UL – IIT Gandhinagar Kitchen Fire Safety System

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Abstract

Fire occurrence in Indian home is well documented. Presence of cooking oils and appliances used for preparing food along with presence of Liquefied Petroleum Gas (LPG) as a source of energy make it ideal combination of fire hazard at kitchen. Statistical data in India show that approximately 16% of fires in Indian home originate in the kitchen. Many of these fires are suspected to be due to distracted or unattended cooking.
A research project was designed to collect data on the conditions (e.g., temperature, gases, smoke) around the Indian kitchen cooking appliance while heating the oil using a LPG stove appliance. Experiments were conducted by heating cooking oils typically used in India such as sunflower oil, soybean oil, groundnut oil and mustard oil. The kitchen appliance environment was instrumented to measure temperatures and carbon monoxide concentration. The data generated during experiments were collected using a data acquisition system which collected the oil temperatures, and carbon monoxide (CO) concentration measured in the kitchen ventilation system (chimney). Based on the observations and analysis of the experimental data, a multi-sensor algorithm was developed to predict potential occurrence of fire. The algorithm includes oil temperature and CO measurement in the kitchen ventilation. The algorithm has been incorporated in a microprocessor based fire detector kit to provide a multi-level response to the fire threat. It can, for example, (i) alert the home occupant through an alarm; (ii) send Short Messaging Service (SMS); (iii) call the occupant; and (iv)cut off the LPG (fuel) supply to cooktop.

More testing is required to validate and tune the performance of the algorithm for the range of stove and ventilation design parameters in the Indian kitchen. In addition, research is also required to better document the performance of the system to reduce and nuisance situations in the Indian kitchen.

The IIT Gandhinagar fire safety system is a modular and low cost kit which can save loss of property and lives due to kitchen fire.

Keywords:
Safety, kitchen fire, fire protection, CO sensor, oil heating