TVSFPE Secretary's Report
11/11/2021

Sign-In Sheet: Attachment 1
Meeting Minutes: Attachment 2
Relevant Documents: Attachment 3

2021
TVSFPE Chapter Members & Local Members of the Chapter

Date: 11/11/2021	TOPIC: History and Impact of Fire Alarms on Saving Lives	Presented by: Jimmy Landmesser, Jr.

Member		Chapter Membership	2022 Dues	Signature
Albertsen	Brent	Professional Member		
Alt	Matthew	Local-Only Member		
Baity	David	Professional Member		
Bane	Pamela	Local-Only Member		
Bardes	Sean	Member		
Barrack	Sam	Professional Member	Paid	
Bartek	Dave	Member		
Beasland	William	Local-Only Member		
Beck	Eric	Professional Member		
Begley	Jim	Fellow		
Berkley	Bryan	Local-Only Member		
Borum	Al	Professional Member		
Boyll	David	Local-Only Member		
Brown	Ethan	Member		
Brown	Harrison	Professional Member		
Buckles	Jack	Local-Only Member	Paid	
Caldwell	Andy	Local-Only Member		
Cantu	James	Student	N/A	
Capito	Nick	Local-Only Member		
Christman	Tom	Fellow	Paid	
Cloyd	Tonya	Member		
Coleman	David	Local-Only Member		
Coleman	Jay	Local-Only Member		
Cook	Steve	Professional Member		
Copeland	Tom	Professional Member		
Cross	Jeremy	Local-Only Member		

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11/11/2021	History and Impact of Fire Alarms on Saving Lives	Jimmy Landmesser, Jr.

Member		Chapter Membership	2022 Dues	Signature
Dee	Tim	Local-Only Member		
Deschambeault	Rob	Local-Only Member		
Devinney	David	Professional Member		
Doliber	Diane	Professional Member		
Douglas	Logan	Member		
Douglas	Ryan	Local-Only Member		
Dungan	Ken	Fellow		
Eckroth	Jim	Local-Only Member	Paid	
Edwards	Zachary	Student	N/A	
Felch	Chris	Professional Member		
Fetzer	Jim	Local-Only Member		
Frazer	Scott	Professional Member		
Freels	Doug	Professional Member		
Gilliam	Chris	Local-Only Member		
Gillmann	Colby	Student	N/A	
Goranson	Harvey	Professional Member	Paid	
Greenwell	Jacob	Local-Only Member		
Greer	David	Professional Member		
Gump	Jack	Local-Only Member	Paid	
Hartford	Clifton	Member		
Henderson	Alan	Member		
Higgins	Tommy	Member		
Houff	CJ	Student	N/A	
Hughes	Bradley	Professional Member		
Icove	Dave	Fellow		
Jenkins	Bobby	Local-Only Member		

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Johnson	Dan	Local-Only Member	Cash*	
Kasmauskas	Dominick	Professional Member		
Klima	Steve	Local-Only Member		
Landmesser, Jr.	Jimmy	Professional Member	Paid	
Landmesser, Sr.	Jim	Professional Member		
Laubach	Eric	Member		
Livesey	Hannah	Student	N/A	
Massey	Shay	Professional Member	Paid	
Masters	Mike	Local-Only Member		
McEnery	John	Local-Only Member		
Migun	Peter	Local-Only Member		
Miller	Leonard	Local-Only Member		
Nelson	Steve	Student	N/A	
Overton	Monty	Professional Member		
Patterson	Eric	Member		
Phillips	Dennis	Local-Only Member		
Platfoot	Luke	Professional Member		
Platfoot	Mark	Local-Only Member		
Presnell	Joshua	Local-Only Member		
Presnell	Stephen	Professional Member		
Rockwell	Norm	Member		
Rockwell	Scott	Member		
Rogers	Kenny	Local-Only Member		
Russell	Kirk	Member		
Russell	Matt	Local-Only Member		
Sellers	J.R.	Professional Member	Paid	

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Member		Chapter Membership	2022 Dues	Signature
Sharp	Gary	Professional Member		
Shehane	Michael	Local-Only Member	Paid	
Sinasac	Tim	Local-Only Member		
Sipes	Jeff	Professional Member	Paid	
Smith	Patrick	Professional Member		
Smith	William	Member		
Solomon	Travis	Local-Only Member		
Steneck	Paul	Member		
Sterchi	John	Professional Member		
Summers	Lisa	Local-Only Member		
Tallent	John	Member		
Thornton	Patrick	Professional Member	Cash ★	
Till	Bernie	Fellow		
Tinsley	Andrew	Local-Only Member	Cash ★	
Torbett	Todd	Member		
Tyler	Eric	Member		Present, didn't sign
Tulay	Mark	Student	N/A	
VanLandigham	Sara	Member		
Vargas	Leonardo	Student	N/A	
Vuoso	Jerry	Professional Member		
Waggoner	Wayne	Local-Only Member	Paid	
Walker	Rodney	Local-Only Member		
Walters	Glenn	Member	Paid	Present, didn't sign
Williams	Jesse	Professional Member	Paid	

Stallions Will Email: will.stallions@gmail.com

2021
TVSFPE Chapter Members & Local Members of the Chapter

Levels of Membership:

A. Fellow: Fellow is the highest grade of membership in SFPE.
B. Member (MSFPE): A Member shall be a person who supports the goals and objectives of the Society. Membership starts immediately upon completing the online member application and submission of dues payment.
C. Professional (PMSFPE): A Professional Member is a graduate of an engineering curriculum of accepted standing and shall have completed not less than four years of practice indicative of growth in engineering competency and achievement, three of which shall have been in responsible charge.
D. Associate Member:
E. Affiliate:
F. Student Member: A Student Member shall be enrolled full-time in an engineering curriculum or an engineering technology curriculum and not have full-time employment.
G. Honorary Member:
H. Local-Only Member:

TVSFPE GENERAL MEMBERSHIP MEETING

Meeting Minutes
November 11th, 2021

Meeting began at 6:06 p.m.

REPORTS

Minutes were emailed from previous meeting. Minutes were accepted

Treasurer Shehane read the Treasurer report

OLD BUSINESS

- Discussion on additional by-law changes curated by Christman and Dungan – First Reading
    - Removed sections from bylaws that may infringe upon the scholarship committee
    - Removed section X-5. Moved still applicable sections to other sections

NEW BUSINESS

- January meeting is to be held at WaterIntoWine (607 N Campbell Station Rd, Knoxville, TN 37934)
- Jimmy Landmesser Jr. presented with plaque from TVSFPE for Hats Off Award
- Glenn Walters presented with clock recognizing his passing of the Fire Protection PE
- Gold Award presented to chapter
- 2022 SFPE Conference will be held in Detroit

Business meeting concluded at 6:21 p.m.

