Title
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

Evaluation in TV Studio & Experimental Setup

UCLA –– UCR –– Caltech –– USC –– CSU –– JPL –– UC Merced