@integra group

@osf®

@integra open space fire

NeoLIDAR Technology

AUTOMATIC FAST FIRE DETECTION SYSTEM FOR OPEN SPACES

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PRESENTATION OF @osf®

@integra **group introduces its novel patented technology for early fire detection in large open spaces, a realm scarcely covered by today's market solutions. The technology detects the smoke generated in a combustion and it is not a thermal system, thus independent of the smoke source temperature. The @osf® system was born to alleviate the huge cost of fires, which in the case of large open spaces lead to massive economic losses, as it implies the destruction of facilities and materials.**

The @osf® technology is called Optical Pseudo-random Signal Extraction and Noise Elimination (OPSENE), or with the more intuitive name of NeoLIDAR, and is based on the capture of the electromagnetic radiation scattered by a smoke plume as it is illuminated by the so-called Pseudo-Random Modulated Beam (PRMB) generated by the system itself. It works much better at nighttime than at daytme.

@osf® can be used in large open spaces such as forests, agroforestry units, industrial complexes, harbours, free ports, electric power plants, petrochemical plants and any setting in which piles of combustible materials at open air exist. The system works autnomously and automatically in a 24x7 regime, and it does not intefere with any activity carried out in the industry. Any alarm detected by @osf® is instantaneously sent to the Control Centre, where the most appropriate actions must be decided, based on the information supplied by @osf®.

The OPSENE (also called NeoLIDAR) technology is completely eye-safe, as it uses no laser no generate the PRMB.

@osf® BRINGS A NEW APPROACH TO THE DETECTION OF FIRES COMPARED TO OTHER SYSTEMS CURRENTLY IN USE, AND THAT IS THE CAPABILITY OF DETECTING INDUSTRIAL FIRES AT A VERY EARLY STAGE (EVEN WHEN THERE IS NO OPEN FLAME), AND THE ABILITY TO REDUCE FALSE ALARMS.

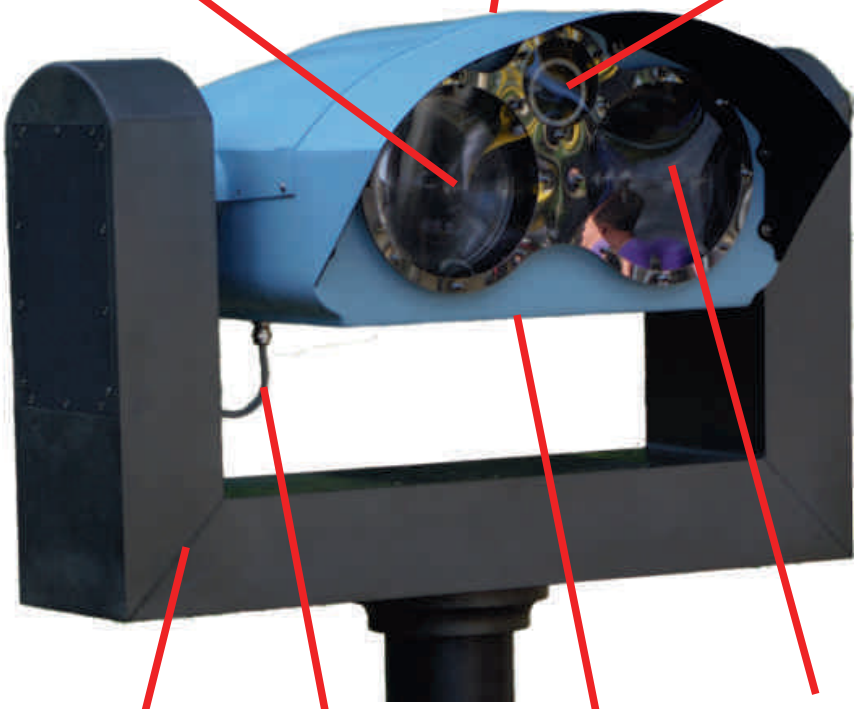
@osf®

MAIN COMPONENTS OF iosf®

ELECTRONICS: The system is endowed with 5 microprocessors, one of which is exclusively devoted to mathematical calculations. The electronics has been specifically developed for this application.

RECEIVER: A powerful optical system concentrates the light upon an advanced electronic sensor. The sensitivity I_{bs}/I_{solar} is better than 10^{-9}. It performs much better at nighttime.

CAMERA: It is just used to supply images or short videos of the event to the users, to help them make decisions.



EMITTER: It generates the PRMB and sends it above horizon. The light source is not a laser. Emission power is adjustable.

POWER SUPPLY: The unit only consumes 18W @ 12 Vdc. It can be powered from a small solar panel.

