

Rapid-Response Early-Warning Wildfire Alert

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PROBLEM STATEMENT

Wildfires pose an increasing threat globally. The sooner emergency services are notified, the better. We need a faster system to alert dispatchers. Figure 1 is an example of the devastation of wildfires.



Figure 1: Camp Fire moving through a community. Picture courtesy of <https://www.convoyofhope.org/blog/features/disaster-response/camp-fire-response/>

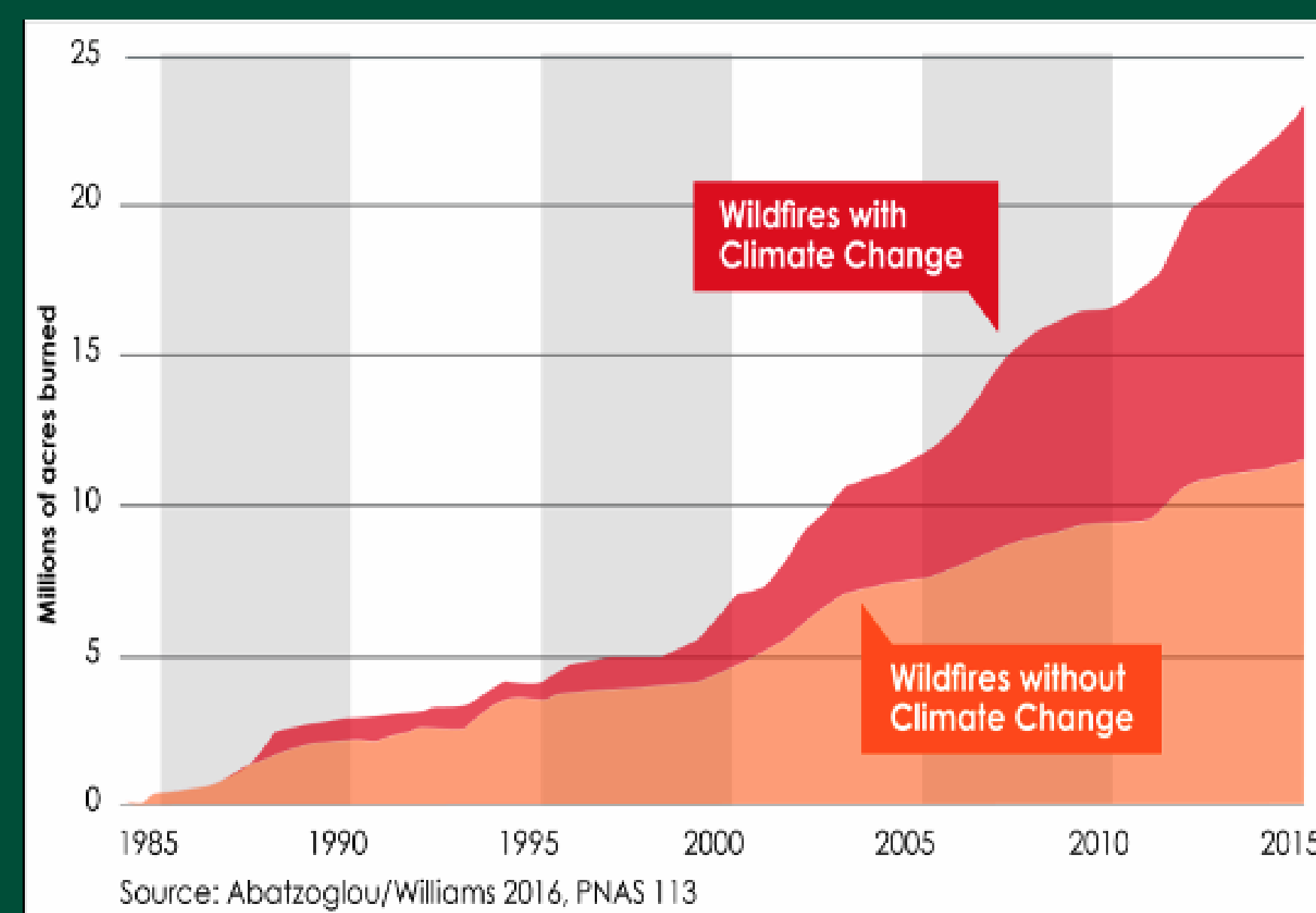


Figure 2: Wildfires increase due to climate change.

<https://www.gov.ca.gov/wp-content/uploads/2019/04/Wildfires-and-Climate-Change-California's-Energy-Future.pdf>. [Accessed 2 February 2020].

BACKGROUND

Wildfires have always been a problem in California. However, there has been a dramatic increase in the number and severity of fires. Climate change has increased the likelihood and harshness of wildfires, as can be seen in Figure 2. The ability to control and contain a fire in its most early stages is paramount to reducing the amount of damage. The most common way in which wildfires are identified is through human identification. This makes it very complicated to monitor large and remote areas. Visibility can also change due to weather conditions.

