## Aramco Upstream Solution Technathon 2019

## IoT Challenge: Design of Smart seismic node.

**Problem:** In oil and gas exploration operations, there is a constant demand for increasing seismic image resolution. This challenge is addressed with increasing number of sources and receivers and emerging of distributed sources and autonomous seismic nodes technologies. The seismic nodes are getting more common. Nodal acquisition systems provide flexibility and reduce cost by removing wires out of the equation. However, most of the existing seismic node models remain just as autonomous geophones that are only capable to store some data. And the vast amount of data recorded on such nodes requires massive storage space and lots of computer power for basic preprocessing at large volume.

**Solution:** Considering rapid development in wireless transmission technologies and computing capabilities of the small chips. It is logical to design next generation seismic nodes that can perform basic preprocessing on board utilizing both local (signal preprocessing for each location) and spatial processing algorithms (e.g. FK-filtering, noise suppression, deblending) by communication to each other. This in-field preprocessing will significantly reduce size of the recorded data and will free computing resources at the data processing center making big step towards “green seismic”.

**Details of the challenge:** In this IoT challenge, the participants will be given basic IoT kit and requested to design Smart seismic node that will be capable of recording of acoustic and/or vibration signal and performing basic local and spatial preprocessing (detect and clean the signal and triangulate source location or any other task that can be performed with small number of nodes). These operations must be done locally on-board of smart nodes. The Smart node design must include also designing compact and robust package for the electronics. The package could be 3D printed for demonstration.

**Evaluation of the performance:** There will be several tests with different source location for statistics. Team that will locate source with best accuracy in all tests will get highest technical score.

**Data for challenge:** The local coordinates grid will be provided (drawn on the floor).

**Hardware:** Each team will get IoT starting kit that is enough to produce 5 Smart nodes. The kit will include: ESP32 IoT board, Microphone, Battery, Wires. There will be 3D printers provided for manufacturing Smart nodes shields.