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MULTIMODAL VIDEO SURVEILLANCE SYSTEM

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Abstract— Surveillance has become one of the promising applications for Wireless Sensor Networks (WSN) in the recent years. Surveillance finds variety of applications in various fields like target acquisition, image detection, object detection, recognition, and tracking. The challenging task in this is designing distributed video systems within the limited on board power. In this work, a multi-modal video surveillance system based on PIR OR IR sensor is proposed. The application depends on an advanced video analysis framework which is truly low-cost and low-power architecture and is able to detect events such as abandoned or removed objects.

Index Terms— **Low-cost, PIR sensor, Surveillance, Wireless Sensor Networks(WSN)**

I INTRODUCTION

Recent development in micro-electromechanical systems, embedded computing, and low-power radio communication technology have resulted in the development of massively distributed Wireless Sensor Networks (WSNs). The WSNs consists of great number low-power sensor nodes, which gathers and disseminate the data and also these sensor nodes are aimed at working within several applications, including surveillance, target acquisition, situation awareness, and chemical, biological, radiological, and nuclear early warning. To support these capabilities, it is now become essential to develop new architectures and design concepts that provide multimodal sensing without sacrificing the attractive low size, weight, and power capability. The key advantage of WSNs is the ability to fill the gap between external and internal world by collecting and sending useful information to devices that have the computational resources to process it. WSNs appropriately applied to dangerous tasks that can greatly reduce the need of manpower for safety control. Within this regards, applications that use Low-Power Video Wireless Networks (LP-VWN) consists of networks that are low-cost video sensors connected by low-rate wireless channel.

II EXISTING SYSTEM

A huge number of applications in surveillance, health care, environmental monitoring, and entertainment is based on the LP-VWN. Typical applications are in the domain of object detection, recognition and tracking and is a very challenging task in designing the distributed video devices within the low power budget typically mobile devices and Wireless Sensor Networks. These works could be performed after the acquisition of a continuous video stream from the base station.

The block diagram of the existing system is shown in the fig 1.

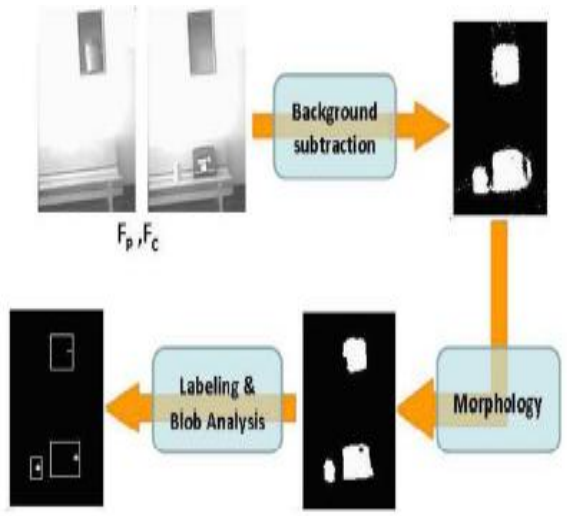

Fig.1 Block diagram of existing system

This approach would be extremely energy and bandwidth inefficient, difficult to implement on stand-alone mobile systems and ultimately it becomes not scalable in a network. Clearly, if the target object/event is not detected nothing can be done from the point of view of data transmission. Even in presence of the target object/event, only very limited amount of information about the object may be transmitted, that includes the number of interest objects, their size, position, etc. In terms of computing power, through the usage of smart cameras reduces the processing time of the Central Processing Units(CPU) by executing the low-level image processing tasks within the camera platform and before data transmission to the host system. Instead of sending the whole image contents to the host system, only some specific, information is sent so that the amount data that is needed to be transmitted is gradually reduced. Furthermore, the transmitted data is more relevant than the raw pixel flow, that is the received data can be promptly used by the central processing units, without the need for running time-consuming tasks. The major drawback in this work is that computer vision typically requires high computing performance and also it requires high power consumption and the sensor may send a false alarm and it has low interference towards sensing .

III PROPOSED WORK

We present a multi-modal video surveillance system based on PIR OR IR sensor characterized by low power consumption and low cost that is to be used as a node in a WSN. And also a solution for this is given which is integrated into a standalone camera with embedded video processing capabilities and wireless communication. The proposed work relies on an advanced video analysis framework that, based on the low-cost and low-power architecture, which is able to detect events such as abandoned or removed objects. The PIR sensor is integrated with the video processing module, since it appropriately triggers the video analysis module based on the absence/presence of people in the scene.

This provides two main benefits. The first one concerns the robustness of the video analysis algorithm, since, as it will be shown more in details in the following, it helps reducing false positives due to closure or moving objects. The second one concerns power consumption: by limiting the performance of the video analysis module when this is not needed the most, there is a notable reduction of the overall power consumption of the system. In fact, in the before discussed scenario of detection of abandoned/removed objects with a camera sensor network and in most of the times the area surveyed seems to be empty and the network should no longer monitor continuously the sense because there is nothing to detect. When an IR detects an event, the network can be switched on and start the video processing once again. Eventhough the camera is

low power, it can last only few hours in continuous mode.

A. Transmitter Section

The block diagram of the proposed work is shown in the fig 2.

