Microsoft IoT Hackathon DX

Scenario 3 – Industrial

Proposal

The purpose of this scenario is to demonstrate real world sensors in action with Azure IoT Suite and Azure ML.

For this scenario we can use sensor data to simulate a machine fault and use cloud to device messages to simulate a reset of the machine, fixing the fault.

## Device

We will use a Raspberry Pi running windows 10 IoT Core. Connected to the Pi will be a temperature and humidity sensor. Readings will be taken every 2 seconds and sent to an IoT Hub. For the first x seconds the readings will be the real readings then after every reading we will increment an offset variable for each sensor by 1 which will be added to the real world temperature and humidity readings and sent to the IoT Hub.

The device will listen for cloud to device messages and will accept 7 different messages: - Reset temperature, reset humidity, reset all, pause temperature offset, pause humidity offset, change poll, flash (/warn). The reset temperature message will reset the temperature offset variable, the reset humidity message will reset the humidity offset, the reset all will reset both offset variables. The pause messages will be used to notify the device not to use the offset allowing different situations to simulated. The change poll message will allow the user to change the number of seconds between each IoT hub message.

The flash message will be sent automatically by a web job when Azure ML detects that a fault (temp or humidity reading) has occurred to alert the device user to the problem.

## Cloud options

There are two routes we could take with this for our cloud services. We could use a customised version of one of the predictive maintenance IoT suite template (<https://www.azureiotsuite.com/>) or we could build our own suite of services.

I think building our own set of services is probably the best method as the preconfigured scenarios are very basic and would need a lot of extending. Based on this method we will use/ create the following services: -

* IoT Hub
* Machine Learning
* Azure Stream Analytics. This will be used to call the Machine Learning function and create an event when an issue is detected by ML for the Web Job. Azure Stream Analytics will also output the temperature and humidity readings for PowerBi (Azure SQL DB).
* Web Job. This will read messages from the ASA output event hub and send the flash command to the device.
* Web App. This will provide a very simple interface for the user to issue cloud to device commands i.e. Reset temperature, reset humidity etc. The web app could also show the current reading for temperature and humidity.