# FUTURE MINING 2019 – CONTENTS

## Artificial Intelligence

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automated rock quality designation (RQD) estimation from digital images of drill cores using convolutional neural networks</td>
<td>F Al-zubaidi, P Mostaghimi, G Si, P Swietojanski and R T Armstrong</td>
</tr>
<tr>
<td>A novel physics-AI based hybrid digital twin for enhanced gold recovery</td>
<td>S Bhongale and P Moyo</td>
</tr>
<tr>
<td>Automating load-haul-dump cycle data capture with machine vision and deep neural networks</td>
<td>C Higgins</td>
</tr>
<tr>
<td>A workflow for assessing interpretation uncertainty in spatial domains using Bayesian approximation</td>
<td>S McManus, J Coombes, A Horta and A Rahman</td>
</tr>
<tr>
<td>Predictive maintenance in mining</td>
<td>J C Pellicer</td>
</tr>
<tr>
<td>Machine learning – a new paradigm for resource geology</td>
<td>S Sullivan, C Green, D Carter and H Sanderson</td>
</tr>
</tbody>
</table>

## Automation and Robotics

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis of model fidelity between exploration and blast-hole based models: a cross-validation style testing</td>
<td>M Balamurali, J Zigman and A Melkumyan</td>
</tr>
<tr>
<td>Reduction of personnel in exposed areas, safety devices and early steps towards robots in mining</td>
<td>M Berner, N A Sifferlinger and P Moser</td>
</tr>
<tr>
<td>The use of automated drones in underground hard rock mines.</td>
<td>E Jones, D Reardon and S Hrabar</td>
</tr>
<tr>
<td>Automation gaps to achieve zero entry mining in surface mining operations</td>
<td>P F Knights and G Yeates</td>
</tr>
<tr>
<td>Development of mining automation system at Northparkes</td>
<td>Z Li, B George and M Plummer</td>
</tr>
<tr>
<td>Intelligent coal mining technology development and prospect in China</td>
<td>G F Wang, Y H Pang and H W Ren</td>
</tr>
<tr>
<td>Automation of ground control for mine shaft sinking – a step forward</td>
<td>M Weber, C Garcia Pina, S Bock, J Franz and J Henriquez</td>
</tr>
</tbody>
</table>

## Big Data

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual reality data exploration and mine planning with the real-time mining control cockpit</td>
<td>D Buttgereit and J Benndorf</td>
</tr>
<tr>
<td>VoxelNET: a digital middleware platform for mining industry 4.0</td>
<td>C Sennersten, C Lindley, B Evans and E Sellers</td>
</tr>
<tr>
<td>Identifying barriers and pathways to sustainable mixed reality simulation for the mining industry</td>
<td>P Stothard, A Squelch, R Stone and E Van Wyk</td>
</tr>
<tr>
<td>Beyond Excel: power BI and your databases</td>
<td>C Vincent, M Demmer and S Boddington</td>
</tr>
<tr>
<td>Application of the mining cloud platform in mining industry</td>
<td>Z Yang, C F Guo and G H Zhang</td>
</tr>
</tbody>
</table>
Future Mining / Green Mining

Mining and mineral exploration: public participation at an early stage in Finland, Germany and Spain
L Benighaus

Implementation of sustainable mining methods for the Platina Scandium Project in NSW
J A Horton and G Steyl

Recovery of gold ions from ammonium thiosulfate using synergistic effect of aluminum and activated carbon
S Jeon, H Takahashi, C B Tabelin, M Ito and N Hiroyoshi

Satellite-bound monitoring of mine sites
J Kretschmann, S Möllerherm, P Goerke-Mallet and C Melchers

Reprocessing of ferriferous nickel laterite siltation sediments into magnetic nanoparticles through coprecipitation
E Opiso, L M Ramos, J P Aseniero, J R Delfinado, I Park, A Orbecido and C B Tabelin

Social license to operate in the coal industry
J P Orchard

Application of pre-concentration technologies in sublevel stope mining
F Sotoudeh, M Nehring, M Kizil and P Knights

