Tru-Alert: A Smoke Alarm with Steam Sense Technology

Du, Kelvin (School: Newington College)

Purpose: Smoke alarms are common life-saving devices. However, many nuisance alarms due to cooking-related activity can occur which can be very costly. It is hypothesised that water vapour triggers a nuisance alarm. A comparative experiment between activation times of ionisation and photoelectric smoke alarms in the presence of different levels of smoke and humidity was conducted; with an evaluation supporting the integration of a relative humidity sensor in an ionisation smoke alarm circuit to help reduce such nuisance alarms. Procedure: Ionisation and photoelectric alarms were used in comparing the time it took for activation under various experimental settings, with the use of a hygrometer to measure change in relative humidity. A simulation of the prototype of the circuit was generated using Multisim software. A comparator was used in the breadboard prototype to trigger or silence the system. Results: 1) the ionisation alarm was faster to respond than photoelectric alarms and as relative humidity increases, activation time was faster for both alarms; 2) the simulation proved that adding a comparator to compare humidity and smoke signals in the circuit works and; 3) there were no water vapour related nuisance alarms when there was no smoke, and the alarm would still activate if there was smoke. Conclusions: Project Components 1 and 2 demonstrate that an increase in humidity does cause alarms to send fire warning signals including nuisance ones. The integrated alarm system with the addition of a humidity sensor demonstrates the potential of reduction in water vapour related nuisance alarms.

Awards Won: