

Robotics

State of the art

14/01/2020



Mobile Robot



Remotely operated vehicles (ROV)



Exoskeleton

ROV 4 IR

Nido Robotics



Business challenge

Enel manages 42 underwater cables in Italy and 1 in Brazil (Ilha Grande), that in some case are older than 30 years (Ischia). Typically making a joint in a cable takes more or less 6 days with very high cost . For instance it happen every 3 years in Ischia island, where due the relevant presence of tourist during the summer the impact of service interruptions is very high.

Solution

The main goal of the project is to introduce the NIDO ROV (Remotely Operated Vehicle) technology in order to do inspection, fault location and 3D model (NDT) of underwater cables. ROVs are the best alternative for visual and work inspections. Thanks to them, maintenance & cable repair are faster and safer compared to scuba divers operation.

POC Phase 1 to inspect the cavo 8 at Ischia to test :

- Sonar technologies to produce 3D mapping for NDT
- GPS for Georeferenced images
- Instruments for cable fault location

Phase 2 :

- Purchasing the Nido Rov
- Test in operation (Brazil Ilha Grande site)

Project Owner

GI&N O&M
S.Orrù

Location

ITA 
Brazil 

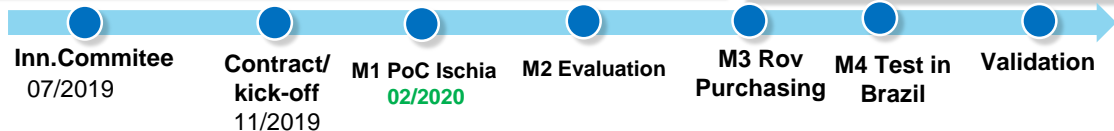
Updates

- Contract with NIDO signed
- IT Country Team defined
- Port authorities authorization
- PoC Phase 1: sched. Feb. 2020

Next Steps

- PoC phase 1 Evaluation

Project Timeline



HV/MV Tunnel Inspection

Spot Boston Dynamics



Updates

- Poc location : Barcelona
- Tunnel: Vilanova
- Use case definition

Next Steps

- Boston Dynamics Feasibility OK
- PoC Quotation

Business challenge

In Barcelona area there are many tunnels with underground H/M voltage lines . The facility is categorized as a plant with risk of confined space. This implies greater security measures for the crews conducting the inspections. Currently the inspections are made by workers and tunnel can be long up to 2 km.

Solution

Introducing the inspection of underground high voltage lines using a remotely operated or completely autonomous system can perform the inspection of the tunnel faster and reliable compared to human inspection and assessment It reduces the risk to humans resulting from prolonged incursions into a hazardous environment. By the Lidar sensor it can also produce 3D model.



«Spot» is entering just now on the market. There is a collaboration with Boston Inn.lab. and the interest of other Enel BL. Received the proposal for early adopters program.

Project Owner

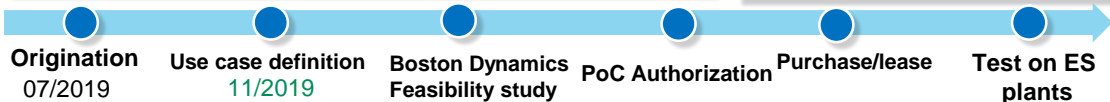
GI&N

Location

ES



Project Timeline



Monitoring Primary Substation

Spot Boston Dynamics



Business challenge

To minimize failures of power facilities and avoid the huge economic losses caused by power outages, transmission line and substation equipment ought to be regularly inspected for detecting defects as soon as possible to arrange the maintenance plan and produce a 3D model of the infrastructures.

Project Owner

GI&N

Location

ES



Updates

- **Poc location** : Barcelona
- **Substation**: Vilanova
- **Use case definition**

Solution

A robot can patrol in a substation and inspect equipment with a visible-light camera and an infrared thermograph to find abnormal hot spots and abnormal appearance. Through accurate sensors the inspection robot can perform task such as partial discharge detection, instrument meter recognition, intrusion detection and by Lidar produce 3D model.



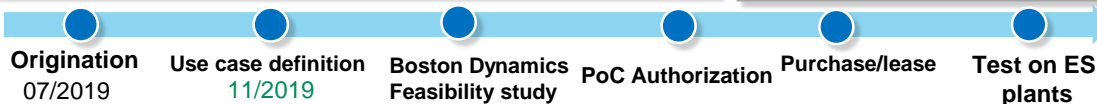
Boston Dynamics

«Spot» is entering just now on the market. There is a collaboration with Boston Inn.lab and the interest of other Enel BL. Received the proposal for early adopters program.

Next Steps

- Boston Dynamics Feasibility OK
- PoC Quotation

Project Timeline



Exoskeletons (wearable robotic)

Skelex



Business challenge

The goal is to help the workers in the field to better withstand the working conditions in which they have to keep their arms raised for a long time or to use their force to lift and handle weights, such as toolbags. The challenge is especially thought to help the LST group, the blue collars who work on active parts, to handle the insulated stick with more accuracy and to reduce the fatigue.



Solution

Skelex's solution is made by a non powered Flex Frame technology exoskeleton structure. The frame is designed to support the upper body portion of the worker, especially the arms.

- The exoskeleton is completely flexible, allowing complete movement of arms and body in all directions.
- The total weight of the frame is about 2 kg and provides support up to 8 kg lift.
- The structure is completely detachable, the harness is removable, allowing the complete washing. Furthermore, the structure is not in contact with the back, preventing sweating.

POC:

Testing the Skelex's exoskeleton, capable of supporting field workers with their daily activities involving great physical fatigue, especially those working on active parts. The scope of this effort is reducing as much as possible fatigue and preventing injuries. Skelex solution will be tested in two different Enel facilities by two different operative teams. The PoC includes the rental of six exoskeletons, equally divided among the two teams.



Project Owner

e-distribuzione

Location

Ita



Project Timeline