Minutes submitted by: Logan Douglas

Fire Alarms and Their Progression with Technology

Jimmy Landmesser, Jr., P.E.

THE UNIVERSITY OF TENNESSEE KNOXVILLE

TVSFPE Chapter Meeting

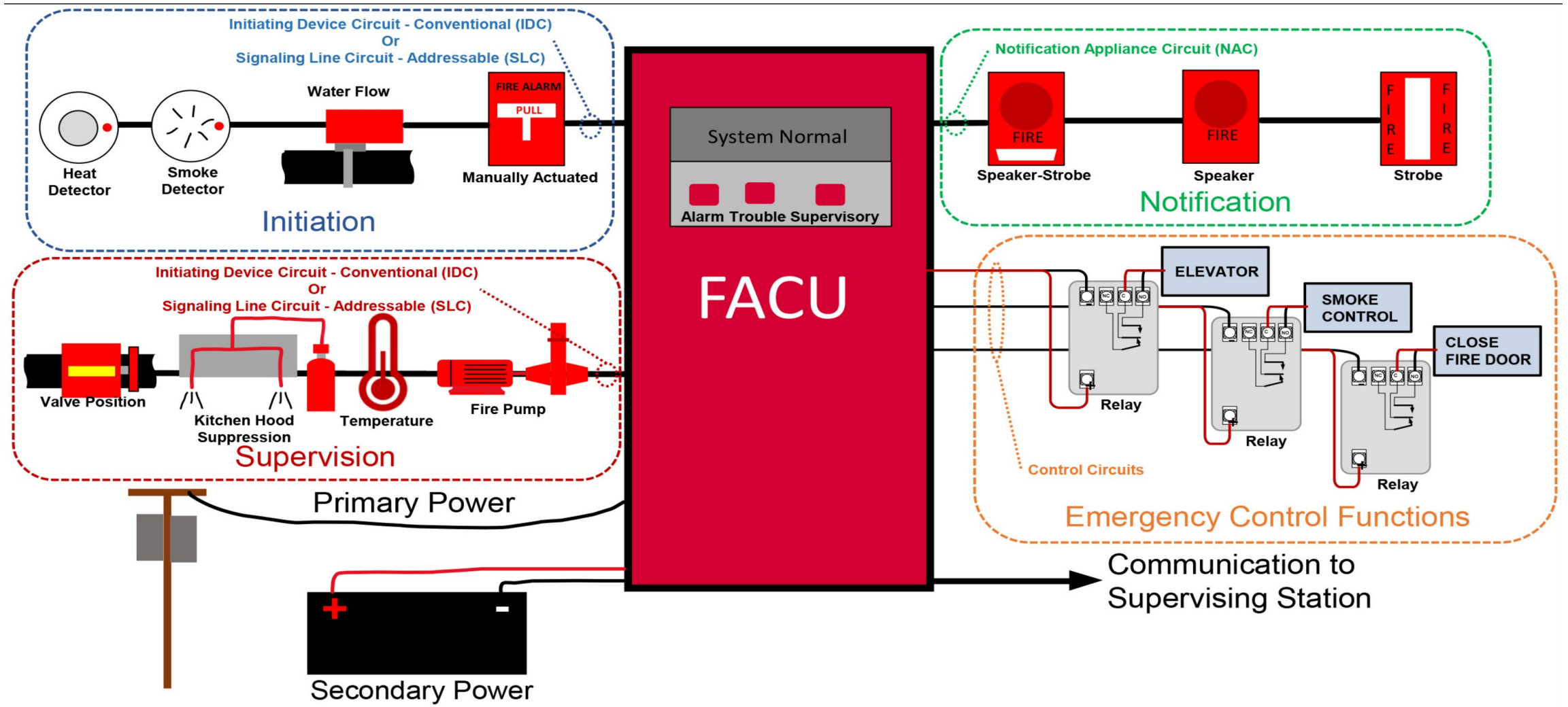
Department of Electrical and Computer Science Engineering

November 11, 2021

Overview

- Fire alarm basics
- Development and improvement with technology
- Benefits of fire detection
- Potential improvements
- Conclusion

A specialized stereo system



1 “A guide to fire alarm basics,” National Fire Prevention Association

A time when bells were *BELLS*

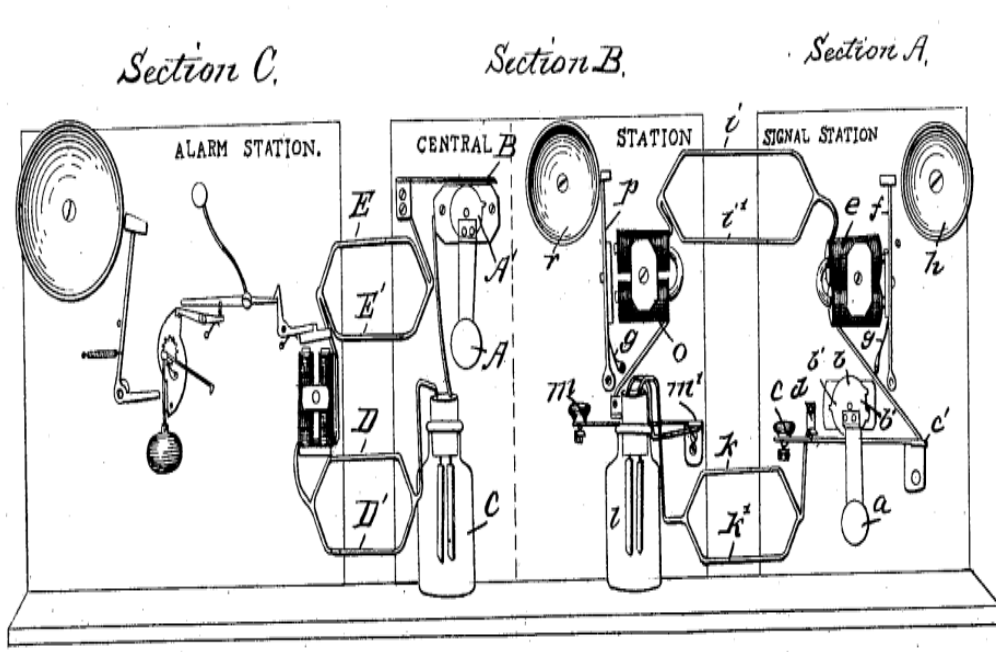
- Earliest US “systems” credits to NYC in mid-1600s
- Required human detectors
- Sometimes it was better to be lucky than good.
- Small bells located throughout the city
- Major city-wide bells weighed several tons

