

# World Congress on Industrial Automation

July 20-22, 2015 San Francisco, USA

## A robots perspective of the future of mineral mining

**William Lovell**

c-Link Systems, Inc., USA

As a race, our resource consumption is increasing exponentially as we expand in both population and intellectuality. For mineral recovery, we now must delve deeper into the earth, into realms more unforgiving and dangerous for humans. The use of robots in mining brings into play some unique challenges in what is expected and performance. Is the equipment, a full autonomous robot or a tele-operated robot? Will it be utilized in above ground or underground mining, maybe even under the ocean? A further examination of current technology to determine needs to move robots forward in this arena. COTS (Commercial off the Shelf) equipment is the starting point, this means use the mining equipment already on-hand, built, designed and certified. Sometimes it does make the conversion to a robot cumbersome, but it is a cost reduction in most cases. Sensor arrays are needed and will push our imagination and creativity to the limits. The sensor arena has an almost unlimited potential for use and expansion. For this paper sensor will encompass RF, light and optical. Above and below ground, what type of sensors are we using and can we improve on our methods. Power plants and final control, do we let the robot work or hold its hand? How does this all play with the governing institutes like the U.S. the Department of Labor's MSHA or Australia's own MSHA? Why are we not seeing MSHA certified robots for S&R in a tunnel collapse?

[wlovell@c-linksystems.com](mailto:wlovell@c-linksystems.com)

## Development of energy efficient battery electric car for Shell Eco Marathon Competition - Qatar University experience

**Ajad Hossain Howlader, Noor Alam Chowdhury, Mazen Mohammad Kamel Faiter, Farid Touati, and Mohieddine Amor Benammar**

Qatar University, Qatar

The paper reports on the participation of Electrical Engineering students of Qatar University students in Shell Eco Marathon (SEM) competition, which aims at designing and racing energy efficient vehicles. This participation has multiple objectives both for improving student technical and soft skills. Details of the design of a three-wheel car for SEM Asia 2014 race in Manila are given. Additionally, a dedicated computer-controlled test bench is developed for testing and optimizing the car design, and for training the drivers for optimum driving strategy that minimizes energy consumption. The process of car and test bench design has gone through various phases of study, modeling and simulation, optimization, and testing. Both mechanical and electrical parts of the test bench as well as the car are designed in-house. The design has to meet SEM technical and safety requirement, which guided the team till the ultimate design. The testing was done on the designed car, which was shipped to Manila/Philippines to participate in the SEM Asia 2014 competition February 3-9, 2014 in Manila. In Manila, the team planned to record so many data from different runs with different driving strategies on the real track circuit. These data will be compared to those that will be obtained using the designed test bench for same conditions for further tuning and improvement of the car model and car design.

[ah097142@qu.edu.qa](mailto:ah097142@qu.edu.qa)