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GSM Based Smart Surveillance System Using CCTV

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Abstract - In this paper, we describe a real-life trial system where various video analytic systems are used to detect events and objects of interests in a mass transport environment. The system configuration and architecture of this system is presented. In addition to implementation and scalability challenges, we discuss issues related to on-going trials in public spaces incorporating existing surveillance hardware. The ability to recognize objects and humans, to describe their actions and interactions from information acquired by sensors is essential for automated visual surveillance. The increasing need for intelligent visual surveillance in commercial, law enforcement and military applications makes automated visual surveillance systems one of the main current application domains in computer vision. The emphasis of this review is on discussion of the creation of intelligent distributed automated surveillance systems. The survey concludes with a discussion of possible future directions. The technological evolution of video-based surveillance systems started with analogue CCTV systems. These systems consist of a number of cameras located in a multiple remote location and connected to a set of monitors, usually placed in a single control room, via switches (a video matrix).

Keywords: CCTV, GSM, Smart Surveillance System, PIC controller and Sensing & Controller.

I. INTRODUCTION

A primary objective of this paper is the field trialing and ongoing development of a system for the robust detection and identification of persons of interest in a crowd. These people will often have non-frontal facial presentation, be photographed under various lighting conditions, and will exhibit natural expressions such images are typically acquired from CCTV cameras in public spaces as the subjects are not usually aware of camera placement. Other capabilities that are being trialed and developed include

1) Robust detection of background changes,
2) Tracking and identification of people by their appearance across multiple cameras,
3) Detecting suspicious events such as left luggage or the dangerous behavior of people, and
4) Video summarization to produce brief video summaries of activity.

In this paper, the configuration of the trial system and some early results from commercial and NICTA research systems is presented. We also discuss the implementation and scalability challenges, as well as issues related to on-going real life trials in public spaces using existing surveillance hardware. The main capabilities that are currently offered by leading Intelligent Surveillance software vendors are demonstrated. Technology gaps are identified and opportunities for computer vision and pattern recognition research in the field of ICCTV are discussed.

The main stages of processing in an intelligent visual surveillance system are: moving object detection and recognition, tracking, behavioral analysis and retrieval. These stages involve the topics of machine vision, pattern analysis, artificial intelligence and data management. Nevertheless there tends to be a lack of contribution from the field of system engineering to the research Even though the main goal of this paper is to present a review of the work that has been done in surveillance systems, an outline of different image processing techniques, which constitute the low-level part of these systems, is included to provide a better context. One criterion of classification of surveillance systems at the sensor level (signal processing) is related to sensor modality (e.g. infrared, audio and video), sensor multiplicity (stereo or monocular) and sensor placement (centralized or distributed). This review focuses on automated video surveillance systems based on one or more stereo or monocular cameras because there is not much work reported on the integration of different types of sensors such as video and audio. However some systems process the information that comes from different kinds of sensors as audio and video.

Intelligent multi-camera video surveillance is a multidisciplinary field related to computer vision, pattern recognition, signal processing, communication, embedded computing and image sensors. This paper reviews the recent development of relevant technologies from the perspective s of computer vision and pattern recognition. The covered topics include multi-camera calibration, computing the topology of camera networks, multi-camera tracking, object re-identification, multi- camera activity analysis and cooperative video surveillance both with active and static cameras.

Detailed descriptions of their technical challenges and comparison of different solutions are provided. It emphasizes the connection and integration of different modules in various environments and application scenarios.

II. ADVANTAGES OF SMART SURVEILLANCE CCTV

A CCTV system may be used to alert human observers, who can then decide if the events are significant. A key technique used to identify moving objects in video data streams is to subtract the current frame from an estimate of the background scene.

III. EXISTING SYSTEM

As far as Video Analysis is concerned, today there are a number of products already available in the market from a variety of vendors. This project was part of a major European initiative on intelligent transport systems. They describe an architecture that takes into account the distributed nature of the detection processes and the need to allow for different types of devices and actuators. They report that the system components have been implemented, integrated, and tested in real metropolitan railway environments.

