2021 catalog

Fiber Optic Land Slide Monitoring System

FOLASMOS-2021

KOR Patent#10-1698835

KOR Patent#10-1927807

- **Sensitively Monitoring of a single land slide or distributed land slides**
- **To alarm at emergency and prevent disaster**
- **Simple to install and operate**
- **No electricity, passive element only, Rare false alarm, no maintenance problem**
- **Remote monitoring up to 10KM current /260KM near future**

Manufactured by

FIBERTRON Co., Ltd.

Innovative Fiber Optic Security & Safety Systems Manufacturer

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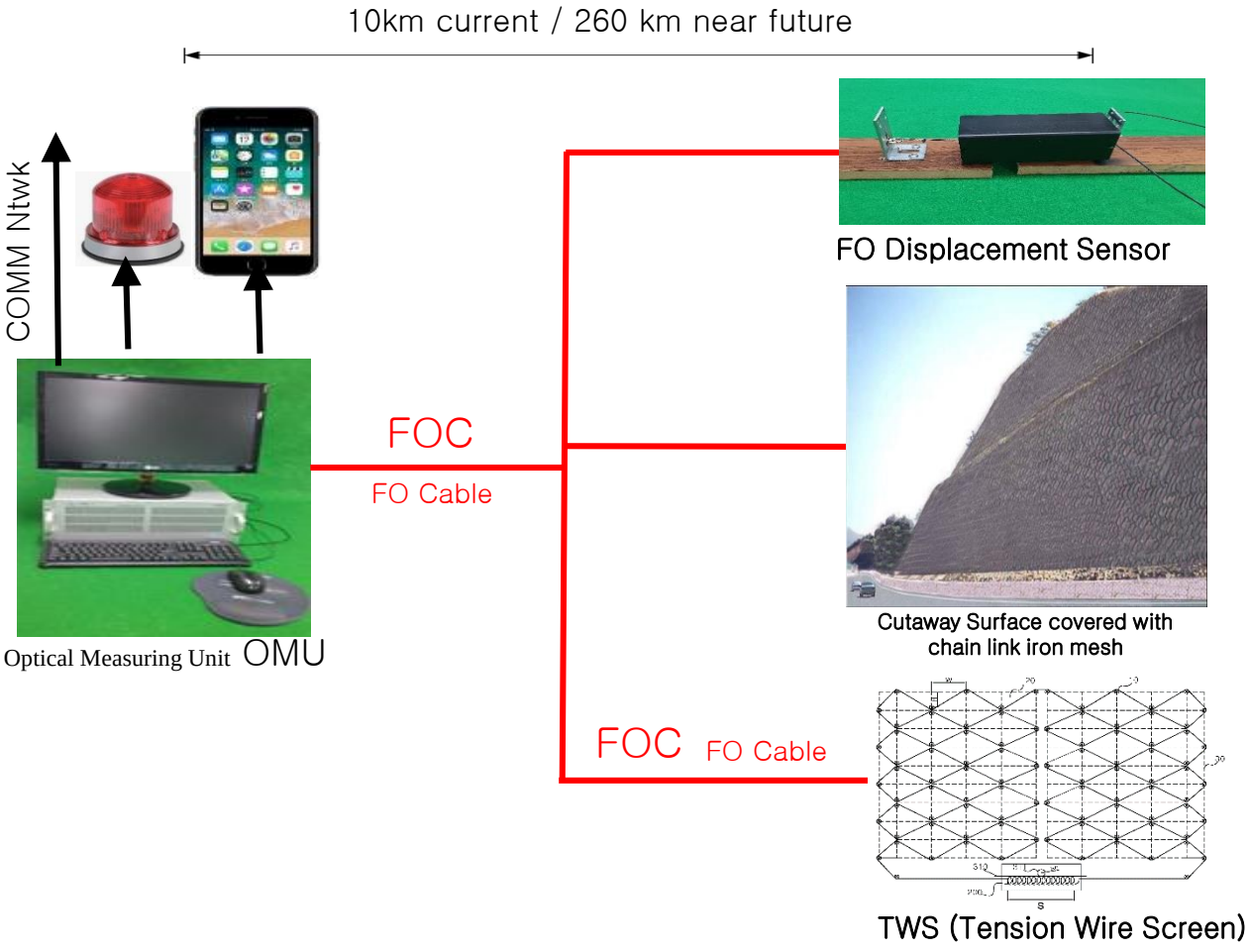
Overview of FOLASMOS