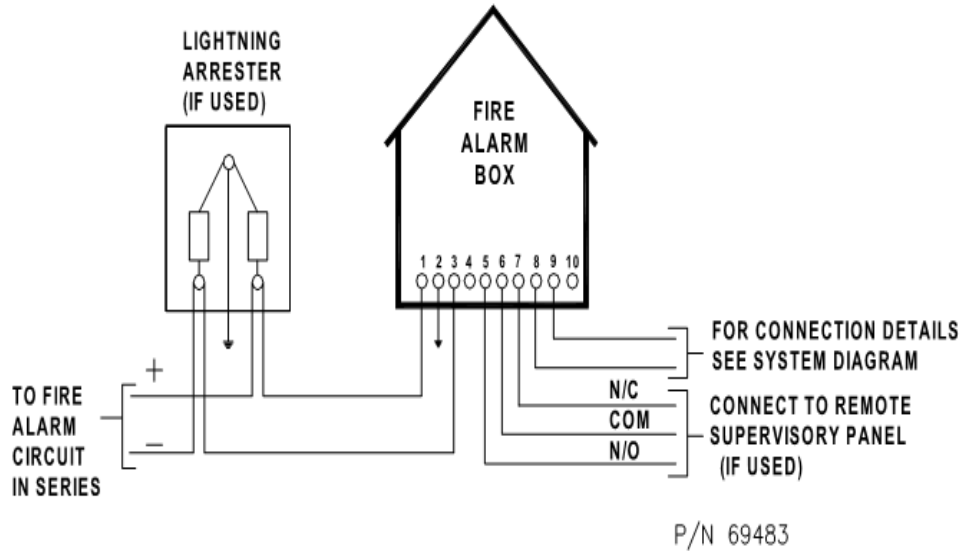
2 “Taking a look at the surprising history of fire alarms,” March 2021

Electrical Transmissions

The first electrically transmitted fire alarm signals utilized.

- William F. Channing and Moses G. Farmer
- 1852 in Boston, MA
- Transmits electrical current from an alarm station to a central station and any auxiliary signaling stations.
- Original interconnected alarms.





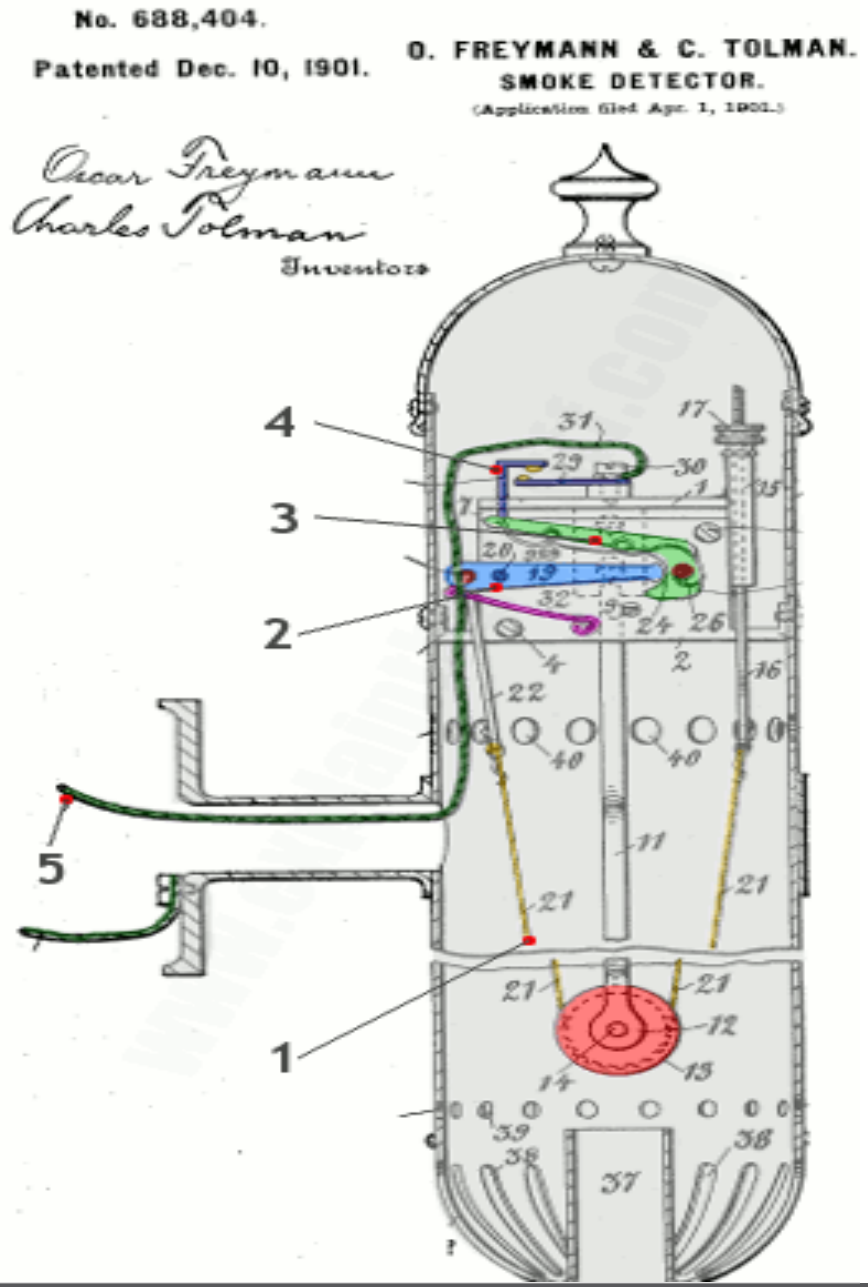
3 Patent US17355 City Fire Alarm Patent, Channing (1857)

Click, click, ding

Gamewell Master Box

- Next step forward in fire alarms
- Interconnected and coded
- These are still in service today in major cities

Gamewell Punch Register and Ticker Tape Reels



Does it come in automatic?

