FireStream Project Goals

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LONGAN VISION

McMaster University | BRIGHTER WORLD

Organizational Information

Name of Organization	Longan Vision
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Project Description

Longan Vision is involved in developing an AR device for firefighters, which combines a thermal camera, sensors to collect thermal imaging, environmental sensing data, and streaming all the data to the cloud servers, so the commanders can access the cloud app, to see and interact with what firefighters are looking at by thermal imaging, and the real-time situation by sensor readings by the AR device, and talk or interact with the firefighters that are using the device.

For this project, we would be responsible for live streaming several different devices all streaming video to one place. The video would need to be encrypted and have fail-safe protocols. Additionally, a UI would need to be developed to interact with the live stream that will allow the command hub to see all camera outputs, sensor readings and also involve live communication between the hub and the individual firefighters. Logan also has access to the I-pass 5G testbed which can be used in the later stages of the project once we've established a proof of concept with 4G.

In terms of the mechanical aspect, we are responsible for researching the possible cameras that can be used to develop our prototype. In addition, more thought needs to be placed into how these cameras can be insulated to withstand temperatures that firefighters experience on the field.

Key Deliverables

- Create a basic front-end UI web application that will have proper authentication of viewers and devices. Only viewers with access (username and password) can access the web application to view the streaming data from the devices and talk back to the firefighters using the AR device.
- Web application should be able to handle multiple device connections, and managing the connection on demand (connect, reconnect) with security concerns.
- First, start off with a working model with 2 devices.
- Create hardware connections between the camera and microcontroller.
- Create software that will be responsible for streaming data, video and sensor readings to the web application over cloud servers. Audio/Video should be encoded or compressed for faster transmission.
- After 2 devices are able to successfully interact according to project specifications, introduce a 3rd device into the network. The minimum goal for this project is to get 3 devices working together in a network.

Research

- Research and understanding of concepts and any software needed to start development
  - Familiarizing with software libraries including:
    - Qt - cross-platform C++ application library for embedded devices and general UI software
    - OpenCV - C++ library for vision processing which will be used for accessing the camera, encoding data and stream to server
  - Familiarizing with web application:
    - Python Web Application based on Flask and OpenCV
    - AWS Amazon Web Services
  - Concepts include:
    - Transmitting data:
      - Encoding, sending, receiving and decoding
- Researching potential hardware to use for the AR device which includes potential boards and cameras.