In particular, developing total solutions for protecting critical infrastructure has been on the forefront of R&D activities in this field. The solution is far much more complex than only video analysis. It must cover activity detection through to control room decision making. As far as Video Analysis is concerned, today there are a number of products already available in the market from a variety of vendors. Some of the most noticeable ones are iOmniscient, NICE Systems, iSentry and Clarity. In the research arena, one of the closest works to ours was reported by Velastin et al in a project called PRISMATICA. This project was part of a major European initiative on intelligent transport systems. They describe an architecture that takes into account the distributed nature of the detection processes and the need to allow for different types of devices and actuators. The main contribution was a computer vision module used in the system and its particular ability to detect situations of interest in busy conditions. They report that the system components have been implemented, integrated, and tested in real metropolitan railway environments. This is clearly a first step towards providing ambient intelligence in such complex scenarios. In the same group presented some of the key computer vision algorithms that were employed in PRISMATICA and also published a survey on the current state-of-the-art in the development of automated visual surveillance systems. This was quite useful in providing researchers in the field with a summary of progress achieved to date and to identify areas where further research is needed. In this survey, the authors have examined a wide range of capabilities such as the ability to recognize objects and humans Describing human actions and interactions from information acquired by sensors is essential for automated visual surveillance. However the emphasis of their review was on discussion of the creation of intelligent distributed automated surveillance systems. Video analysis covers a wide range of applications such as tracking, pedestrian detection, face recognition, as well as more complex detections such as events of interest as reported. In addition to the video analysis that creates the initial alarms, an immersive 3D visual assessment can be employed for situational awareness and to manage the reaction process. This can then be coupled with wide area command and control capabilities to allow control from a remote location. The Praetorian suit of software packages provides such an environment. The open architecture of Praetorian in essence works as an operating system that can absorb alerts generated from various video analytic systems.

Disadvantages:

- It should be noted that certain specialized capabilities are only available in some and not all systems.
- Some people may simply wish not to be recorded as they have no desire in having photos or videos of themselves being viewable by other people.

IV. PROPOSED SYSTEM - SMART CCTV SURVEILLANCE

Definition

Initialing CCTV Surveillance (a deterrent by its very presence), using the PA (Public Address) for regular security announcements, increased police patrol, installing Passenger help points, and generating awareness via the media. Once these bases are covered, then the next step is the efficient detection of threats so that action can be taken appropriately. Most effective security action plans follow an iterative detection, decision, intervention, and information loop. When video recordings from CCTV systems are required for legal purposes, it is necessary to ensure the feasibility of an independent and authenticated audit, without which such recordings cannot be used as evidence in court proceedings.

Dealing with an ever increasing amount of data whose analysis is a highly repetitive, labor intensive task is a typical scenario for Artificial Intelligence solutions. If we can computationally model the analytic abilities of the best CCTV operator at his or her peak, we can replace human operators at least for the pre-processing of the material, leaving human judgements reserved for those situations that have been identified automatically as worthy of more detailed attention. This overcomes the limitations set by the storage and retrieval capacity of human memory and our low boredom thresholds. One approach to tackle the relative underuse of CCTV images has therefore been unsurprisingly the development of more intelligent image interpretation and data mining tools. The earliest examples of AI enhanced CCTV surveillance modelled global properties of crowds, such as the density and flow of crowds of pedestrians in rail-stations during ‘rush hours’. A camera that “understands” for instance how a typical crowd moves after a train reaches the station can then alert a human operator when the actually observed movements vary from those predicted, for instance when a panic results in a sudden rush of bodies.