First automatic smoke detector

- Mechanically actuated
- Created by Oscar Freymann and Charles Tolman
- 1901

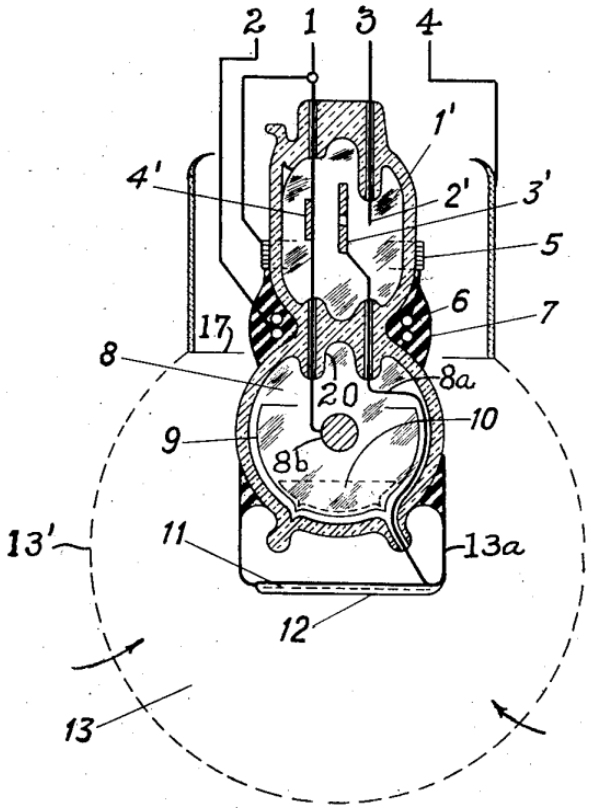
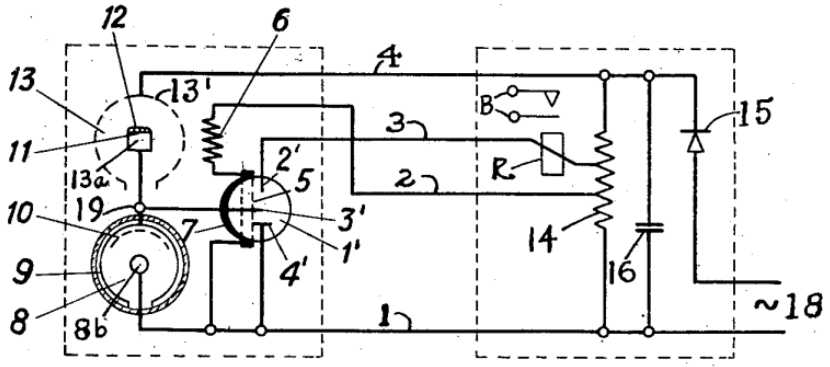


Fig. 2.



OK, well what about all-electric?

Electric smoke detector

- Created by Walter Jaeger in 1937
- His detector was intended for toxic gas
- Allegedly discovered its ability to detect smoke on accident after lighting up a cigarette
- Early ionizing detector

5 Patent US2465377, First Electric Smoke Detector (Jaeger 1949)

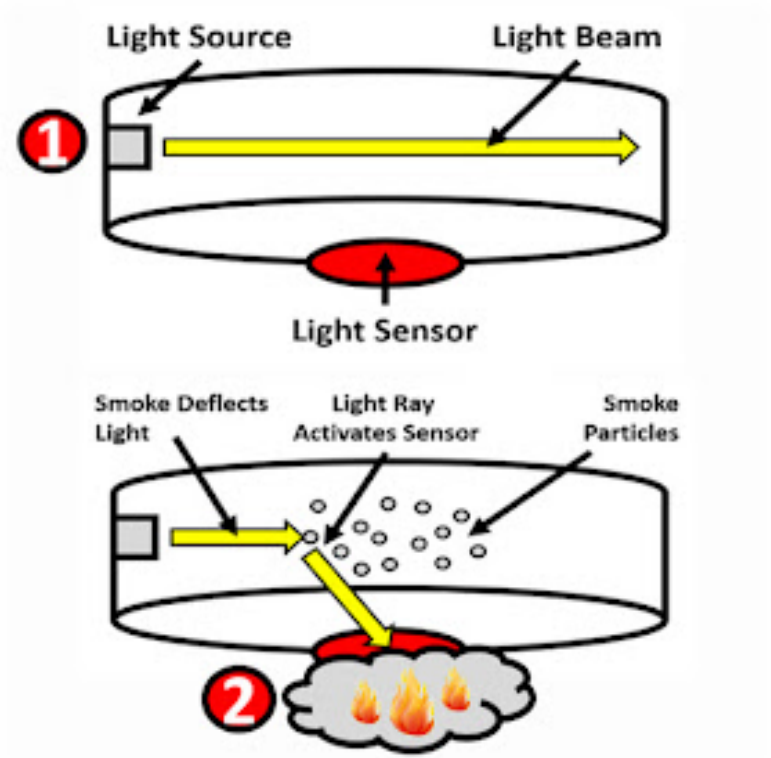
Now we're detecting with atoms

Ionization smoke detectors become the new norm

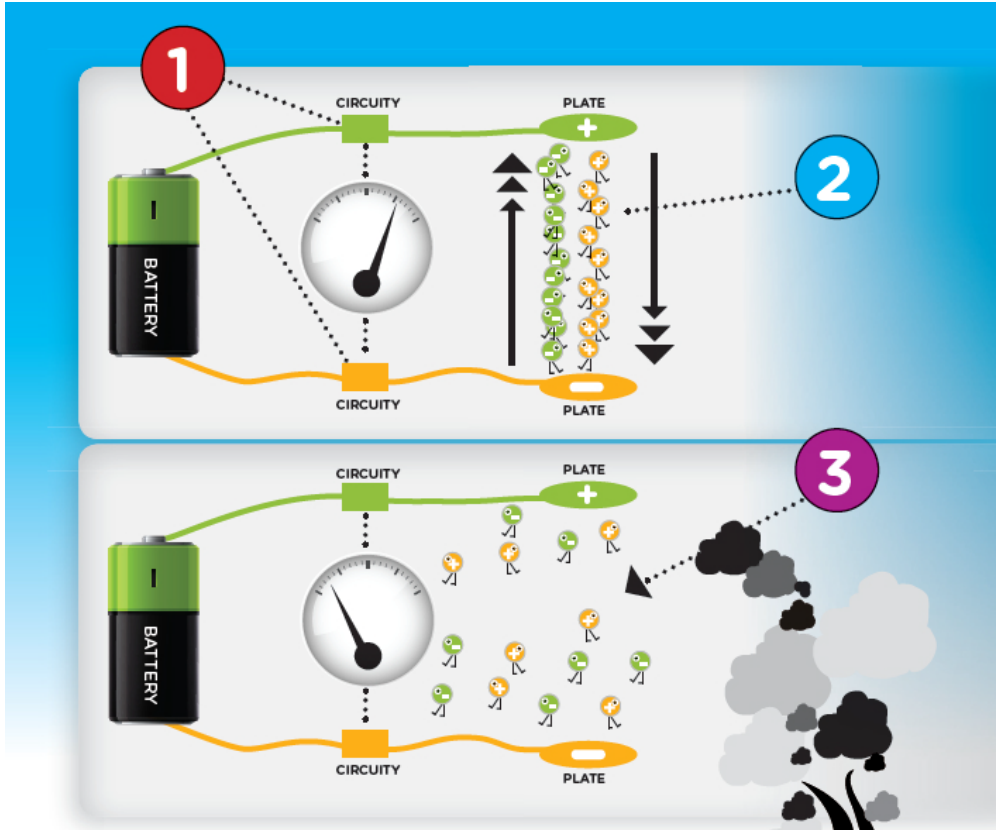
- First credited ionization detectors created in 1951
- First license for detectors with radioactive material granted by AEC in 1963
- Early models still bulky
- Then came the battery-powered SmokeGard 700
- Created by Duane D. Pearsall in 1973

