

# FireLink



- NASA Challenge: Managing Fire: Increasing Community-based Fire Management Opportunities
- CSA Challenge 1
- Short video presentation on LinkedIn: <https://tinyurl.com/yckybmap>
- Article on The Guardian featuring us: <https://tinyurl.com/2p9mncwp>

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# The Problem

- Wildfires are becoming more prevalent
- There's a lack of live updates
- Information comes through slowly and things can be confusing
- First responders don't usually have precise coordinates of impacted areas

ATLANTIC | News

**Some Halifax residents say they received confusing communication amid wildfire**



CTV  
NEWS

Source: CTV NEWS

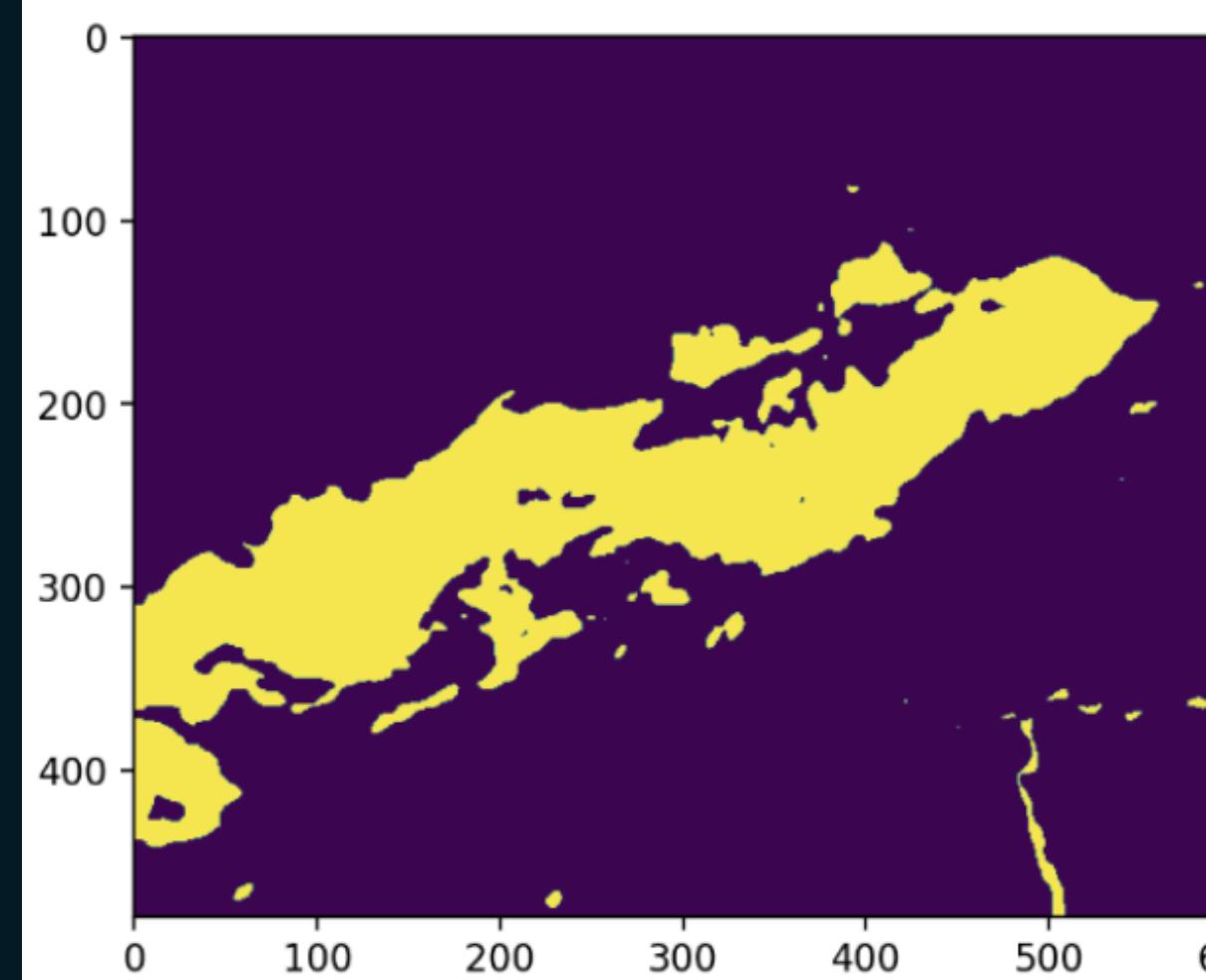
<https://atlantic.ctvnews.ca/some-halifax-residents-say-they-received-confusing-communication-amid-wildfire-1.6419176>