Such a large surface as cutaway surface, steep mountain surface, dam surface, wall surface etc. can be effectively checked by **FODS** (Fiber Optic Displacement Sensor) coupled with either chain link iron mesh or **TWS** (Tension Wire Screen) covering of the surface. FODS shall be connected via FOC (Fiber Optic Cable) to the remote **OMU** (Optical Monitoring Unit) up to 10KM currently / 260KM near future. The OMU periodically pumps Infrared Laser pulses in to the FODS and receives return pulses from the FODS to measure Optical Loss variation accurately. A tiny surface slide shall force to distrub either chain link or TWS covering and activate FODS coupled. The OMU shall measure Optical Loss from the return pulse strength variation and determine the slide value to trigger alarm at exceeding the predetermined value and transmit the corresponding emergency message through SNS and/or safety network.

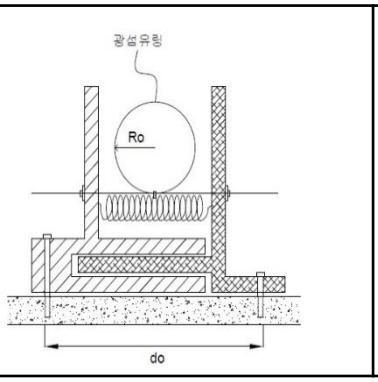
Performance Specification

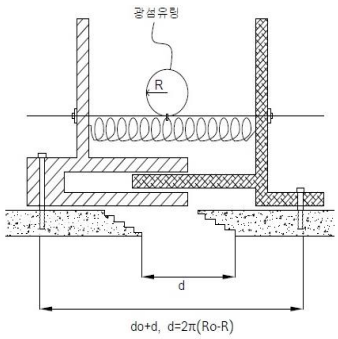
	FODS (FO Displacement Sensor)	TWS (Tension Wire Screen)
Sensor Type	1D Displacement Sensor	2D Surface Deformation Sensor
Max Range, R	500 mm	500 mm
Typical Dimension, mm	75x75x700	50m x 50m
Weight, kg	5	500
Accuracy	±100 mm	
Maximum FOC Length	10KM current / 260KM near future	
Sensor Material	Passive elements only (FO Cable / Anti-resistant metal)	
Power Consumption by Sensor	0 Watt	
Sensor Operating Temp	-40℃ ~ +60℃	
Environmental	Environment – proof (immune to temp, humidity, wind. Vibration, lightening, EMI, sunshine etc.), To work on the earth/Under-ground/Under-water	
Expected Life Time	15 yrs or over	

Optical Monitoring Unit, Model OMU-nP

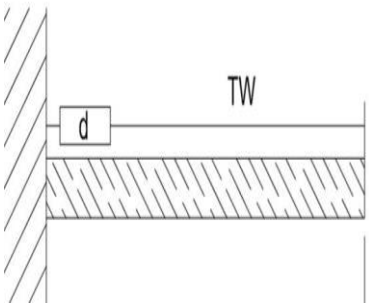
- Operation mode : Normal, Test, Emergency, Setting, Stop
- Sensing mode : cutting and/or excess force
- Location Accuracy : ±1m , ±15m , ±25m, Optional
- No of Optical Ports : n (maximum 8)
- Sensing mode : cutting , excess force , selectable
- External connection port : PC interface
- Fiber Optic test function : semi-OTDR
- Auto-logging : event data (alarm, action, status, setting value etc)
- Monitor : 8.4" LCD color built in or 17” LCD external
- Interface : dry contacts, serial or LAN
- Acceptable output devices : warning light, signal phone
- O/S : Window 10
- Dimension : 19” 4U (177×483×300 mm)
- Operating condition : indoors
- Power : AC220V±10% 50/60Hz, 100Watt approx

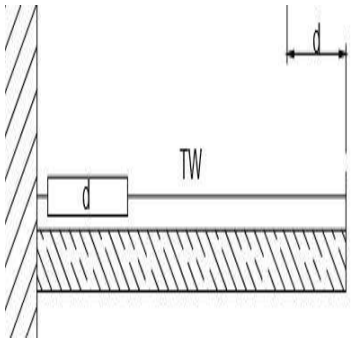
Principle of displacement/deflection measurement, KOR Patent#10-1698835





Longitudinal Displacement





Transverse Displacement (Deflection Measurement)

A Fiber Optic Displacement Sensor (FODS) positioned parrallel with the gap of any crach or connection portion is constructed with a spring and FO ring to stretch or shrink and result in Optical Loss change accordingly.