V. SYSTEM ARCHITECTURE

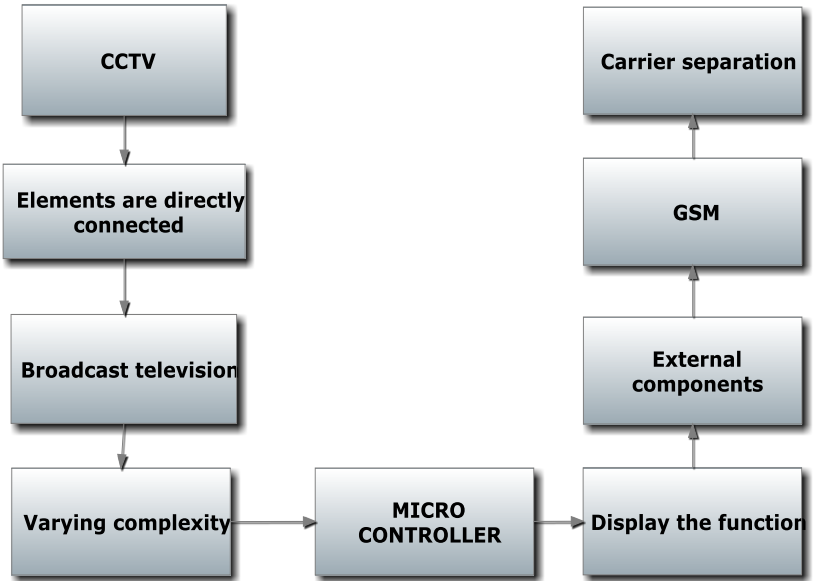

Fig. 1. System Architecture

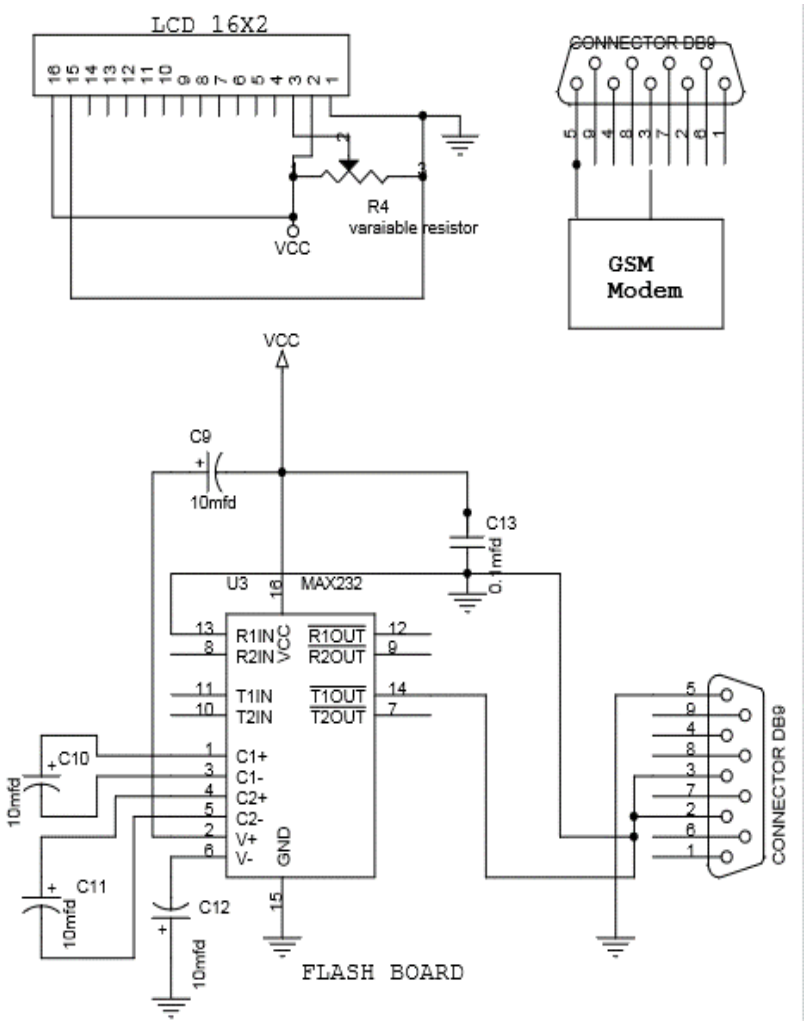

Fig. 2. Circuit Diagram

VI. COMPONENTS USED

- LED DISPLAY
- GSM
- PIC CONTROLLER
- LABVIEW SOFTWARE
- I/O BOARD

LED DISPLAY

- An LED display is a flat panel display, which uses an array of light-emitting diodes as pixels for a video display.
- Their brightness allows them to be used outdoors in store signs and billboards, and in recent years they have also become commonly used in destination signs on public transport vehicles

GSM

- The SIM Application Toolkit consists of a set of commands programmed into the SIM which define how the SIM should interact directly with the outside world and initiates commands independently of the handset and the network.
- This enables the SIM to build up an interactive exchange between a network application and the end user and access, or control access to, the network.

PIC CONTROLLER

- PIC is a family of modified Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1650. The name PIC initially referred to *Peripheral Interface Controller*.
- Data memory is 8-bit, 16-bit and in latest models, 32-bit wide. Program instructions vary in bit-count by family of PIC, and may be 12, 14, 16, or 24 bits long.
- The instruction set also varies by model, with more powerful chips adding instructions for digital signal processing functions.
- Sensing and Control (S&C) offers a wide variety of current sensors to monitor alternating (ac) or direct (dc) current.
- From digital output detectors sensing a few hundred milliamps to linear sensors monitoring over one thousand amps, our comprehensive line provides superior, often accurate performance at a reduced cost.
- As well as the advantages you'd expect from an experienced provider offering decades of engineering expertise: thru-hole design, fast response times, output voltage isolation from input.

