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UNMANNED FIRE EXTINGUISHING AERIAL VEHICLE

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UNMANNED FIRE EXTINGUISHING AERIAL VEHICLE

ABSTRACT

An Unmanned Aerial Vehicle (UAV) fire extinguishing system extinguishes a fire using an UAV. The UAV carries a payload such as a fire extinguishing unit. The system keeps on monitoring the surrounding environment and detects a fire using a detector. Upon this determination, the system launches the UAV. The system then determines the exact location of the fire using the UAV. Subsequently, the system extinguishes the fire by activating a fire extinguishing unit in the UAV over the location of the fire.

PROBLEM STATEMENT

Fires can ignite at homes due to various reasons such as accidents cooking, accidents BBQ'ing, short circuits of home electrical appliances, etc. The National Fire Protection Association (NFPA) estimates that U.S. fire departments responded to an average of 366,600 home structure fires per year from 2007-2011. These fires caused an estimated average of 2,570 civilian deaths, 13,210 civilian injuries, and \$7.2 billion in direct property damage per year. The NFPA also states that a first company of firefighters should ideally arrive on the scene of a fire 4 minutes after being alerted of the fire to contain losses to a minimum. However, the actual response time for firefighters ranges from 9 - 14 minutes depending on population density.

One tested and widely employed solution to contain the spread of fire and losses before firefighters arrive on scene is the use of sprinklers. However, the cost of sprinkler installation is high, as are maintenance costs. Sprinkler systems are also vulnerable to colder climates, availability

of adequate water supplies in rural areas, and potential for property damage from accidental activation., Therefore, sprinkler systems are an imperfect solution in the average home. An advanced system for extinguishing fires is described herein.

UAV FIRE EXTINGUISHING SYSTEM

The systems and techniques described in this disclosure relate to a UAV fire extinguishing system. The system can be implemented for use via the Internet, an intranet, or another client and server environment. The system can be implemented as program instructions stored locally on a client device or implemented across a client device and server environment. The client device can be a detector which can be used to detect a fire such as a smoke detector, a fire sensor, a flame detector, a fire suppression system, a heat sensor, a fire alarm, etc, or can be an electronic device capable of communicating with the detector such as a mobile phone, smartphone, PDA, a digital thermostat, a home communication system, etc., which includes the necessary processing capabilities.

Fig. 1 illustrates an example method 100 which can be used for extinguishing a fire using the Unmanned Aerial Vehicle (UAV) fire extinguishing system.

The system detects a fire using a detector (110). The detector can be a sensor used to detect fires. A few examples of the detector are a smoke detector, a heat sensor, a flame detector, etc. For example, as can be seen in Fig. 2, smoke emanating from a fire is detected by the system utilizing the smoke detector. The smoke is considered as a sign for a fire by the smoke detector.

The system launches an UAV upon detecting the fire (120). The system undocks the UAV, which may be connected to the smoke detector, upon determining there is a fire. The UAV is a device which can be remote controlled or can fly autonomously based on pre-programmed plans or

dynamic automation systems. The UAV can be light-weight and of appropriate size so that it can attach to the detector and be placed anywhere in a home environment. The UAV can be attached to the detector using clamps or mechanical clasps. Additionally, the UAV also has the required fittings and attachments in order to hold a fire extinguishing unit. Additionally, or alternatively, the type and size of the UAV is determined based on the fact that the UAV can stabilize over a desired target while carrying the fire extinguishing unit.

As soon as the UAV is launched from the detector, the UAV locates the fire (130). The system can engage thermal cameras, installed on the UAV and/or installed throughout the home to identify the location of the fire. The system can process the images from the thermal camera to locate the fire. For example, the system processes the infrared images to locate the point in the home with the highest temperature. This can be achieved by comparing the different thermal imaging readings from the camera. The point of highest room temperature is determined to be the location or center of the fire. Additionally, in case of multiple points of the fire in the same room, the system can determine the fire that is more spread out by comparing the images from the thermal camera.

Upon determination of the location of the fire, the system extinguishes the fire by activating a fire extinguishing unit in the UAV over the location of the fire (140). The fire extinguishing unit is carried by the UAV and can be activated as soon as the system determines that the UAV is hovering over the location of the fire (see Fig. 2). In an embodiment, the system determines that the UAV is hovering over the location of fire by using the thermal imaging camera. In another embodiment, the system utilizes a motion detector present on the UAV to determine that the UAV has stopped moving and is simply hovering over the fire. The fire extinguishing unit can be an automatic aerosol fire suppression spray, be connected to the home's water source, or can be any portable device that

discharges a jet of water, foam, gas, or any suitable material to extinguish a fire. Additionally, or alternatively, the system may also sound an alarm or alert the authorities when the system detects the fire.

The subject matter described herein can be implemented in software and/or hardware (for example, computers, circuits, or processors). The subject matter can be implemented on a single device or across multiple devices (for example, a client device and a server device). Devices implementing the subject matter can be connected through a wired and/or wireless network. Such devices can receive inputs from a user (for example, from a mouse, keyboard, or touchscreen) and produce an output to a user (for example, through a display and/or a speaker). Specific examples disclosed are provided for illustrative purposes and do not limit the scope of the disclosure.