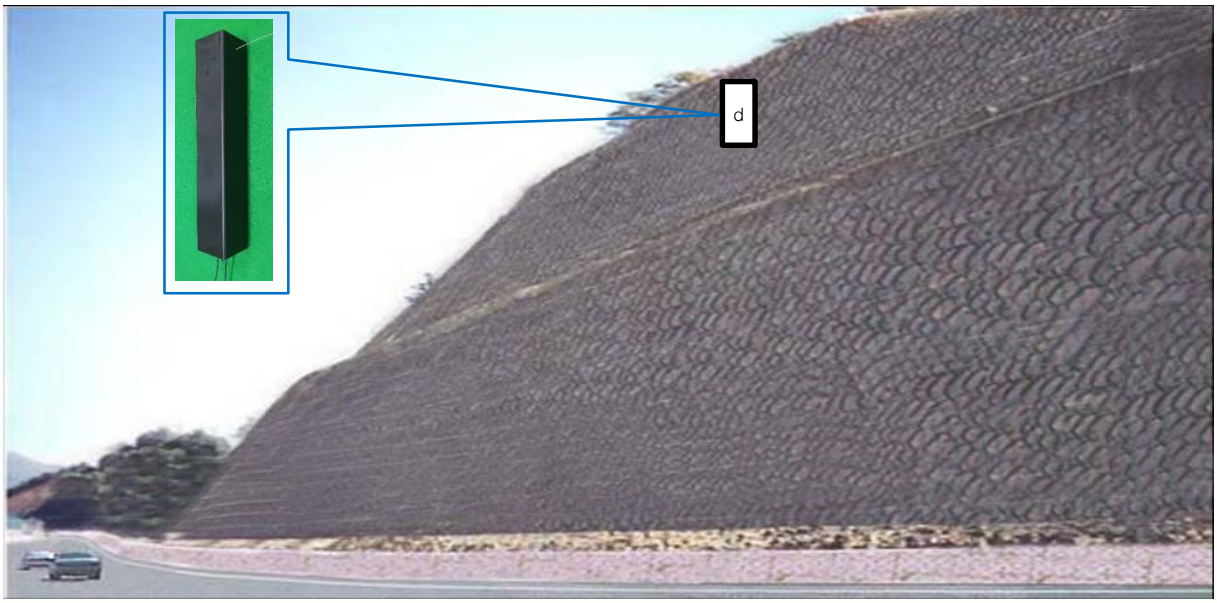
According to the KOR Patent#10-1698835, The relation between the Optical Loss L and the Displacement d can be characterized by the following Equation

$$d = 2\pi(Ro - (\alpha - \beta \ln L)/L)$$

where Ro, Lo, α and β are constant independent from the Optical Loss L.

Suppose to measure the deflection of a suspension bridge. To do this, first attach a FO Displacement Sensor to the girder plate middle and mount a TW (Tension Wire) between two neighboring pillars or two other locations on the ground.
Next put the TW under vertically force - balanced condition to be floated at fixed position vertically overcoming temperature change or wind disturbance. Finally the System shall measure the deflection without being affected by the temperature change or wind disturbance.

