

2022 WITSA Global ICT Excellence Awards

Award Category: Emerging Digital Solutions

Category: Private

1. Organisation/Company Name: Telekom Research & Development Sdn Bhd

2. Organisation/Company Address: TM Innovation Centre, Lingkaran Teknokrat Timur, Cyberjaya, 63000, Selangor, Malaysia

3. P.I.C Name: Dr. Hizamel Bin Mohd Hizan

4. P.I.C Designation: Principal Researcher

5. P.I.C Contact Number: +60 19-218 0890

6. Liaison Officer: Edrina Zainal

7. Liaison Officer Contact Number: +60 16-971 3613

6. Brief description of your nomination. Clearly state name of project, the beneficiaries, impact, duration and other key information:

Name of Project: Solution for Intelligent Machinery (SOFIA)

Solution for Intelligent Machinery (SOFIA) is a machinery health prognostic system for downstream operations in the oil and gas field that comprises of a centralised machinery control and monitoring system, real-time alarm and notification system, advanced Industrial IoT and edge computing coupled with AI analytics capability for predictive and preventive maintenance.

This emerging, future proof solution utilises advanced ICT that comprises of modern day IoT and data transfer protocols which are effective and efficient for scalable and massive IoT implementation in accordance with IR4.0; with the full use of intelligent sensors, mesh network, edge processing and AI. SOFIA is made to capture this ICT revolution, in line with the worldwide trend in digital transformation, whereby it is reported that the value of Digital Transformation in the Manufacturing Market is expected to hit \$642.35 billion by 2025. *

SOFIA facilitates the O&G industry in incorporating predictive maintenance to mitigate unplanned downtime which has a high impact on the production schedule. The AI-driven predictive maintenance solution proactively pinpoints the exact cause of machinery anomaly or potential failure, thereby allowing maintenance technicians to schedule the repairs and maintenance at the most cost-effective times. Without predictive maintenance, a plant can lose an entire shift on a simple rotor or valve problem. Using a combination of powerful wireless industrial IoT sensors and artificial intelligence, plant personnel will be alerted to a potential machinery problem to evaluate, repair, or replace the parts before the problem gets out of control.

Successfully deployed at Petronas Lubricants International (PLI) plant in Melaka, SOFIA is being used to monitor PLI's positive displacement pumps. The machinery health that is being monitored includes but not limited to rotor/bearing/connector's unbalanced fault detection, misalignment fault detection and loose connection fault detection. The vibrational analysis inclusive of RMS, FFT and acceleration data

is collected via the deployed wireless vibrational sensors and analysed using SOFIA's AI engine for machinery health prognostics.

The smart predictive maintenance (PdM) using SOFIA is capable in increasing overall equipment efficiency by 10-25%** and potentially overall savings in plant operation and maintenance costs. This bodes well for Petronas' bottom line, should this solution be expanded to Pengerang for example, where the cost of ICT maintenance alone costs RM 100 million per year. ***

SOFIA is fully compatible and interoperable in terms of frontend connectivity deployment. For example, for the deployment in PLI Melaka, SOFIA uses Wirepas mesh technology to deploy its sensors. However, other LPWAN technologies such as NB-IoT or LoRa can also be used in different circumstances because SOFIA is made as an agnostic solution that can cater for many frontend connectivity via its gateway. Also, the frontend connectivity makes use of IoT edge computing in its deployment strategy to improve power, bandwidth and data transfer.

Easy and intuitive use of SOFIA is presented in its user-centric design of SOFIA Web portal and mobile phone access. SOFIA's main dashboard consists of all the relevant information available via a dedicated, multi-tenant SOFIA Website. This website is made mobile responsive for users to take advantage of mobility and readily available information from their mobile phones. Alternately, SOFIA also features a compact SOFIA Mobile App for simpler at-a-glance dashboard info and ease of use.

The SOFIA platform and application are wholly owned by TM R&D and have been wholly developed and co-created by Malaysian expertise in the areas of IoT frontend and backend platform and connectivity development, AI-driven analytics for machinery health prognostics and SOFIA web portal and Mobile App development. Being an agnostic solution with the best local support, SOFIA is primed as Emerging Digital Solutions to ride the 5G wave while open to different vertical usage other than oil and gas, such as manufacturing and utility sectors.

* Adroit Market Research

** Deloitte, Analytics Institute

*** Petronas Outlook 2021-2023, Pengerang Refinery & Petrochemical Complex

7. Organisation/Company Website Link: <https://www.tmrnd.com.my/>

8. Link to Supporting Documents *

a). *Full nomination presentation (required):* As above

b). *SOFIA portal:* <https://sofia.tmrnd.com.my>

c). *Other relevant documents:* SOFIA supporting document & Sofia business leaflet as attached