

# 2020 Wearable Technologies Workshop Challenge Request

**Challenge Title:** Energy-harvesting smart sensor array

**Organization Name:** BP

**Team Assignments Available:** 5

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## Summary of the Challenge and Team Project

### Background:

The Technology group in BP seeks different ways that technology can improve our oil and gas operations. We are currently exploring the application of various wearable devices to capture different types of data within a facility. A key challenge is finding efficient means of powering these devices for extended use.

### Problem statement:

We would like to build a system consisting of an array of low-powered, wireless, long-range sensors deployed across a facility with base station that can be worn by an operator or robot patrolling the facility. The sensors lay fully unpowered in a dormant state until they receive a trigger energy from the wearable base station, which consumes no stored power. In addition to energizing the smart sensors when within range, the wearable can also collect data from the sensor array and transmit it to a cloud database for interpretation and storage in a streamlined fashion. The wearable needs to be feasible for an operator to wear for extended periods of time while working.

### Important design considerations (These can be discussed, and possibly negotiated, in more detail after the Team has been assigned):

- Type of data to be collected: what sensing elements could be built that would be of value to BP facilities
- How many sensors in an array?
- Maximum range between the wearable base station and smart sensor to energize and collect data
- Streamlined design for the wearable base station; inconspicuous on the wearer, sufficient battery life

### What funding and/or resources can be provided to each Team? (The details of the payment arrangements must be negotiated with the Team.)

We can provide some financial support for the materials required to develop the sensor and base station system as well as mentoring throughout the project.

**Deliverables (the final product you expect the Team to provide – such as a report, garment, user evaluation, ...):**

- The smart sensor array and wearable base station prototype (hardware and software)
- A final report documenting the design and development process as well as results of testing

**How will the results be used?**

The results of this project will provide benefit to BP in our investigations of how wearables can be implemented in our operations. An array of sensors that can transmit data in an energy-efficient manner using a wearable device is an important use case for us to explore at this time.

**What deliverables (if any) do you want transferred to you at the end of the project?**

BP would like unrestricted access to the developed prototype for possible additional development or usage in a field trial on one of our facilities.