FODS with chain link iron mesh covering bare surface



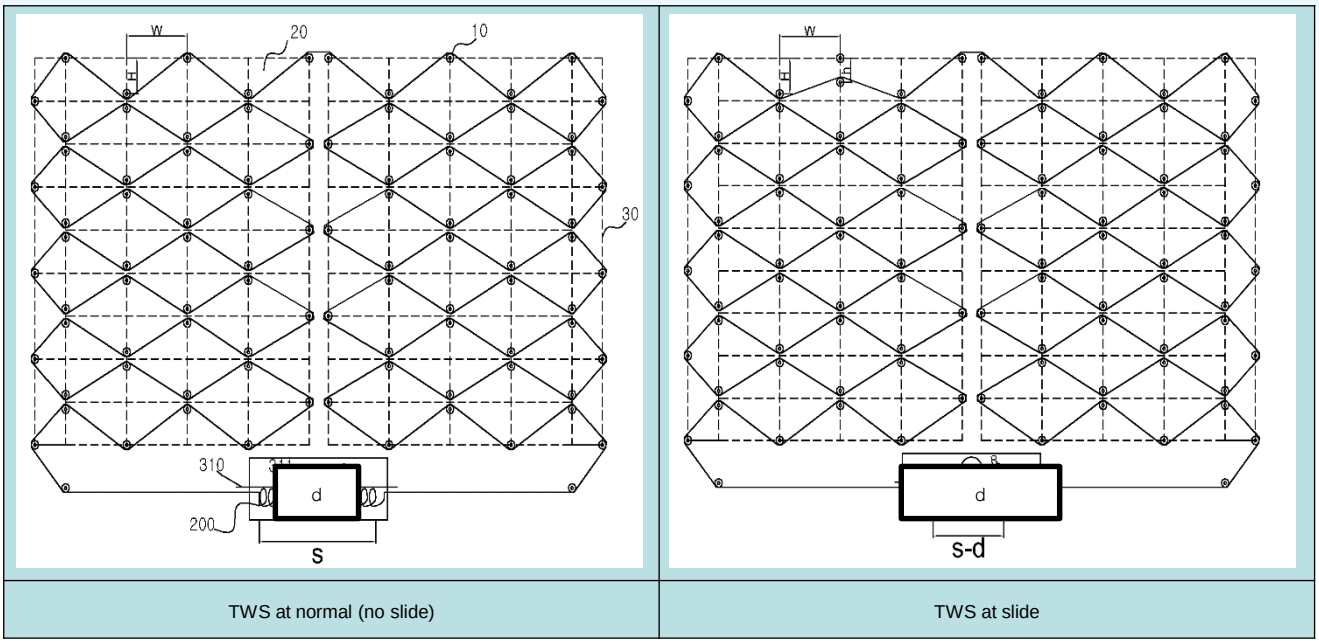
First cover the entire surface vulnerable to slide or fall with chain link iron mesh.

Second mount a **FODS** (FO Displacement Sensor) to the top middle of the chain link iron mesh covering.

Third connect the FODS via FO Cable to the remote OMU at the control center.

Any slide or fall shall activate the **FODS** (FO Displacement Sensor) to trigger alarm at exceeding the predetermined limit value.

Principle of 2 – dimensional surface deformation measurement, KOR Patent#10-1927807



TWS at normal (no slide) | TWS at slide

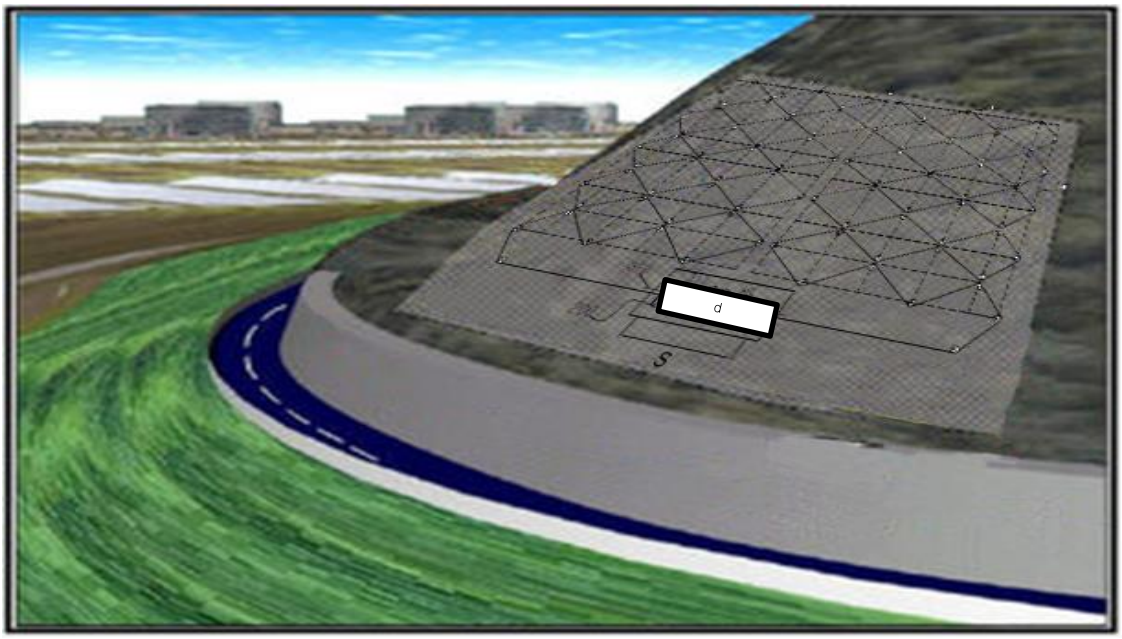
The entire surface vulnerable to slide or fall shall be covered with **TWS** (Tension Wire Screen) which is composed of a tiny stainless wire (typically 1.2mm diameter) in Zig-Zag pattern under tension. Any slide or fall shall disturb the initial TWS pattern so as to activate the **FODS** (FO Displacement Sensor) positioned on the bottom TWS and trigger alarm at exceeding the predetermined limit value.

