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Computer aided alarm information systems

R. Wilton
Cobrabell Limited, 3 Great West Road, Chiswick, London, UK

INTRODUCTION

London Underground's Fire Protection Engineer's instigated a research project to provide a method of data gathering for the newly installed fire detection systems. Cobrabell Ltd. is one of the contractors employed by London Underground on Fire System's Design and Maintenance. Cobrabell has developed a number of process control systems for various clients. We have produced and implemented several systems that include a processor of some type.

The flexibility and reliability of this type of control mechanism have steadily increased. Currently nearly all the systems that we design include a micro processor.

With this in mind, when London Underground decided to turn its research project to a pilot scheme, they employed Cobrabell to assist with the work.

Cobrabell has experience that includes different systems such as Energy Management and Security being combined to give an overall 'Building Management' Information. System'. It was agreed that as far as possible the information system should be able to gather data from any other systems within the underground station environment. This required design work to allow information exchange from different systems. From a management point of view much data is available that can be used to assess maintenance requirements and operational efficiency. The problems that arise concern compatibility, communication and volume of data.

Standard

.This highlights the need for an agreed International Standard for data exchange between processor systems.

Cobrabell and London Underground Ltd. approached the problem by looking at flexible communication, combining this with a universal connectivity system that is compatible with standard software. This was essential to provide a flexible information system required by London Underground. The target was to use Windows (T.M.) compatible software for data management. The system should also give engineers the possibility to access control systems from almost any location with compatible P.C. equipment and modem.

The system described is in use on the Fire Protection systems installed at some 30 locations in Central London. Its purpose is to gain more information about the exact cause of alarm actuation. The requirement is to capture for further analysis the data of non-fire events that cause disruption. The use of automatic data gathering for this purpose will help to provide better system design in the future and allow for adjustments to the existing system to increase reliability and system integrity.

Our client, London Underground Ltd. (LUL) have in excess of 117 analogue addressable fire alarm and detection systems installed in Sub-Surface Railway Stations. The systems are required to be operational whenever the station is open to the public. London Underground additionally prefers that the alarm systems are operational even during extensive engineering works.

The decisions to use Analogue Addressable Fire Detection Systems was based on the requirement that LUL should use the most efficient technology available to provide the highest standard of safety and reliability possible. The specification required the system to provide the best possible Fire Defence System with a minimum of false alarms. Ease of maintenance was a high priority. The ability of such systems to monitor fire sensor calibration and call for maintenance if calibration is outside set tolerances was foremost in this decision.

Data

The volume of data from over 100 of such systems is large. The original program of attending each site and down loading current data for analysis at the Fire Engineer's offices was expensive and too slow. The result was that London Underground's Engineers were unable to take preventative Acton since information upon the conditions leading to false operation of alarms was sometimes ambiguous, and was not available until after an incident.

The data needs to available quickly to allow for preventative action to be undertaken

Coupled with this London Underground has a statutory obligation to record any instances when the Fire Alarm Systems require isolation, as is the case when 'hot' work is taking place. They must ensure that all such isolations are traceable, correctly performed and are reinstated when the work is complete

. This has required engineers to attend site to activate and reinstate isolations.

With this in mind the Maintenance Engineer and his team set out a specification for a monitoring system that could provide alarm information quickly, but not necessarily in real time; A system that could allow remote control if required of isolation and reinstatement to reduce the costs associated with sending Maintaince Engineers to site; A system that could monitor isolations and reinstatements to produce an audit trail. Finally a system that would have the capacity to call for Preventative Maintaince before false alarm conditions occurs.

SPECIFICATION

The specification had three objectives:

Firstly to provide a cost effective method for isolations. *Secondly* to provide monitoring of alarm systems status and *Thirdly* to provide information for a pro-active maintenance program thereby reducing system down time.

Pro-active maintenance and down time objectives are considered to be secondary. The reduced number of service visits per year should provide a reduced cost of ownership. The whole program ought to operate without prejudicing Fire Safety.

MONITORING PROJECT IMPLEMENTATION

The cost of providing a dedicated data gathering line, for connection to each site is prohibitive, so this was ruled out as not cost effective. On the other hand all sites are connected to the telephone system. Better still LUL. has its own 5 digit internal system, so the internal telephone system was possibly the most cost effective method of gathering data. The cost of a dedicated telephone line was considered too high and is inefficient in the use of available resources.

Therefore the alternative of a telephone modem in conjunction with normal telephone extensions, was considered to be cost effective and flexible.

The system uses as far possible off the shelf hardware and software, To meet the objectives of the project the provision of a universal method of data gathering is essential. To Interface the LUL alarm control systems with the normally used commercial hard and software.

This has been achieved by using 'The CdC Engine' This Software produced by 'CdC systems Ltd' fitted the requirements.

It is a windows based software system that lets existing windows application software to communicate with real time data networks and systems.

It's has a modular construction enabling it to connect the fire alarm systems to a central network via Telephone Modems also containing a CdC engine controlled processor system. Thus not only can data from the alarm systems be automatically collected but some or all of the alarms' systems control functions can be remotely displayed and if necessary controlled.

A prototype was set-up and tested using a local network P.C. system and Fire control panels together with the processor controlled programmable modem.

The prototype proved that the system was viable and worked very well over the existing telephone network.

The flexibility of the system allowed other systems including closed circuit TV, Access control and Energy Management to function along side the Fire system. Thus in practice the Intelligent Modem could be used to transmit data from different systems to either a central data gathering system or to disseminate information to a number of different networks. The receiver of the information can decide what information he requires. The modem can also be programmed to send information about different systems to various and multiple locations.

Thus the possibility exists to receive for example, a closed circuit television picture from a site that is indicating a fire condition. The system is possibly going to be extended to cover all the fire alarm systems.

The current programming allows for each of the connected Fire systems to contact a central PC network several times each day.

The Central PC system's programming allows it to read each smoke sensor's analogue value. This information is stored as a data base.

The data base programming is designed to look at trends and integrates historical data to form the basis for prediction of smoke sensor's maintenance requirements over the next time period. Thus a prediction of when the smoke sensor device will require attention is available.

The ability to adjust plans to optimise the next service visit is clear. There should be a reduction in false alarms from over sensitive detectors. The incidence of under sensitive detectors will also be recorded, thus ensuring the efficiency of the system.

If the increased efficiency of both the connected system and the Maintaince of the systems monitored in this way leads to reduced costs I would speculate that they will become common place.

Further if the integrity of such systems is proven the need for routine visits may be reduced. What is apparent is that this type of systems ability to call for maintenance when required will now allow for more efficient use of available resources and thus be at least self financing.