6 Backgrounder on Smoke Detectors, US Nuclear Regulatory Commission, 2021

We need more light in here!



- Invented by Donald Steele and Robert Emmark of Electro Signal Lab in 1972
- Photoelectric smoke alarms are more sensitive to smoke produced by smoldering fires.
  - Fires involving upholstery or bedding
  - Recommended that every home have a photoelectric smoke detector
- Sometimes referred to as optical detectors.



SMOKE ALARMS

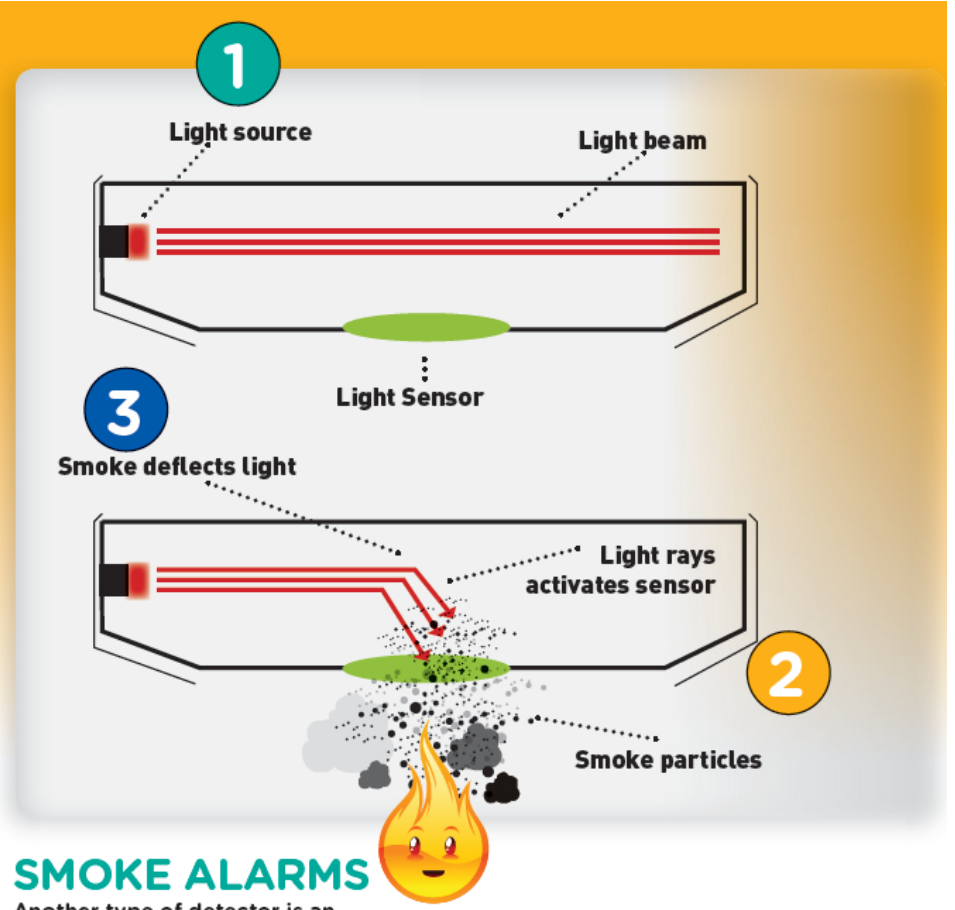
Did you know that scientists have spent many years working on smoke alarms to keep us safe? One of the most common types is an ionization smoke alarm. Here's how it works:

1 Inside the smoke alarm, there are two tiny metal plates called electrodes that are connected to a battery. This is called a circuit.

2 There is also a substance called Americium-241. Americium-241 converts air molecules into positive and negative ions. Because opposites attract, the negative ions move toward the positive plate and the positive ions move toward the negative plate. This movement creates a complete circuit or path of electricity.

3 When smoke enters the smoke alarm, the ions bond with the smoke, breaking the path of electricity.

4 When the flow of electricity is reduced, the alarm goes off.



SMOKE ALARMS

Another type of detector is an photoelectric smoke alarm. Here's how it works:

1 Inside the smoke alarm, there is an LED light that sends a beam of light (similar to a laser pointer) in a straight line across the chamber. In a separate compartment inside the chamber, there is a photosensor that detects light.

