# DNB Hackathon 2023

## Problem Statements

# Optimal base station positioning at seaport

The shipyard area is where TEU containers are stored, for both imports and exports. Due to the dynamic container load change during loading/unloading, the height of containers can stack from nil to several (e.g. 5 containers with each 2.6m).

The metallic nature of TEU containers can severely affect RF propagation especially if antenna towers are inland and serving is required at the far end of vessel berth. Investigation/analysis is suggested to determine the optimal base station placement and planning to ensure 5G coverage is available for all use cases.

*Varying heights of TEU containers*

# Improving rural connectivity through 5G

The scope of this problem statement is to find ways to use 5G technology to improve connectivity in rural areas at competitive costs which typically have poor or non-existent internet access. The background of this problem is that while 5G technology has the potential to bring faster and more reliable internet access to remote areas, there are still many challenges to overcome in terms of infrastructure and cost.

Do make a list of potential scenarios (farming / plantations / homes / offices / fishing / etc.) you see as important and really addressing the problems including your proposed 5G based connectivity scenarios; What is the end to end solution (what are the building blocks); How cost effective are these solutions and the time and effort to get these implemented.

# Enhancing smart city infrastructure with 5G

The scope of this problem statement is to explore how 5G technology can be used to improve the efficiency and effectiveness of smart city infrastructure, such as traffic management systems, public transportation, emergency response systems and the various other scenarios. The background of this problem is that as cities become more connected and reliant on technology, the need for faster and more robust communication networks becomes increasingly important.

Make  a clear overview of the potential scenarios where 5G can make a difference; What is that solution in detail; What that difference is; How it will help the smart city infrastructure & speed of deployment; Any cost implications and the impact on improved smart city value statement.

# Personal Jarvis

Develop an application that supports VR/AR to assess, on any type of product a consumer purchased, providing detail information about product specifications, usage steps, commercials, and warranty. Additional capabilities to incorporate troubleshooting tips, live support etc. Products such as electronic devices, cars etc can be considered as examples.

Solution Requirements:

a. Consumers have flexibility to get every information about the product from the phone app itself.
b. Live support from the representative can be provided even in a remote areas using 5G capabilities.
c. Determine how 5G can help to get to extensive interactive (support) sessions because of its low latency and bandwidth support.

# 5G based cameras image collection as input for advanced AI-Machine Vision

Under 5G, the need for Machine Vision modeling will explode given the large increase in image data being collected (from many different types of cameras) and for that reason we need to look for good quality Open-Source Machine Vision software (either edge or cloud based) making it easier and faster to analyze this image data for predefined errors, use cases, etc.

Solution Requirements:

Therefore, we do look for Open-Source solutions picking up the image data from cameras, applying AI-MV models, presenting the results, and of course supporting further development of these models until the model meets the required levels. Select the AI-MV Open-Source software such that it can be selected for a broad spectrum of use cases, accessible to the Small to Medium based companies to solve their related problems and IT (startup) companies to bring this solution to the market. Given the availability of 5G, do look at using this software at the edge since then 5G low latency for real time MV analysis and advice is of importance. Provide the solution proposal and an example of how the suggested solutions is applied on any of the digital services.

# Predictive Maintenance

One of the key challenges of industrial enterprises is often reducing the unplanned machine downtime to increase overall equipment effectiveness (OEE) and hence to output productive supply and service. This is due to the reason of insufficient historical and real-time AI-driven data analysis to predict assets health status and hence enterprises are limited to provide prompt remedy before the expected failure. Therefore, intelligent maintenance is about using data to make automated decisions, predictions, and real-time optimisation across the end to-end value chain.

Solution Requirements:

- Develop an AI model with Machine Learning (ML) or Machine Vision (MV) that can further improve the availability and service levels of end-to-end digital services.
- Look at the components of the end-to-end digital services and identify the critical problematic components that will impact the operational of digital services.
- Provide the predictive steps that can be taken to avoid that any of the problems can happen and / or can have an impact.
- Make it clear as well in which order these AI-ML (or maybe AI-MV steps) should be implemented and for each step the positive impact on the availability of the digital services and why.
- Indeed, we do not expect that you do develop the relevant AI-ML models, but make it clear what these models should predict and, to get to that and what data types (in detail) need to be used for that?

Validate whether these data types are or can be made available. And, how to apply 5G into the solution.

# Consumer 5G Apps - Quick wins

It is important that we get much faster 5G enabled apps on the market; Often Consumer Apps solving simple problems make the real difference and can be deployed very fast to have an immediate impact. Therefore, come out with at least five 5G Apps which can be developed and deployed on wholesale 5G very fast (within weeks) and will have an immediate impact. To get to speedy deployments it is important that we focus on simple apps.

Include the detailed steps to get these apps fast from design to deployment. Think out of the box for areas where to deploy these 5G Apps.

# Green Manufacturing

Sustainability with lesser environmental impact is an important topic for Industrial 5.0 evolution. For example, green manufacturing focuses on using the potential of automated processes such as 5G real-time quality assurance, preventative maintenance in reducing leakage, machine learning quality inspection in creating less material waste, remote expert AR assistance in reducing the travelling, factory environment data collection in identifying the weak point for continuous sustainability improvement. With the assisted AI technology and apps, it can help to provide an aggregated insight across the manufacturing process chain to optimise the environment impact and profitability.

Solution Requirement: To support the improvement actions and initiative decision making, develop a Green Manufacturing Monitoring Applications (Visual Tool) with suggested metrics and provide the solution on how to collect the data for comparison between the actual performance and set targets. Also, identify the solution that requires 5G components.

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