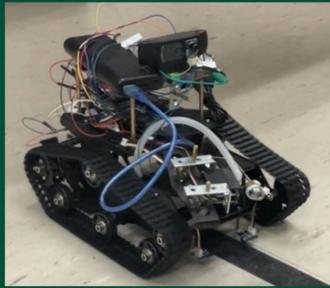# A.H.P.I Autonomous Home Protection Against Infernos

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PROBLEM STATEMENT

First responders' response times can vary greatly and at times fires run rampant before emergency services may arrive, destroying precious belongings and destroying homes. A.H.P.I aims to shorten the time for Initial attack on a fire that has been detected within a single storing dwelling. Our intent provides a solution to the time propagation that it takes emergency services to arrive at a house fire to begin fire suppression efforts. The robot, being stationed within a home, will deliver a payload of fire suppression to the room in which the fire has been detect and with the ability to detect the fire, at a minimum, prevent a fire from spreading further across the home, and at best extinguish said fire.
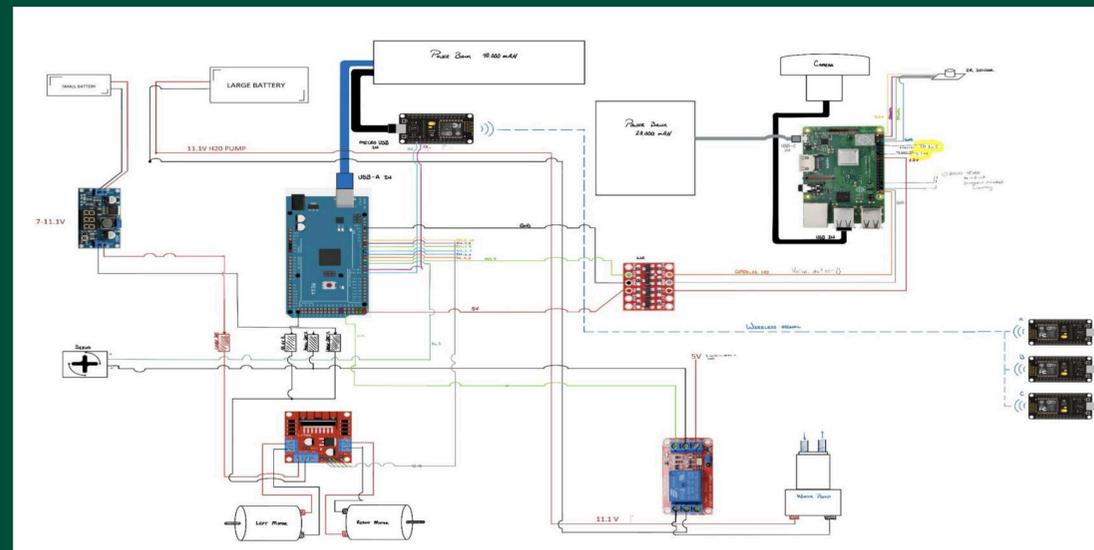
BACKGROUND

Posed with our societal problem, the team brainstormed a design solution to the dynamic response of emergency services which is the rapid suppression response of a firefighting robot. A solution to battle home fires is a semi-autonomous firefighting robot. This robot would be capable of mobilizing to the location of ignition/fire based on a mesh system of a fire alarm, with the robot following a predefined trail to the room of a fire-based on line following. Then it will aim at the fire with its fire suppressant equipped to put out the danger so long as no verbal stop commands are asserted. Our idea provides a solution to the time propagation that it takes emergency services to arrive at a house fire. The robot will, at a minimum, prevent a fire from spreading further across the home and ideally extinguish said fire.

The Above picture shows the flame detection system.

SUMMARY OF WORK

Smoke Alarm Mesh System
- ESP8266 with wireless LAN to transmit location of fire

Fire Suppression System
- Raspberry pi 4 with Logitech camera and thermal IR sensor to initiate water pump to suppress fire

Line Following System
- Arduino Mega, two motors, and two sensors to follow a black line to location of fire
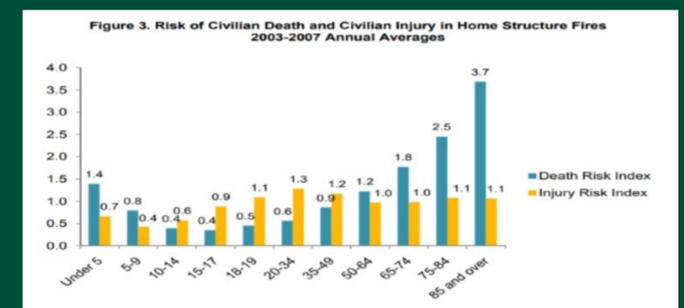
Measurable Metrics
- Fire suppressant can be sprayed for an effective range of 2 feet.

- Robot is able to reach a speed of 1 ft/s, carry a minimum of 1.5 pounds of liquid, and the battery life can last at least 20 minutes.

- Line following and Voice detection

IMPACT ON COMMUNITY

The intended, long-term impact of this work includes:
- **The Robot will aid first responders by providing more time for occupants to seek safety while suppression efforts are handled by A.H.P.I.**

- **Minimize direct property damage caused by home fires.**

- **Reduce civilian deaths and injuries.**

- **Has the potential to reduce the emission of pollutants (VOCs and SVOCS) when certain items are burned that causes health problems such as cancer**

The Above Picture displays the risk of death and injury for ages under 5 through 85 and over.