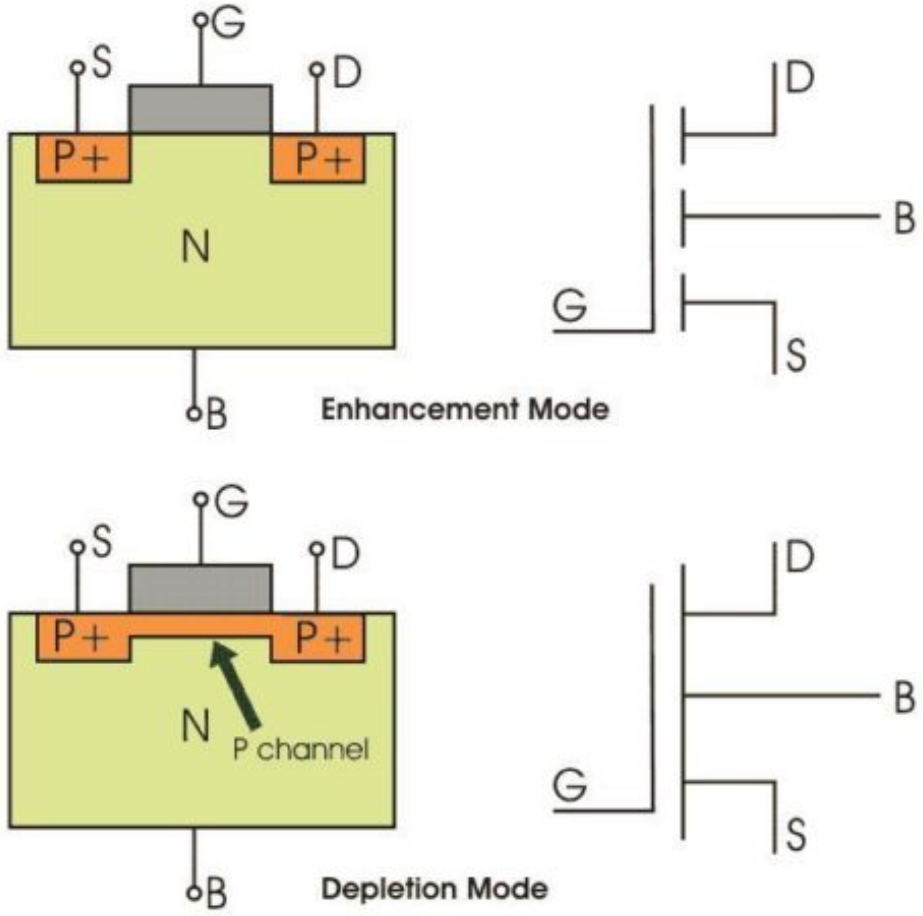
2 As smoke enters the detector, the smoke particles interrupt the light beam, scattering it in many directions. Some of the LED light scatters toward the light sensor. When light beams hit the sensor, the alarm will go off!

3 When the batteries in your smoke alarm get low, the smoke alarm automatically activates a low battery chirping sound different from the alarm sound so you know it's time to get new batteries.

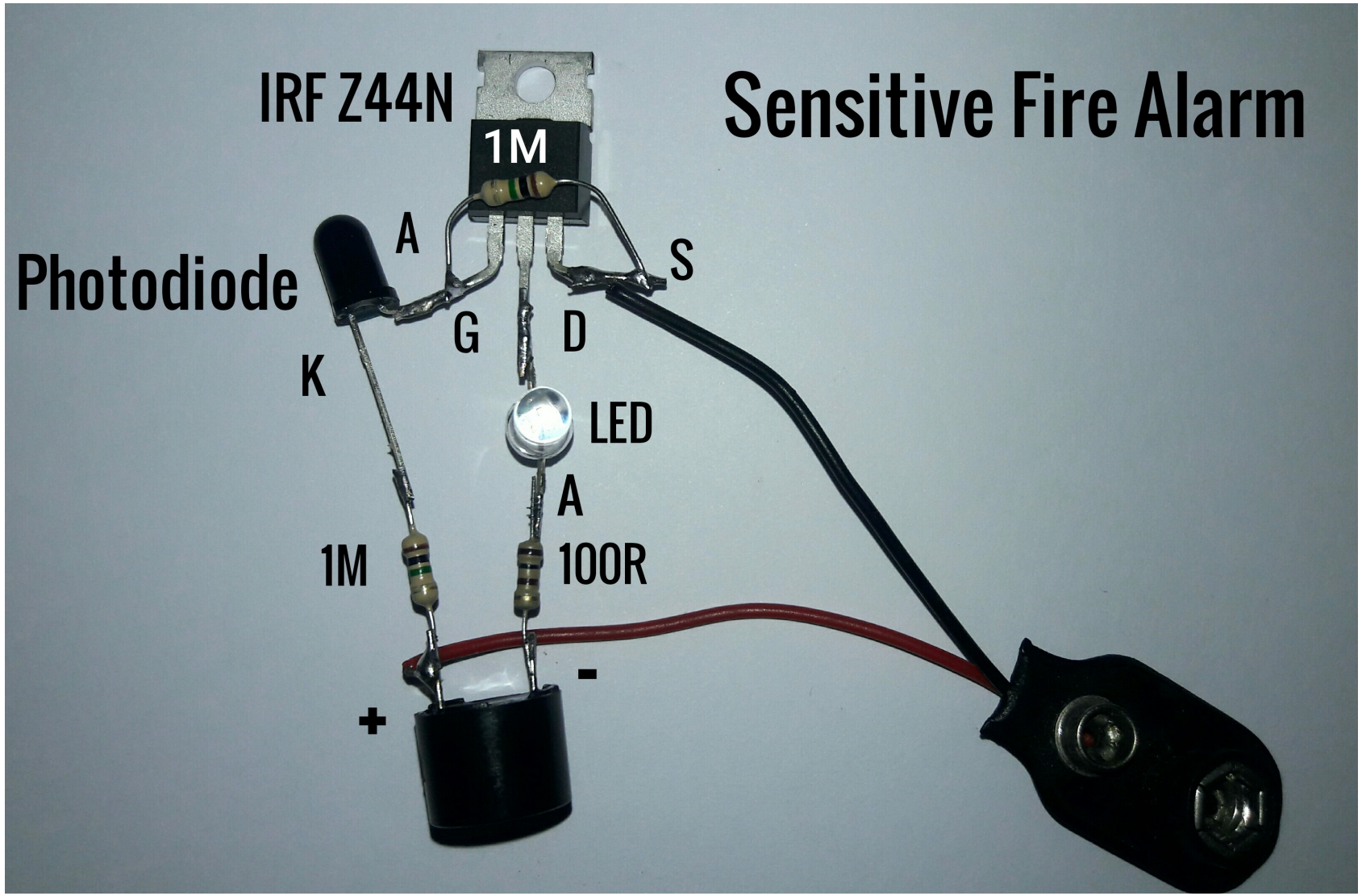
Some smoke alarm contain both optical and ionization smoke detection systems.

