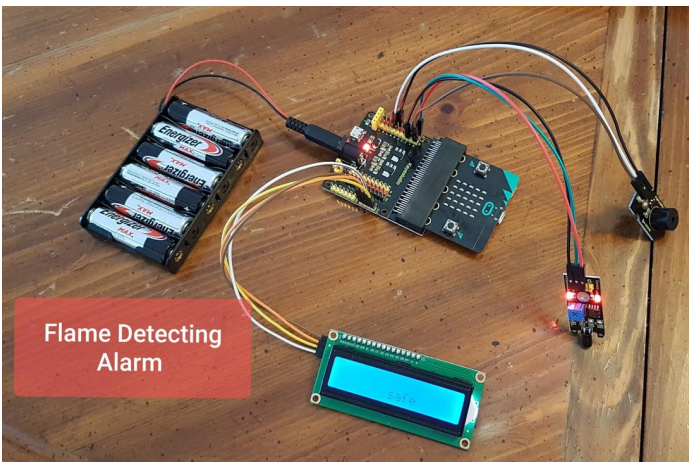


Figure 2: CAPTION

