SURPASS: Supplemented Urgency Regulating Personal Alert Safety System
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Introduction: Firefighting has long proved to be a dangerous occupation. Developed in the 1980’s, the Personal Alert Safety System device, better known as the PASS device, has proved to be a crucial tool for saving lives. PASS devices are distress alarms that are activated after a pre-defined period of no motion, alerting others of an incapacitated firefighter, even when the downed firefighter is not able to call for assistance himself. Although PASS devices have indisputably saved lives, their principle of operation has not changed since their inception.

Design: SURPASS intends to evolve the PASS alarm by focusing on several aspects of the PASS alarm. SURPASS aims to improve the basic alarm functionality by utilizing additional sensors to create a contextually aware device, one that regulates the urgency of alarm activation in order to both reduce the potential for false alarms and expedite the reaction to dangerous situations. SURPASS integrates motion detection via accelerometer, position orientation detection via gyroscope, location estimation via GPS, and wireless communication capability via XBee radios.

The time required for the alarm to activate is varied in accordance to the multitude of scenarios a firefighter may encounter.

SURPASS can detect whether the firefighter is standing or is upside down, if he is moving, or if he has fallen on the ground, hence, it takes into account the contextual information of the firefighter while signaling an audio alarm. This allows SURPASS to prevent accidental activations. In addition, SURPASS integrates advanced wireless features that would allow the device to communicate with key personnel that are outside the periphery of the region where fire appeared. This would give information about each firefighter’s current status, past activity, or call for an evacuation in case of an emergency.

Conclusion: Overall, SURPASS aims to introduce simple yet effective improvements to a crucial, life saving device. With the proliferation of affordable sensors and technology in devices such as smartphones, the modernization of the PASS device has been long overdue. SURPASS is designed to surpass the capabilities of the PASS devices that exist today.