It started with a semi…

- Semiconductors were the key.
- Metal-oxide-semiconductor field-effect transistors (MOSFET)
  - First manufactured in 1960
  - Integral in reducing the size of detectors
  - Expanded potential use and increased sensitivities
- Smoke detectors are P-channel

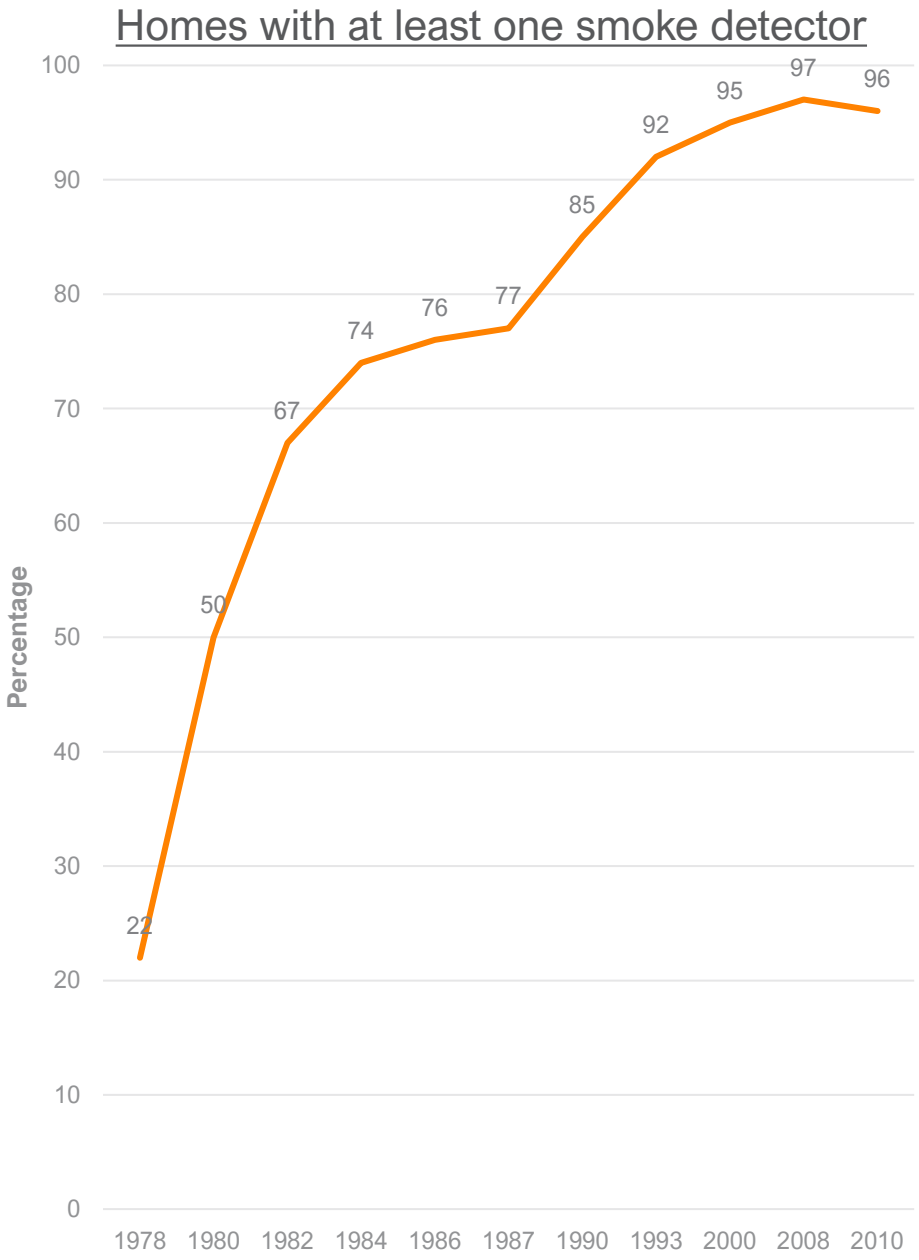


Soooo, what does it look like?



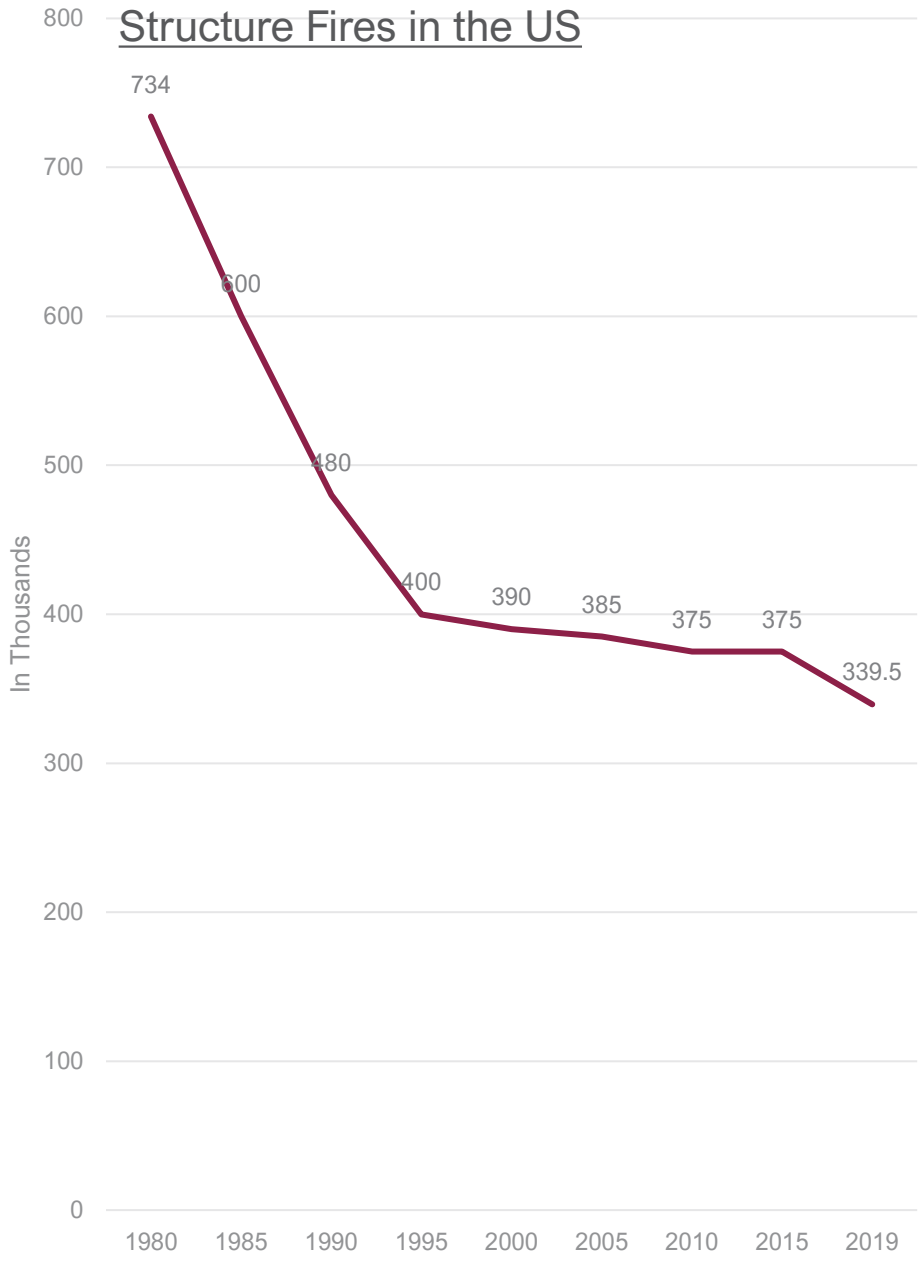
We don’t need no stinking detectors...