DRAWINGS

100

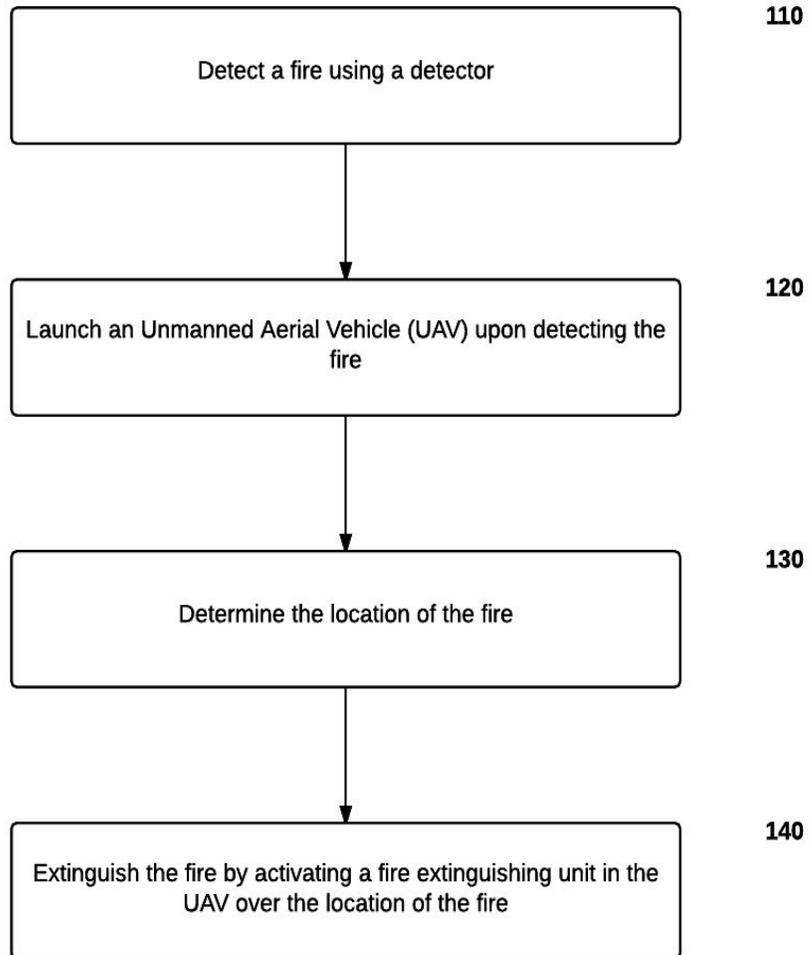


FIG. 1

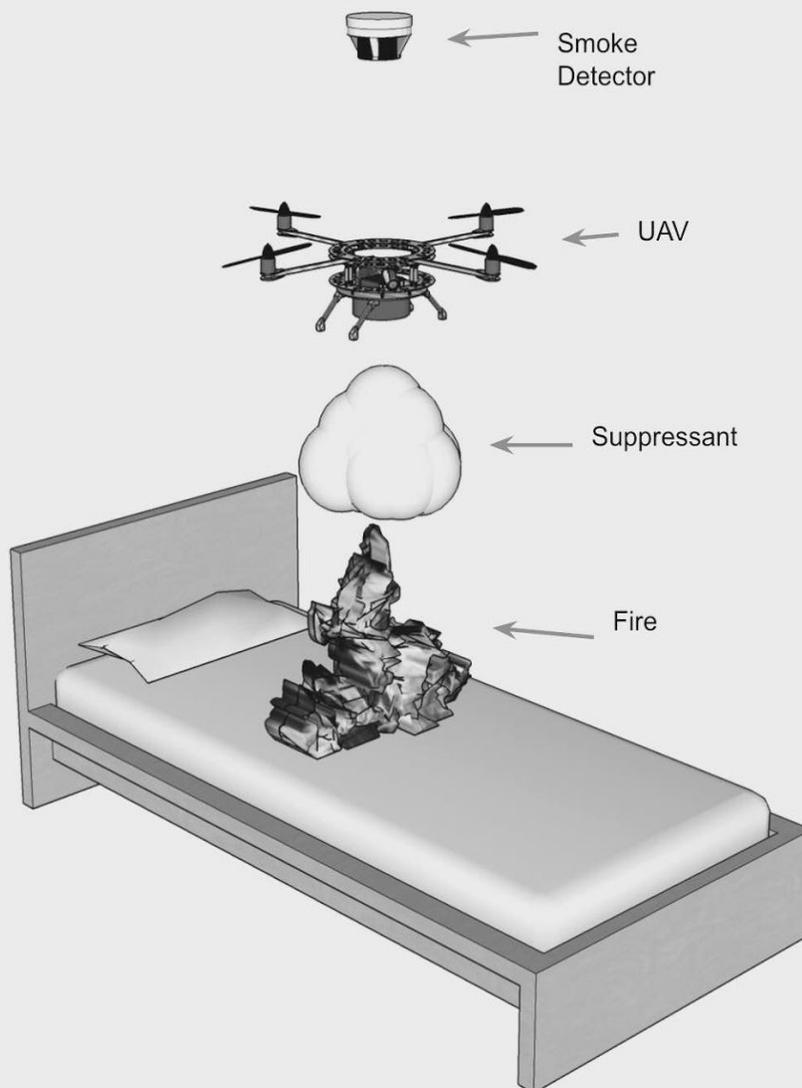


Fig. 2