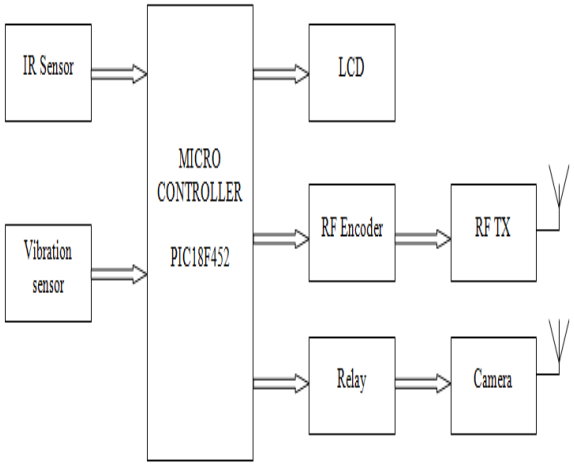

Fig 2 Transmitter section

IR Sensor

Infrared sensors are in the form of diodes with 2 terminals. We can also buy a pair of such diode (one transmitter and one receiver) at a low cost of about 5 - 7 rupees only.

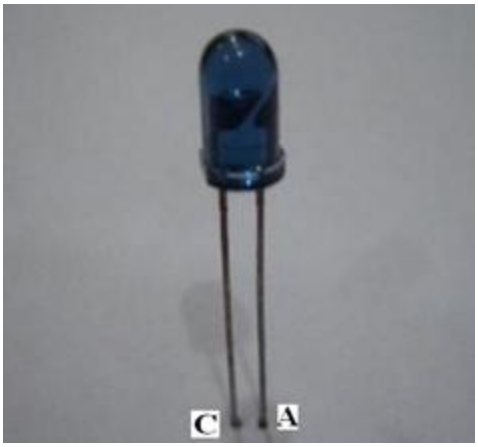

Fig 3 IR Sensor

Infra red sensing for object detection. It uses a comparator for providing the required logic level for micro controller. And is highly reliable for detecting an obstacle and is not affected by EMI and industrial noises. It Needs to be protected from ambient lighting disturbances.

Vibration Sensor

Vibrating level sensors are designed for point level detection of very fine powders and granular solids. Three parameters representing motion detected by vibration monitors are displacement, velocity, and acceleration.

Microcontroller

The building block of PIC 18F452 microcontroller is based on Harvard architecture. This microcontroller also has many advanced features. Peripheral Interface Controllers (PIC) is one of the advanced microcontrollers which is developed by the microchip technologies. These microcontrollers are widely used in various modern electronics applications. The PIC controller integrates all type of advanced interfacing ports and memory modules. These PIC controllers are more advanced than the normal microcontroller like INTEL 8051. The first PIC chip was announced in 1975 (PIC1650). As like normal microcontroller, the PIC also combines a microprocessor unit called CPU and integrates with various types of memory.

LCD

The LCD interface lets us directly interface to an LCD saving you having to use an LCD module such as the HD44780. We have not used this feature as it is another commercial requirement where removing a chip (HD44780) saves money in the production run.

B. RECEIVER SECTION

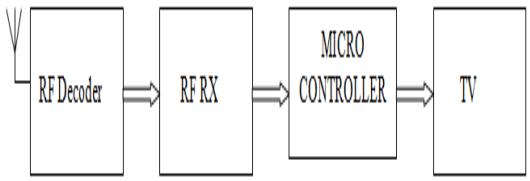

Fig 4 Receiver section

The receiver section block diagram is shown in the fig 4. RF Decoder decodes the incoming signal from the Transmitter section. RF RX is used to receive the signal. The decoded information will be sent to the Microcontroller. It process the video frames and will transmit the frames to TV.

IV RESULT AND CONCLUSION

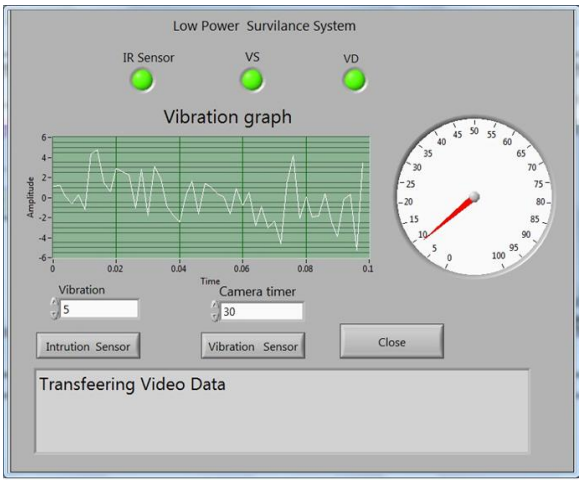

Fig 5 Output

"Multimodal video surveillance system" has been completed successfully and the results are verified. The results are similar to the expected output. The output has been checked with both software and hardware testing tools. In this work "I/O devices" are chosen proves to be more appropriate for the intended application. The project is having enough avenues for future enhancement. The project is a prototype model that fulfills all the logical requirements. With minimal improvements it can be directly applicable for real time applications. This work can be applied to variety of industrial and commercial applications.

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