‘Social License to Operate’ is an industry narrative laden with unconscious bias
D Yeates

Mine Internet of Things

Applications of LoRa wireless relay networks in underground mining
P Branch, B Li and K Zhao

IoT dashboard implementation into mining operations using encrypted wireless mobile telecommunications and cloud infrastructure
T D Hadley and A A Monch

Clustering routing based on link quality estimation for disaster monitoring sensor network
Q S Hu, D W Luo, M X Zhang and S Y Li

Observation of crack initiation and propagation in coal subjected to heating and cooling
J Kodama, R Naka, T Minami, T Sugawara, A Hamanaka, K Itakura, G Deguchi, D Fukuda and Y Fujii

A cost-effective positioning and communication technology for the underground mine IoT application
B Li, K Zhao and S Saydam

Node re-localization for anchor drifting scenarios of post-disaster in coal mines
M Li, Q S Hu, H N Zhang and W. Yang

IoT application to rock engineering
R Mitra and S Madonsela

Implementation of ‘edge sensors’ into mining operations
A A Monch and T D Hadly

A flexible global telemetry and IoT solution that enables instant custom remote monitoring and automation anywhere
D Scott

Mobile 3D imaging in underground coal mines: a case study
S K Singh, S Raval and B P Banerjee

Investigation of nature-like rock joint shear behaviour using 3D printing
J Zhang, J Oh, G Si and H Roshan

Future Mining 2019 / Sydney, NSW, 19-20 November 2019
# Mineral Processing Frontiers

- **Alternative energy roadmap for the mining and mineral processing industry**  
  M Allen  
  Page 152
- **Technospheric mining of critical and strategic metals from metallurgical by-products**  
  R D Alorro, D Ibana, S A Jones, Z T Ichlas, B Lim, M R Kurniawan and G G Lee  
  Page 157
- **The importance of water quality monitoring in mineral processing plants**  
  G Bournival, N Lambert and S Ata  
  Page 160
- **Use of process water in reverse cationic flotation of iron ores**  
  I V Filippova, L O Filippov and A Frade  
  Page 161
- **An advanced passivation technique of sulphide minerals in mine wastes for preventing acid mine drainage formation**  
  I Park, M Ito, C Tabelin and N Hiroyoshi  
  Page 165
- **Towards sustainable mine waste management: finding value in mine wastes via the ferrite process and geopolymerisation**  
  C B Tabelin, T Igarashi, H Uchiyama, P Herrera, E M Opiso, J P J Aseniero and C Maestre  
  Page 169

# Space Mining

- **Resource exploration strategies for lunar polar volatiles**  
  S Casanova, C Espejel, A G Dempster, R C Anderson, G Caprarelli and S Saydam  
  Page 173
- **Lunar Ore Reserves Standards 101 (LORS-101), a First Code for the Reporting of Lunar Exploration Results, Lunar Resources, and Lunar Reserves**  
  C D Espejel Garcia  
  Page 176
- **Resource modelling for mining on the moon, Mars and asteroids**  
  C A Lindley, C C Sennersten, B Evans and E Sellers  
  Page 181
- **Using biomimicry to address engineering challenges in space mining**  
  N S Melkoumian  
  Page 183
- **Developing the case for mining resources on the Moon**  
  T M Pelech, A Dempster and S Saydam  
  Page 185
- **Space Mining: why, what, where (and when)**  
  M Sonter  
  Page 189

# Technology Integration and Management

- **Value-driven optimisation using integrated technology solutions**  
  R Chandramohan, M Pyle, R Byfield and R Whittering  
  Page 193
- **Real time LHD dispatch optimisation at Newcrest’s Cadia Valley Operations**  
  S Donaldson, B Hollis, K Wynn, L Potts and M Evans  
  Page 198
- **Asset health process as a thrust for asset performance management (APM)**  
  Y Fedichkin and C Perez  
  Page 203
- **A golden age for optimisation in the mining industry**  
  B Hollis and J White  
  Page 209
- **The Vortecone: a new maintenance-free wet scrubber device**  
  A Taylor, S Schafrik and A R Kumar  
  Page 216