

# Augmenting Film/Video Footage with Sensor Data

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## Introduction: Augmenting Film with Sensor Data

### Why an Intelligent Film Set/Stage?

- **Traditional Sets are Heavily Scripted and Not Dynamic**  
 Once a decision in the film process has been made (e.g. location of actors, color temperature of lights, etc) it is very expensive and cumbersome to *change* later. Post-production insertion of computer graphics or other effects often requires careful preplanning and precision from the camera crew.
- **As a result performer creativity and freedom is stifled.**  
 We want actors and actresses to be able to *interact* with their environment. In addition, we want the film set to actively *record* useful non-visual information about a shot.

### An Ideal Marriage: WSN + Theater/Film

- **Wireless Sensor Networks**
  - Can monitor and localize data on film sets.
  - Are small and unobtrusive to performers, directors and technicians.
  - Are easily deployed in various filming environments.

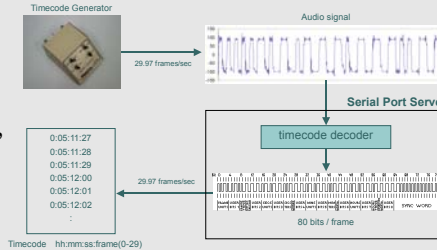
### A First Step: ARS, Augmented Recording System

- *Augmented Footage* is sensor data synchronized with each film or video frame.
- The crew can view recorded film and observe its corresponding data in real-time.
- Define a new level of seamless integration between computer graphics and real world photography.

## Problem Description: Issues in Developing a Synchronized Data Recording System

### Recording Data

We *augment* SMPTE (an industry standard timecode for video) synchronized sensor data with film frames. Data is needed for each frame, which is approximately every 1/30 seconds. We *filter* redundant data and *buffer* readings at the sensors-side.

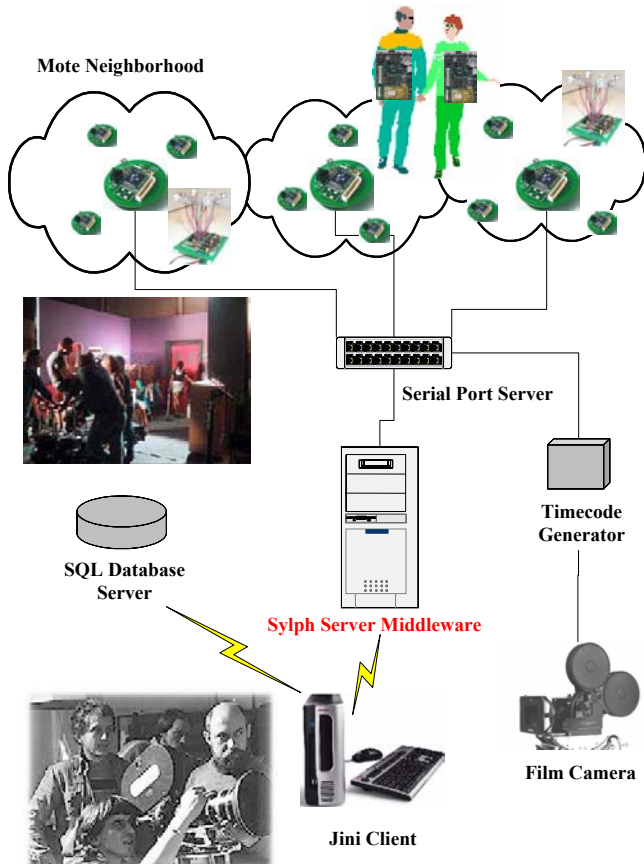


### System Design

Mechanisms for *time synchronization* to compensate for clock drift.  
 Custom *MAC* protocol for high speed transfers with PALOS.  
 Middleware software *Sylph* for sensor registration.

## Proposed Solution: Augmented Recording, a Subset of the Intelligent Film Set

### System Architecture



### Evaluation in TV Studio & Experimental Setup