According to KOR Patent#10-1927807, the sliding h can be characterized by the following equation

$$h = H - \sqrt{(\sqrt{H^2 + W^2} - \frac{d}{2})^2 - W^2}$$

where H and W stand for dimension of the cell forming TWS and d stands for the displacement measured by FODS.

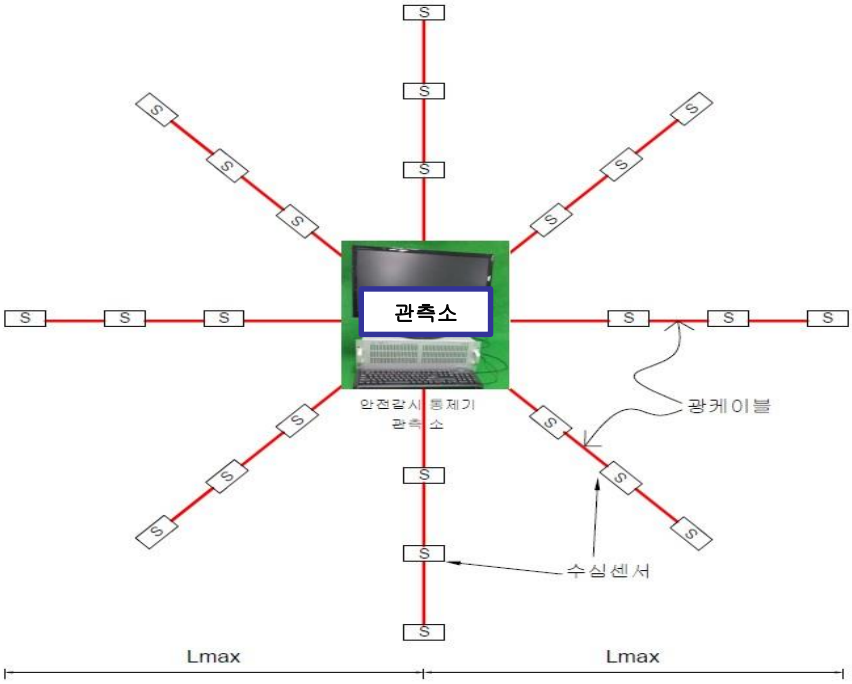
TWS (Tension Wire Screen) to sense land slide

