

### Use Cases for Sixth Sense Suite

- Oil and Gas Sector: Forewarning of upstream equipment failure
- Electricity Sector: Failure prediction of substation static machines e.g., transformers
- Smart Farming: Forewarning of upcoming issues in farming and prediction of crop yield
- Healthcare Sector: Fill state prediction for surgical equipment recycling in hospital environment for sustainability
- Aviation Sector: Forewarning of degrading luminosity in high rise beacons and drone safety

#### USE CASES IN OIL AND GAS (ROTARY MACHINES):

**Challenge: Oil production** and upstream oil business rely 24X7 on accurate functioning of rig machinery such as, Electric Submersible Pump (ESP), Gas Lift Compressors (GLC). These stay deep under the earth surface and constantly pump out crude oil. Any emergency shutdown of these equipment can cause undesired disruption of oil production resulting into huge financial losses. In all modern oil well setup, various sensor data such as temperature, intake pressure, vibration, leakage currents etc. are collected from the machines and are used for automation and control purposes. Supervisory Control and Data Acquisition (SCADA) systems are software systems that are deployed to perform control instructions and monitoring of these equipment. Typically, Historian databases are used for the collection of sensor Tag data.

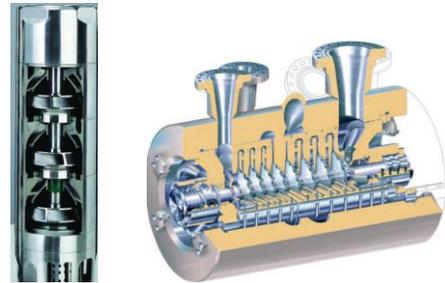


Figure -1: Typical upstream equipment: ESP, GLC

**Goal:** How can we use IoT Analytics to predict machine degradation and prevent any emergency shutdown?

#### USE CASE IN ELECTRICITY SECTOR (STATIC MACHINES):

**Challenge: Transmission and distribution** of electricity rely on 24X7 accurate functioning of substations equipment such as, Transformers, Circuit breakers. These stay in the open air and are exposed to inclement weather as well as electrical load balancing stresses. Any emergency shutdown of these equipment can cause undesired disruption of power supply. In a Smart Grid like setup, various sensor data are collected from substation equipment and used for substation automation. Typical automation task involves Data acquisition, Supervision and Control.



Figure -2: Typical Substation equipment

**Goal:** How can we use IoT Analytics to predict machine degradation and prevent any emergency shutdown?

### USE CASE IN SMART FARMING:

The IoT and agriculture are in many ways a perfect match for each other. IoT sensors allow farmers to track crop yields, soil nutrition and rainfall with a previously unheard of level of precision. Sensors can be mounted on the tractors or can be static placed on the fields. They can also be placed on the drone for fly-by images and other statistical data. The concept is to gather the sensor data related to soil, environment, applied fertilizers, pesticide and merge with other prediction data such as weather and project crop yield by farm or by a geography.

**Goal:** How can IoT Analytics be used for predicting yields and providing forewarning of any issue that can affect the yield.



Figure 3: smart Farming

### USE CASE IN INDOOR RECYCLING (HOSPITAL):

IoT Analytics can be applied to the recycling industry by determining the fill levels of the bins and fill rates of the bins, thus accurately predicting the bin pick up, collection and cleaning scheduling. 5.5 Sense Suite is especially equipped to provide Indoor recycling needs around hospitals and health care clinics. The prediction can be used for the determining the timing and route for the recycling pickups and optimizing the operational efficiency. The fill level data comes from the IoT sensors mounted on the waste management bins. RF and Sonar are the typical technologies used for the fill rate determination. Cellular technologies are used for determining the GPS location of the bins in order to optimize the collection process. The analyses of the sensor data are done on cloud and the predictions direct the trucks to go to the next pick up location based on its current location.

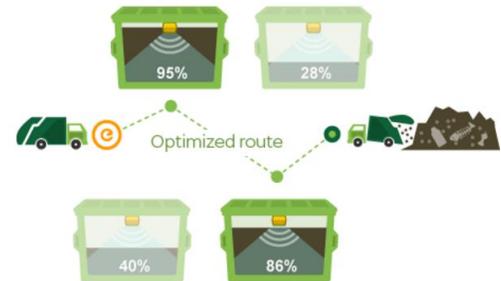


Figure 4: Smart Indoor Recycling

**Goal:** How can IoT Analytics be used for optimizing indoor recycling collection?

### USE CASE IN LIGHTING ASSURANCE AND DRONE SAFETY (SMART CITY):

Sensors can be used to detect and predict degrading lumen level for beacon lights on top of high rise buildings as well as avoiding approaching drone from collision with high rise structures using RF echo mechanism. The lighting application is very appropriate where solar panels are used for the lighting and dusty solar panels can affect the luminosity, e.g., rooftops, factory environment as well as modern solar street lights.

This use case started from ensuring air traffic safety however, it can be expanded to various micro-verticals where Solar Shingles are used or detection of flying unmanned aerial vehicle is required.

**Goal:** How can IoT Analytics be used for aerial safety by alerting degrading luminosity of high rise lighting beacons as well as avoiding drone collisions?