GIMBAL MOUNT: It allows the unit's horizontal (azimuth) and vertical (zenith) movement, in order to scan the horizon.

COMMUNICATIONS: The standard system communicates through WiFi or UMTS/3G. Other communication methods are available.

The new technology is called Optical Pseudo-random Signal Extraction and Noise Elimination (OPSENE), or NeoLIDAR for short, as it has a number of similarities with the well-known LIDAR technology.

FUNCTIONING OF THE SYSTEM @osf®

Any particle suspended in air scatters all electromagnetic radiation impinging on it. A small fraction of the scattered radiation takes place at 180 degrees, directing itself back to the emitter source (*backscattering*). Smoke is made up of particles in suspension and therefore scatters light. NeoLIDAR is based on this effect.

To understand @osf® functioning it is necessary to describe sequentially the detection procedures which are carried out once the PRMB is emitted. The detailed functioning steps are:

1. **@osf® sends the PRMB above horizon, sweeping an area of 360 degrees (or any fraction thereof). Normally the PRMB is lost to infinity, and no backscattered PRMB is expected at the receiver, as no smoke should exist above horizon. The system takes some 3 minutes to sweep the 360 degrees, and starts all over again. This is the system's steady state, in which it will be most of the time.**

2. **Every 3 minutes a new scan begins. If a smoke plume appears above horizon (which was not there 3 minutes before), it will scatter the PRMB and a small fraction thereof will reach the system, where it will be detected and analysed. Note the detection is delayed less than 3 minutes.**

3. **@osf® starts a process to determine whether the detected smoke plume is a false alarm. A microprocessor is exclusively devoted to this task. If the alarm seems real, the system will take a picture of the smoke and send it to the Control Centre, together with its space coordinates, detection curves, date/time, and orther relevant information to assess the situation.**

4. **The user can accept the alarm, cancel it, ignore it for some amount of time, or declare it as a false alarm. The user can also assume manual control on the unit, to better assess the situation.**

5. **Once the alarm has disappeared, the system turns back to its steady state. Every event is recorded in a database which will allow, at a later time, the analysis of events and its characterisation.**

@osf®

FEATURES AND APPLICATIONS OF @osf®

MAIN FEATURES OF @osf®

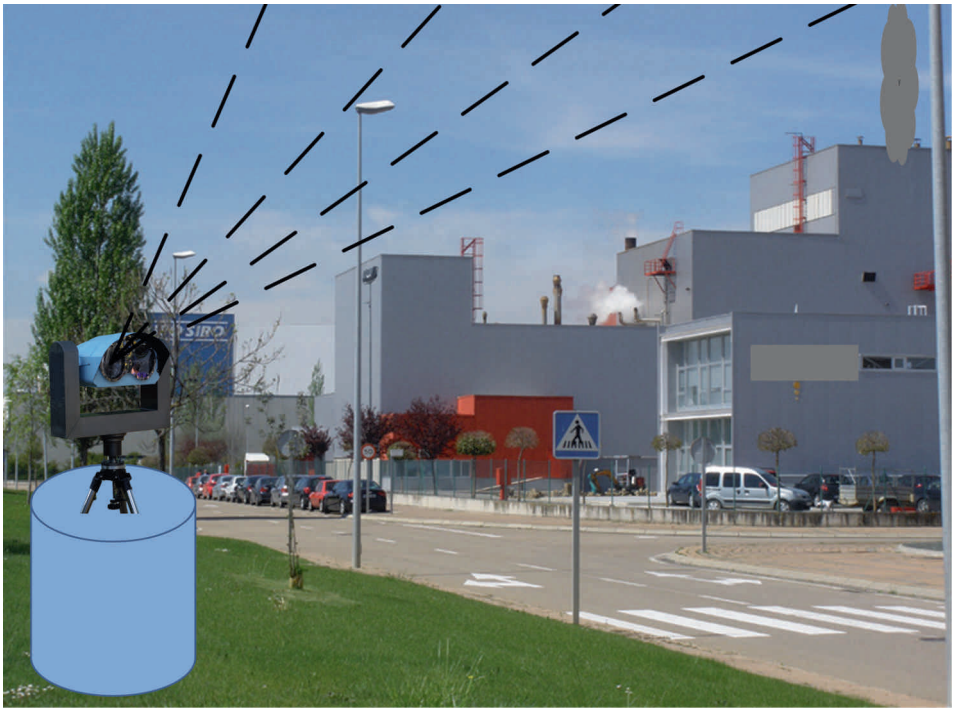
- @osf® generates its own PRMB with known characteristics.
- @osf® detects minute fractions of the scattered PRMB due to a triple amplification (optical, electronic and algoríthmic). This is why it can detect feeble smoke plumes at a very early stage.
- @osf® sweeps its surveillance area in less than 3 minutes.
- @osf® detects feeble smoke at 3 km and denser smoke farther (>5 km).
- @osf® has a validation process that reduces false alarms.
- @osf® helps in decision making supplying pictures of the smoke plume.
- @osf® operates on a 24x7 basis and performs much better at nighttime.
- @osf® is autonomous/automatic and doesn't require human surveillance.
- @osf® only responds to its own emitted light with high sensitivity (<10^{-9}).
- @osf® software is remotely updated, even the firmware.
- Manual remote control of @osf® from Control Centre is possible.

