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# **Design of a Fiber Optic Based Wellhead Perimeter Monitoring System**

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## **Abstract**

The advent of Digital Oil Fields (DOF), Data Analytics and Artificial Intelligence has led to an increase in the number of instruments installed at wellheads and also an increase in the reliance on these instruments and the data they provide for the operation of the

field. The critical nature of this equipment and their roles in the operation of the oil field has also led to the need for a system of remote monitoring of these wellheads to enable the detection of third-party intrusion (TPI) at the wellhead area with the provision of video feedback on demand. The most popular security scheme currently deployed at securing these wellheads is the use of metal cages of different sizes, but the location of these wellheads provides vandals with ample time to cut through the metal cages as there is no means of detecting their presence. This system utilizes a fiber optic cable and cameras to provide intruder detection and identification. It transmits the signals wirelessly through the remote telemetry units at the wellhead. The fiber optic cable is buried around the wellhead, and the flowlines from the wellhead and a wireless transmitter are coupled to the fiber optic cable. The distributed acoustic system of the optic fiber is used to detect the presence of third-party interference at the wellhead locations, and the camera is activated by the system whenever TPI is detected around the wellhead area. The system provides both video feedback and color-coded alerts at the remote monitoring centers to indicate the location of the intruders and the intrusion activity around the wellhead area.

**Keywords:**

[production monitoring](#), [oil field](#), [production control](#), [upstream oil & gas](#), [completion monitoring systems/intelligent wells](#), [production logging](#), [wellhead area](#), [fibre](#), [fiber optic cable](#), [installation](#)

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