# FireLink's Solution

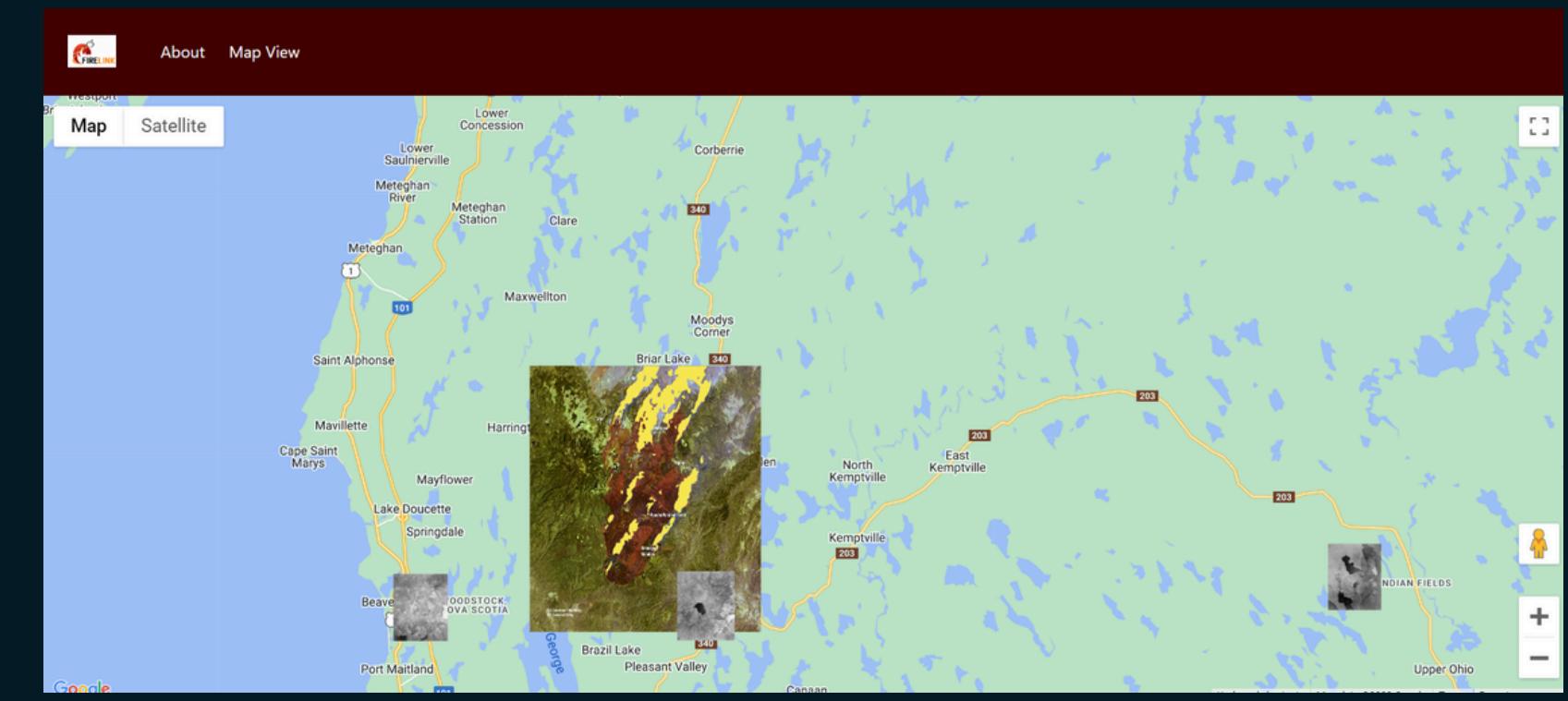
Thumbview



Preview Image

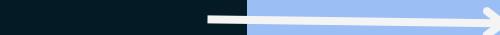
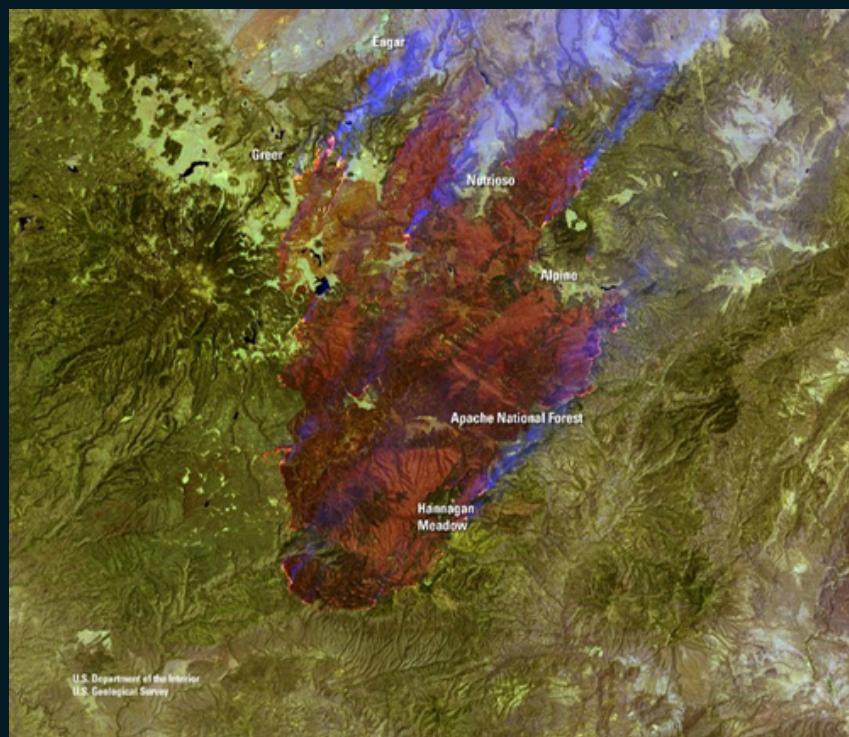


Geographic extent	Value
North	44.030045
South	43.996009
East	-65.918093
West	-65.95725



- AI prediction
- Live Feedback
- Web app available to the public
- REST API available to first responders
- Simple to use interface
- Fire coordinate projection

# FireLink in Action



A screenshot of the FireLink interface. The top navigation bar includes the FireLink logo, About, and Map View. Below the navigation is a map of a coastal town with various geographical features like roads, lakes, and towns labeled. A zoomed-in inset map is visible in the bottom right corner, showing a detailed view of a forested area with fire boundaries highlighted in yellow. The main map also features a yellow overlay representing the fire footprint.

- A drone, satellite or a helicopter, captures an aerial image of an impacted area.
- Positional data of fire is taken from image
- User sees the image overlaid over Google Maps with points of interest highlighted.

# Firelink Behind the Scenes

```
import math
import matplotlib.pyplot as plt
import matplotlib.image as mpimg

# Given/Measured Parameters
alt = 3298 # converting km to meters
f = 20 # example focal length in mm, replace with actual
sw = 35 # example sensor width in mm, replace with actual
center_lat = 40.0 # example latitude of image center, replace with actual
center_lon = -100.0 # example longitude of image center, replace with actual

# Load the image
img = mpimg.imread('path_to_your_image.jpg')