APPLICATIONS FOR @osf®

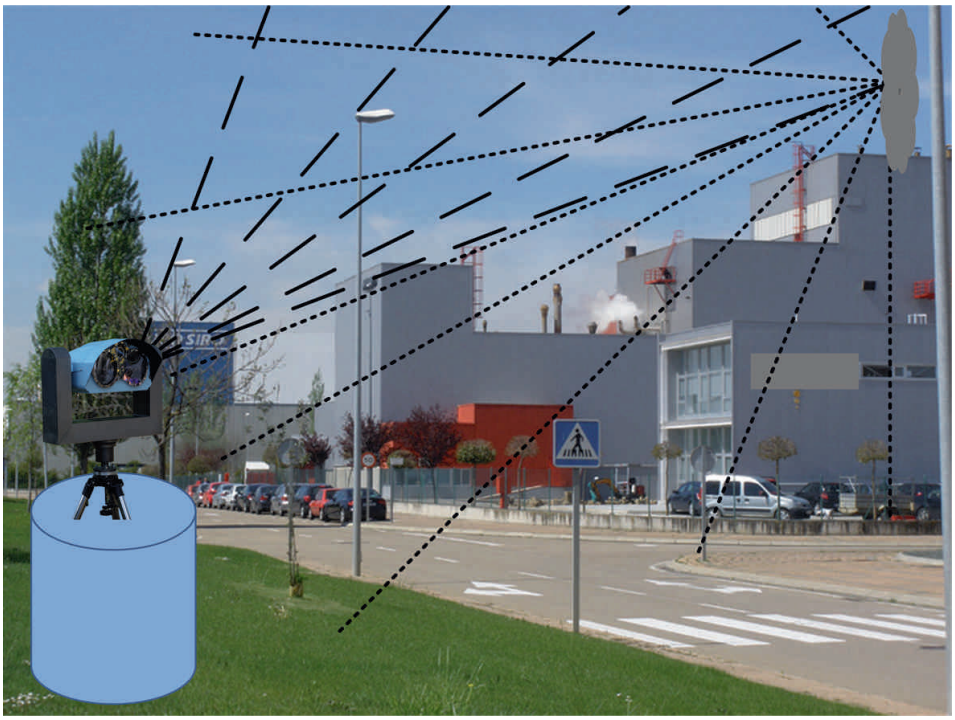
- Forest fires and large agroforestry units fires. Detection of not authorised stubble burning.
- Fires in open spaces (industrial estate, storage areas, free ports, harbours, container storage, power plants, critical infrastructures...).
- Detection of chemical leaks, toxic leaks, atmospheric pollutants, oil and gas pipelines...
- Industrial emissions into the atmosphere (manufactures, incinerators, recycling plants, industrial complexes...).
- Organic emissions from grain silos, fodder factories...
- Dust clouds thrown into the air by vehicles as they cross borders through dusty roads (border surveillance, troop movements in deser...).
- Applications in chemical and bacteriological warfare.
- Mounted on a van can be used for itinerant surveillance.

GRAPHICAL REPRESENTATION OF THE OPERATION OF @osf® (I)

The picture shows graphically how @osf® works in an industrial estate:



@osf® is installed in the optimal position to control the whole area under its surveillance. It is set on top of a tower, or over a building's roof, at a convenient height above any close solid object to guarantee its security and correct operation. The system automatically draws the skyline and starts to scan the industrial estate. It sends out the PRMB to infinity above horizon, and no scattering is produced until a smoke plume appears. The scan is carried out through 360 degrees, or any fraction thereof, taking less than 3 minutes to trace each lap.



