

Fiber based Perimeter Security Solution

A) Introductions:

A 'Fiber-optic' cable based 'Perimeter Security solution' is required to protect the strategic areas. The fiber should be buried under the ground to detect the unwanted intrusion covertly. The different events like human walking, vehicle movement etc should be identified properly without any false alarm. The system should have the controller along with the sensor cable up to the maximum range of the perimeter and it should generate the data of the intrusion round the clock [24*7] in all weather conditions. Scalability of the System is required for protecting the perimeter length from 200 meter to 50 km.

B) Objective:

1. Identifying the best suitable "Distributed Fiber Optics Sensor" Topology for covert perimeter intrusion detection.
2. Developing Distribution Fiber Optics Sensor for intrusion detection along with its associated algorithms.
3. Building Intrusion signature library and identification and localisation of the intruder.
4. Optimization of the sensor for complete removal of false alarm.
5. Data Processing & Software for alarming and notification capable of running in standard computing platforms.

C) Functional Requirements:

1. System should be able to identify the unwanted intrusion in real time.
2. System should be able to identify the unwanted intrusion from a range of 10 meter from the perimeter.
3. System should be able to pin-point the location [with information about geo-spatial coordinates] of intrusion along the perimeter up to a resolution of 5 meter.
4. System should be able to operate round the clock {24x7} , under conditions of Rain, Wind hailstorm, Snow-fall, Dust-storm, Fog, Thunder – storm, normal traffic etc. It should be able to operate in all weather conditions without any false alarm.

5. The fiber cable should not be visible on the ground for the covert security application.
6. Maintenance of the sensor cable should be a minimum BTTE is required to monitor the health of the buried fiber cable. In case of Fiber-break during operation, there should be provision to heal it at the location without any disturbance to the rest of the cable length under the ground
7. System should be able to provide the alert to the user, In addition to the optional alarm system. It should have the functionality of providing the raw data, which can be integrated in a user-defined manner.
8. Following events should be identified and classified in a simple Graphical User Interface.

Sr. No.	Event	Minimum Range for detection	Remarks
1.	Human walking	10 meter	Should be separate from the animal walking
2.	Human crawling	10 meter	Crawling should be distinguished from Walking or Animal Crossing/Movement
3.	Digging & Drilling,	20 meter	Should be able to differentiate between manual and mechanical [Machine-based]
4.	Tunnelling	50 meter	Under the ground Tunneling should be distinguished from Digging/Drilling on the ground.
5.	Agricultural activity	20 meter	Should be able to differentiate the routine agricultural activity from the unwanted intrusion
6.	Vehicle movement	50 meter	Small and heavy vehicle should be classified separately.

9. System should have Event classification as above as well as Location pointing functionality.
10. Provision is required for using the same optical Fiber for sensing intruder as well as for communication link.

11. System shall be man-portable so that it can easily deploy in the difficult terrain.

12. System should be able to send the alert messages to the designated mobiles within 30 second of the intrusion detection.

E) Specifications:

1) Perimeter Length to be protected: 200 meter to 50 Km

Different product solution are required for short perimeter length [200 meter-km], mid-perimeter length [1 km to 15 km], Large perimeter length {up to 100 km}. Accordingly, scalability of the system is required so that it can be easily configured from short to large perimeter length as per the need.

2). Armoured Fiber Sensor cable length:

The complete perimeter can be divided into multiple zones with each zone length can be up to 300 meter. Alternatively, the whole perimeter can be in a single zone and in such case, the Armoured Fiber cable length will become equal to the total length of perimeter.

3) Accuracy of pin-pointing the location of intrusion: + 1 meter

4) Operating Temperature range; - 40 degree Celsius to + 70 degree Celsius

5) Input Voltage: 220 V AC 50 Hz / 12 V battery

6) Data interface:

- a. RS232 or RS485 or USB or TCP/IP-Ethernet, SNMP or equivalent
- b. Should be able to interface with existing CCTV systems, security cameras, etc.

7) Power consumption: <_ 10 watt

8) Alarming Unit:

- a. LEB and Buzzer, option for direct access to data before Alarm generation
- b. Multiple alarms for multiple intrusions with audio and visual/display alert capability in real time

9) Notification Unit: SMS and 'missed Call' alert as well as email messaging to the authorized security personnel.

10) False alarm control

a. Least false alarm rate-Intelligent signal processing algorithm with huge library containing a lot of intrusion signature patterns, automatically and dynamically adjusted detection threshold for changing environmental conditions.

b. Not affected by perching birds, Snow Fall, Wind gust, Rain, fog and Thunderstorm, etc.

11) Leak Location Capability:

-System should be able to pinpoint the source of leakage of signal as soon as it happens along the perimeter.

12) Graphical user interface with functionality of easily identifying the type and location of intrusion.

13) Ability to provide the raw data that generates the alert for user-configurable interface.

14) Data Library for the classification and identification of all events.

15) Integration with CCTV display through dedicated software.

16) Optical Patch Panels: As per the number of zones and total perimeter length of Fiber-optic cable

17) Fiber Outdoor Enclosure-to house the start/end sensors and Fiber-optic splices-should be sealed