LABVIEW SOFTWARE

- LabVIEW (short for Laboratory Virtual Instrument Engineering Workbench) is a system-design platform and development environment for a visual programming language from National Instruments.
- The programming language used in LabVIEW, also referred to as G, is a dataflow programming language. Execution is determined by the structure of a graphical block diagram (the LabVIEW-source code) on which the programmer connects different function-nodes by drawing wires.

VII. RESULTS AND DISCUSSION

As we have seen, there is something deeply ironic about the role of CCTV as a surveillance tool. From the fear of a loss of guardianship and abdication of duties to Big Brother, OCTV , Open Circuit TV and the technologies that underpin it facilitate a return of a pre-modern policing model, where everybody is a police officer, and the "Hue and Cry" of old becomes the "Look and notify" of the internet age. There is one final irony though. Privacy Enhancing Technologies in turn can benefit from the crowdsourcing paradigm just as much as surveillance technologies do. While some people may find it satisfactory to watch CCTV footage from supermarkets to look out for shoplifter, we could harness the same instincts for privacy protection – for instance by volunteering to obfuscate images of faces on Google Earth, another technology where the amount of data created presents problems for traditional methods of processing. Using crowdsourcing for privacy protection is as a research field still in its infancy. Amazon's Mechanical Turk mentioned above has been used for studies to help us better understand privacy risks. The ambivalent nature of crowd sourced privacy threats and crowd sourced privacy protection has also been discussed for crowd sourcing surveillance in the field of environmental protection. So far, the most adventurous use of the crowd for privacy protection is made in the field of testing PETs.

VIII. CONCLUSION

Here, our paper comes full circle, with systems that protect us from the prying eye of CCTV cameras subject of crowdsourcing evaluation and enhancement studies.33 whatever the outcome of these studies is, neither privacy advocates not surveillance experts can overlook any longer the technological, social and political dimension that crowd sourcing technologies have brought to the field.And also extension of this system using crowd flow and crowd density will yield more real time efficiency in surveillance.

REFERENCES

[1] First IEEE Workshop on Visual Surveillance, January 1998, Bombay, India.
[2] Second IEEE Workshop on Visual Surveillance, January 1999, Fort Collins, Colorado.
[3] Third IEEE International Workshop on Visual Surveillance (VS'2000), July 2000, Dublin, Ireland.
[4] M.Prabha, M.Seema and P.Saraswathi: " Distance based Accident Avoidance System using Arduino" , IRJET, Volume: 02 Issue: 07 | OCT-2015.
[5] First IEE Workshop on Intelligent Distributed Surveillance Systems, February 2003, London.

[6] Second IEE Workshop on Intelligent Distributed Surveillance Systems, February 2004, London.
[7] IEEE conference on Advanced Video and Signal Based Surveillance, July 2003.
[8] Special issue on visual surveillance, Int. J. Comput. Vis., 2000.
[9] Special issue on visual surveillance, IEEE Trans. Pattern Anal. Mach. Intell., 2000.
[10] Special issue on third generation surveillance systems, Proc. IEEE, 2001.
[11] Special issue on human motion analysis, Comput. Vis. Image Underst., 2001 11 www.cieffe.com.
[12] P.Saraswathi, M.Prabha: "A novel approach for Automatic Monitoring of Power Consumption using Smart Meter" IRJET, Volume: 02 Issue: 01 | APR-2015.
[13] Ping Lai Lo, B., Sun, J., and Velastin, S.A.: 'Fusing visual and audio information in a distributed intelligent surveillance system for public transport systems', Acta Automatica Sinica, 2003, 29, (3), pp. 393–407.
[14] Nwagboso, C.: 'User focused surveillance systems integration for intelligent transport systems', in Regazzoni, C.S., Fabri, G., and Vernazza, G. (Eds.): 'Advanced Video-based Surveillance Systems' (Kluwer Academic Publishers, Boston, 1998), Chapter 1.1, pp. 8–12.
[15] Weber, M.E., and Stone, M.L.: 'Low altitude wind shear detection using airport surveillance radars', IEEE Aerosp. Electron. Syst. Mag., 1995, 10, (6), pp. 3–9.