SUMMARY OF WORK

Using microcontrollers with basic sensors, we have developed a mesh network operating on the ham radio frequency of 433MHz. Using sensors, we can monitor CO levels over 6 square miles of wilderness. The sensors communicate to a Relay station that collects temperature and humidity information. The relay handles data and alert information from sensors which sends the information through other relays until it reaches the base station. The base provides an interface to human operators. See Figure 3

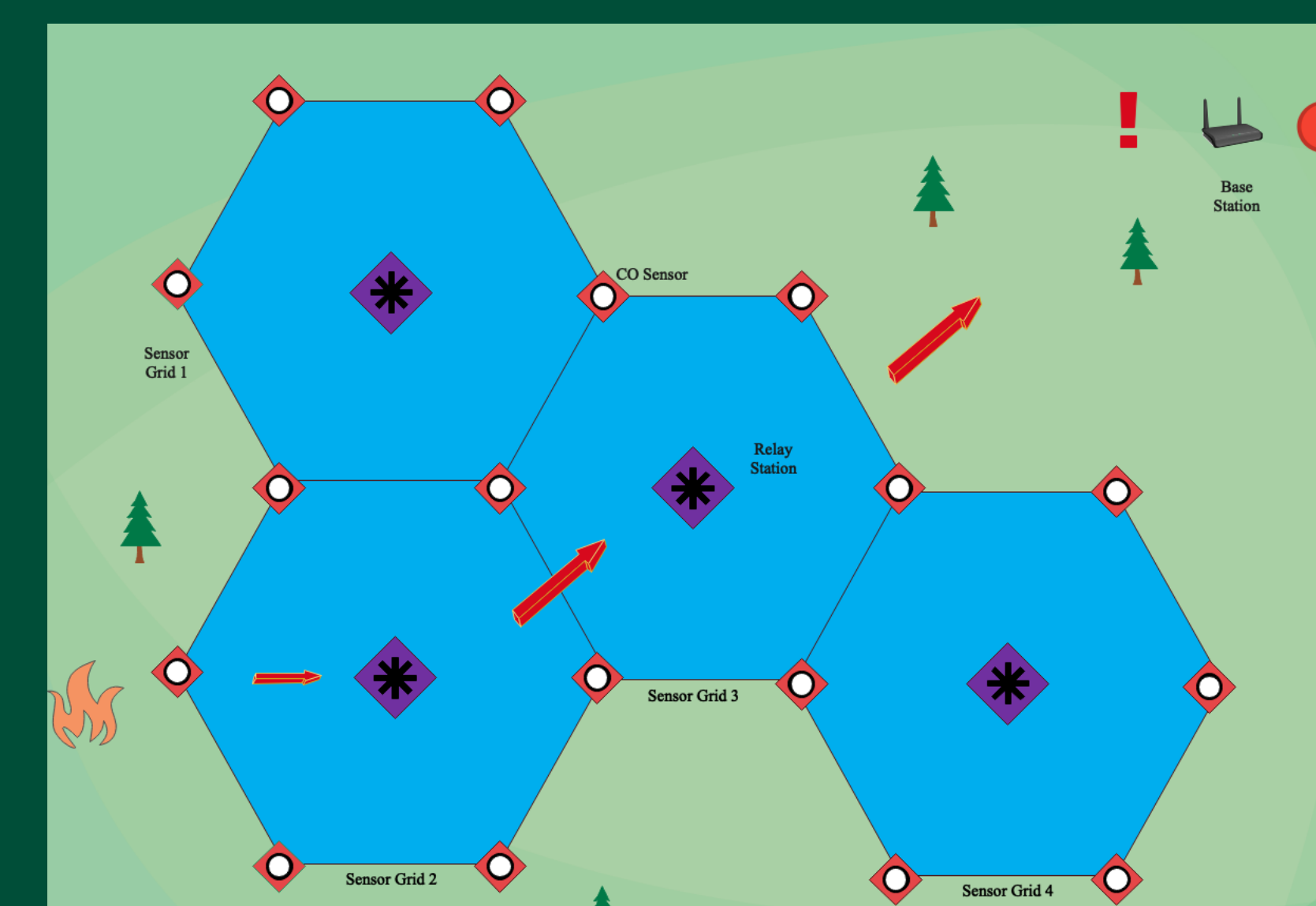


Figure 3: Data flow between devices.



Figure 4: Deployable sensor mounted to a tree.

IMPACT ON COMMUNITY

Rural communities suffer greatly from wildfires. These communities can't afford complicated monitoring systems. Our system is inexpensive, low maintenance, and easily implemented (see figure 4). It allows for early detection of high-risk areas and initial combustion incidents.

Key Features:

- Solar Powered
- Redundant communications
- Long term data collection
- Easily adapted to current systems