- 1976- NFPA 101, Life Safety Code requires smoke alarms in all homes
- 1980- 50% of homes had detectors
- 1984- 75% of homes had them
- 1988- model building codes require interconnected smoke detection in all bedrooms
- 1989- NFPA follows suit for interconnectivity requirements
- 1993- NFPA requires smoke detectors be located in all bedrooms



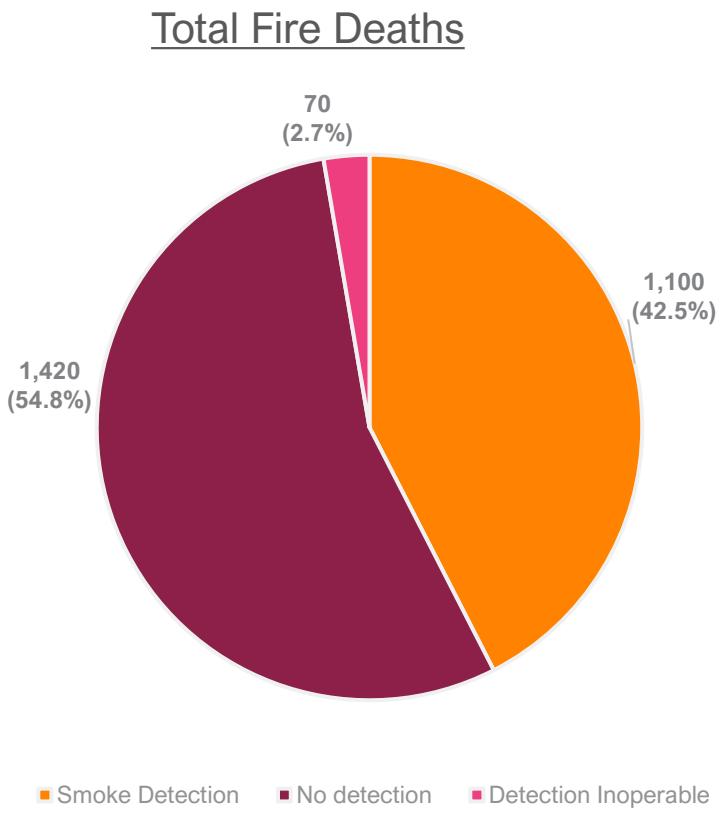
But what do they do?

- Smoke detectors chirp… oh, they also **save lives** and **protect property**. Not sure how important that last part is, but I find it pretty great.
- Smoke detectors are now present in at least 96% of homes in the US.
- Over the past 40 years, structure fire have dropped by 54%.



Yes, but stuff can be replaced.

- You cannot replace a human life.
- Nearly 55% of fire deaths were in homes without detection



12 Smoke Alarms in US Home Fires, Feb-2021
13 Smoke alarms in us home fires," *Smoke Alarms in US Home Fires- Supporting Tables*

12 Smoke Alarms in US Home Fires, Feb-2021
13 Smoke alarms in us home fires," *Smoke Alarms in US Home Fires- Supporting Tables*

THE UNIVERSITY OF TENNESSEE KNOXVILLE

Just set it and forget it!

- 1995- First 10-year lithium-battery-powered smoke detectors
- 1999- NFPA requires replacement of detector every 10 years
  - But why?
  - Determined by research and testing
  - Electronics have a shelf-life
  - NFPA estimates 30% failure rate after 10 years
  - It increases to more than 50% after 15 years
- 2015- IFC requires all detectors in multi-family dwellings to have 10-year battery.

60%

Homes with **battery-only** powered detectors

82%

Battery-only detectors operated

35%

Battery-only detectors reduce death rate

40%

Homes with **hardwired** detectors

94%

Hardwired detectors operated

69%

Hardwired detectors reduce death rate

12 Smoke Alarms in US Home Fires, Feb-2021
13 Smoke alarms in us home fires," *Smoke Alarms in US Home Fires- Supporting Tables*

How much better is hardwired?

15%

More likely to operate

97%

Reduction in death rate

12 Smoke Alarms in US Home Fires, Feb-2021
13 Smoke alarms in us home fires," *Smoke Alarms in US Home Fires- Supporting Tables*

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37%

Actuated when detectors are located **on ALL floors**

4%

Actuated when detectors are **missing on at least one floor**

15%

Alerted occupants when detectors are located **on ALL floors**

2%

Alerted occupants when detectors are **missing on at least one floor**

14 2004-2005 National Sample Survey of Unreported Residential Fires, July 2009

53%

Actuated when detectors are **interconnected**

4%

Actuated when detectors are **standalone**

26%

Alerted occupants when detectors are **interconnected**

2%

Alerted occupants when detectors are **standalone**

14 2004-2005 National Sample Survey of Unreported Residential Fires, July 2009

What next?

- Provide detectors with various microcontrollers
  - Provide better discrimination
  - Improved diagnostics
  - Better and more intelligent integration of multiple sensors
- Environmental conditions can be “learned” over time
  - Include temperature sensing
  - Humidity sensors
  - Chemical sensors

"I recommend installing interconnected (wired or wireless) smoke detectors throughout your home.

Taking it a step further, I also recommend going with the 10-year sealed-battery detectors to help improve reliability and overall safety to the lives of your loved ones.."

Jimmy Landmesser, Jr.

PhD Candidate standing before you

Jimmy Landmesser, Jr., P.E.

ORNL Fire Protection Engineer

I trust my wife with them

- All smoke detectors should be interconnected
- Make 10-year batteries mandatory.

Hopefully you are all impressed

QUESTION?