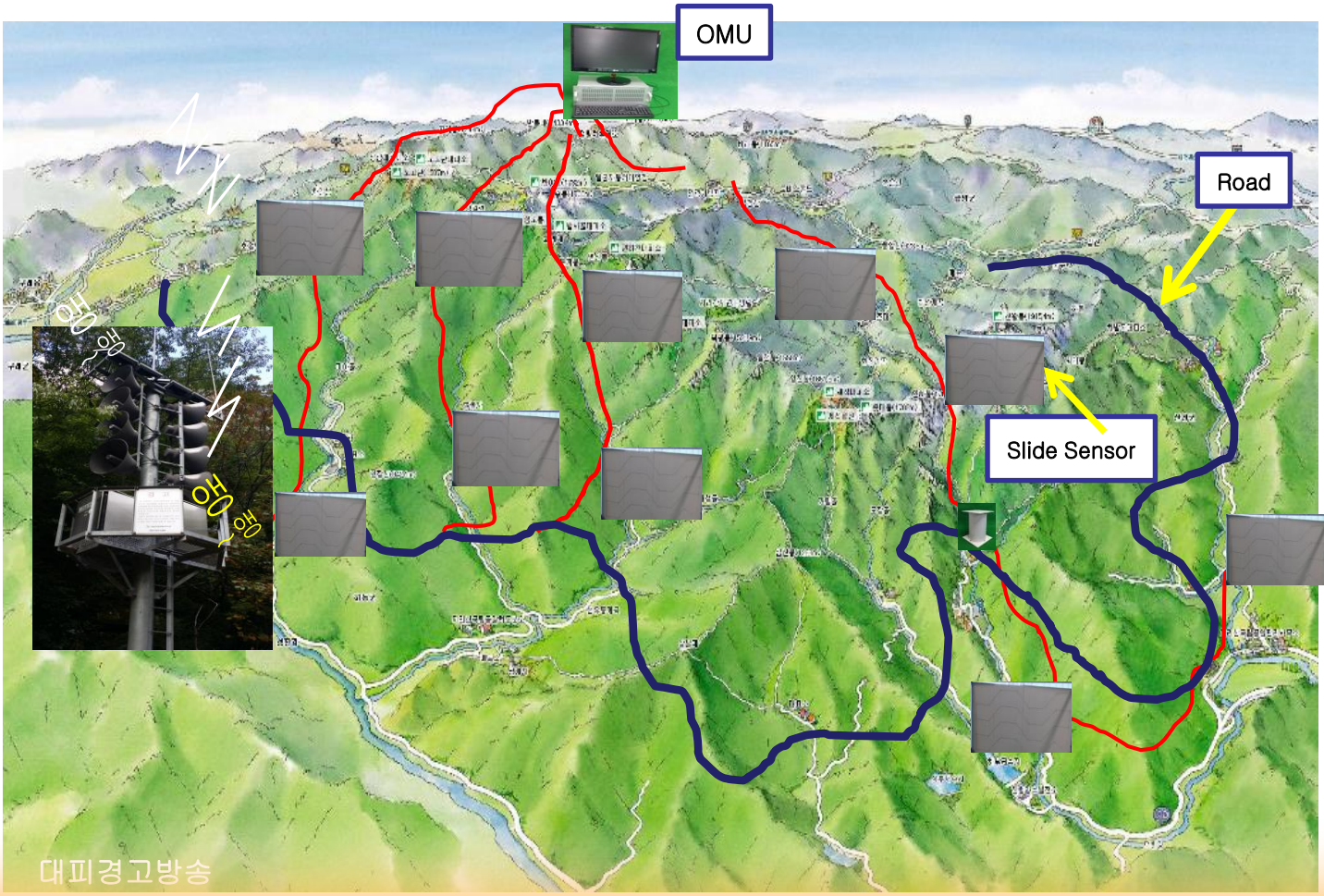


Cover a soft surface vulnerable to slide or fall with TWS and connect it via FOC to the remote OMU.

Sliding or falling of the surface shall be monitored by the remote by OMU to trigger alarm at exceeding each pre-set limit value. TWS can be overlaid to either bare surface or surface with trees and grass while chain link iron mesh with FODS can be overlaid to bare surface only.

Remote Multiple Land Slide Monitoring within 10KM Range by OMU at the control center





Development Background

FOLASMOS (Fiber Optic Land Slide Monitoring System) originates from the mother product FOSM (Fiber Optic Security Mesh) having worldwide proving performance.

Throughout worldwide installations at eminent facilities such as Korean Nuclear Power Plants, Airports, Oil&Gas Reservoirs, Korea Presidential Blue House, Singapore Ministry of Defense, ISTANA, Kuwait MoFA, Saudi ARAMCO/MODA/Palace, **FOSM** (Fiber Optic Security Mesh) was reputed as the unique foolproof – accurate – nuisance alarm free to comply with the purpose of PIDS overcoming the weakness and limitation of other types of sensors .

FOSM (Fiber Optic Security Mesh) operates based on Optical Radar Technology. The system injects Infrared Laser pulses into FOM (Fiber Optic Mesh) to identify intrusion from the presence of abnormal Optical echoes caused by either intruder cutting or excess force and pinpoints the intrusion spot on the monitor with audible & visible alarm at Security Control Center.

The fundamental technologies of FOSM was invented by Dr. Youn Bae in 1982 while serving as a researcher at Korea Agency for Defense Development (ADD) and later far upgraded gradually to the current level of commercial version by Dr. Bae team under Fibertron Co., Ltd. over 40 years.

FOLASMOS which has long been developed by Dr. Bae team to present as new products in late 2020 shall perform in the same excellency as the mother product FOSM to the level far beyond of other technology reach. Thus any worry about its performance is actually unnecessary although FOSSMOS has no previous installation record yet because it is new,

Fibertron shall provide the brochure and videos to introduce the products first and submit technical proposal / commercial offer per specific site data.

FOSSMOS really wishes to be respected its performance as it is and to get order from the client. Order for a few pilot installations in small scale may be desirable by both Fibertron and client to carry out very quickly for confirming the performance at the operating site and then move forward in growing scale gradually.