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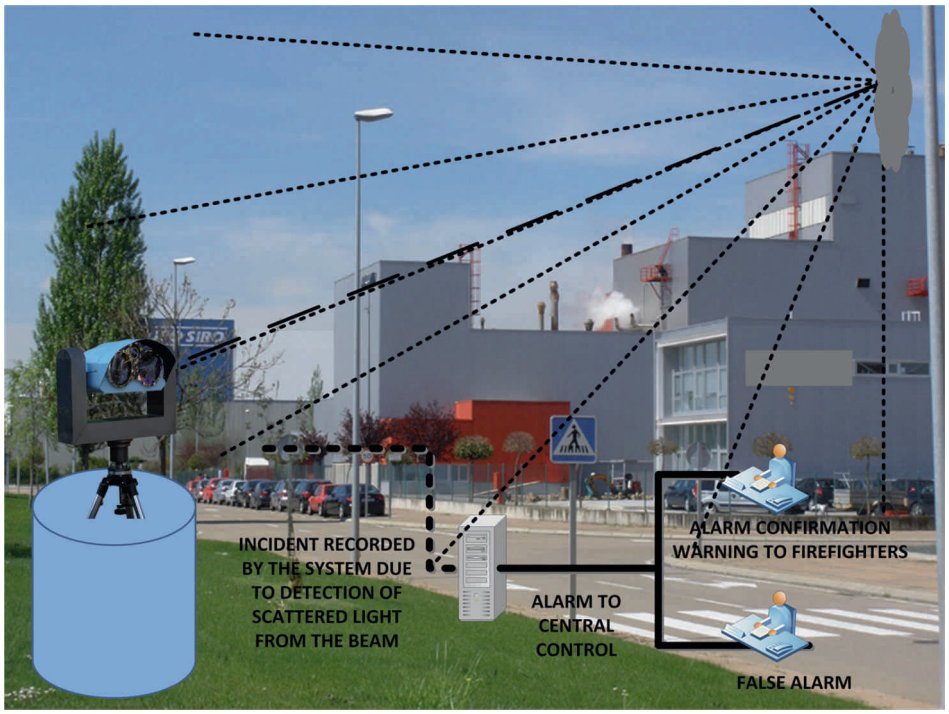
GRAPHICAL REPRESENTATION OF THE OPERATION OF @osf® (II)

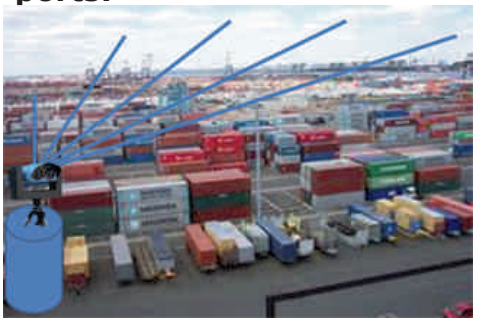
When the PRMB hits a smoke plume the scattering takes place in all directions. A minute fraction of the scattered radiation heads back to the @osf® receiver (*backscattering*), where it is captured and analysed. A calculation process begins to determine the detected signal's nature, filtering the false alarms. If the detected smoke plume has the features of a real alarm, a warning message is sent to the Control Centre. The system has into account if this plume has already been detected in the previous lap, or if it is a new one (new alarm).

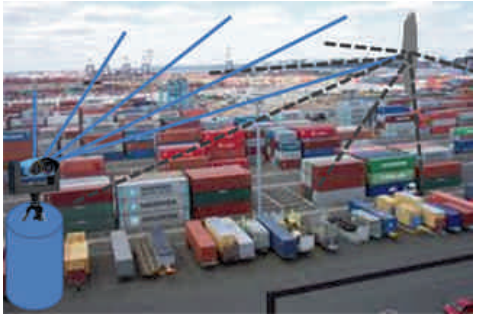
@osf® sends to the Control Centre the relevant information of the alarm: date/time, geographical coordinates, detection curves, a picture of the smoke plume, and some other minor technical information (gain, sensitivity, threshold level, noise level...).



An operator in the Control Centre receives the alarm and, based on the supplied information, makes a decision about the most suitable course of action. The alarms can be accepted, cancelled, ignored for a given time... The system registers every event, in order to allow for further study. It can have different configurations for the day and for the night, or for working days and festivities, or for summer and winter... @osf® is fully configurable and flexible.

The following pictures show how would @osf® work in the surveillance of a container storage area in harbours and free ports.





Ministry of Defence - DGAM Registered Company no. 5537-Sector 5-Level VI

Ministry of Interior - Police Registered Company no. 3.085

Ministry of Industry - Fire Protection Registered Company no. RIGA 15021141

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TÜV Rheinland Certification: ISO-9001:2008 no. 9105075098-Q

TÜV Rheinland Certification: ISO-14001:2004 no. 9105075098-MA