Improving Rig Floor Safety by Leveraging Artificial Intelligence Capabilities

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Abstract

Operating a drilling rig presents numerous hazards particularly at the rig floor area: heavy equipment moving around, suspended loads, potential dropped objects just to name a few. Although significant progress has been made to automate drilling activities, people are still required to perform specific tasks around the rotary table, classified as the “red zone”. The recent developments in Artificial Intelligence (AI) have driven step changes for improving the safety of drilling rig operations. The initiative aims at minimizing the risks at the rig floor through the introduction of an innovative digital solution and AI-based technology.

Leveraging on company internal digital infrastructure and expertise, cameras connected to AI machine are deployed on the rigs. Proprietary algorithm developed and built into the AI machine can detect certain parts or equipment on the rig floor along with their motions. The algorithm will then be able to identify the parts, foresee its movement, and compare against the predefined condition to determine an unsafe condition or behavior. A real-time automatic intervention to the Driller of any unsafe act or condition is now made possible to stop an incident or accident from happening.

The project was first pilot tested as a proof of concept on one rig prior to further deployment to the other rigs in the project. Conceptual infrastructure setup was tested and proven to be possible and reliable. The “brain” was constructed through development and integration of multiple algorithms. Challenges were faced to achieve desired accuracy and consistency of the detection method for it to produce meaningful result and trigger accountable intervention. Also, several rounds of iteration were done to yield on acceptable result.

Besides the real-time intervention, the system is also capable of producing statistics and reports for further analysis and optimizations to target both improvement in efficiency and reduction of HSE exposure for the workers. The feedback loop through discussions with the rig crews is key to achieve progress and continuous improvement towards a safer human behavior on the rig floor. The system was also integrated with the larger Behavioral Engineering Methodology (BEM) workflow that the service provider has implemented for various other processes to identify the gaps and risks associated with the human interactions at the rig floor.

In its quest to achieve accident-free operations, the service provider has embraced digital solutions and Artificial Intelligence for transforming the management of HSE in general and particularly at the rig floor. Both operators and service companies will benefit from the digitalization of HSE processes and workflows to enable the implementation of innovative ways to further reduce the risks associated with drilling activities.