iw, ih = img.shape[1], img.shape[0]

# Calculating GSD
gsd = (alt * sw) / (f * iw)

# Pixel coordinates of the point of interest
x_pixel = iw // 2 # example x coordinate, replace with actual
y_pixel = ih // 2 # example y coordinate, replace with actual

# Calculating the offset from the center of the image
x_offset = (x_pixel - (iw / 2)) * gsd
y_offset = (y_pixel - (ih / 2)) * gsd

# Calculating the latitude and longitude of the point
# Note: The following assumes a flat Earth, which is a good approximation for small distances
lat_point = center_lat + (y_offset / (111.32 * 1000)) # converting to degrees
lon_point = center_lon + (x_offset / (40008000 * math.cos(math.radians(center_lat))))
```



- All calculations are performed locally, on board the vehicle based on GNSS and the camera lens
- An open-source transformer AI model locates fire in the images captured by the drones, before it gets sent to the user
- The image gets overlayed over google maps by mapping of the calculated global coordinates

# Who Could Benefit From This?



## First Responders

- Reconnaissance
- Damage Assessment
- Search and Rescue

## Communities Impacted By Wildfires

- Providing fast updates to users
- Allowing users and companies to assess damage in affected areas

The algorithm can be adapted with different models to serve different purposes.

# Business Model

Government  
of Canada

Gouvernement  
du Canada



- B2B - Government/Enterprise service for multipurpose application
- Provided as a service (SaaS)
- Access to future R&D and updates
- B2C
  - Free for the end user
  - Premium access for citizen scientists