SLEEP/ WAKE UP SYSTEM FOR UNDERGROUND MINES

J.M.V.H Peiris[1], K Zhao[2], B Li[3] , H Gong[4] and A.Seneviratne

.

1.PhD Student, School of Electrical and Telecommunications Engineering, UNSW, Sydney, NSW 2052. v.peiris@unsw.edu.au
2.Research Engineer, School of Minerals and Energy Resources Engineering, UNSW, Sydney, NSW 2052. kai.zhao@unsw.edu.au
3.Senior Lecturer, School of Minerals and Energy Resources Engineering, UNSW, Sydney, NSW 2052. binghao.li@unsw.edu.au
4.Director of Operations, Roobuck (Australia) Pty Ltd, Brookvale, NSW 2100, Australia. henryg@roobuck.com.au
5. Professor,School of Electrical and Telecommunications Engineering, UNSW, Sydney, NSW 2052. a.seneviratne@unsw.edu.au

ABSTRACT

The employees and vehicles in underground mines are vulnerable to accidents caused by explosions, fires, collisions, windblasts and collapsing. Underground mine accidents are reported at different parts of the world throughout the year. Latest accident due to an underground collision in Australia has been reported as recently as 2019, at the Moranbah North mine in central Queensland. The accident reportedly claimed a life of a grader driver and injured ten other employee. According to the news report, 37 people have been killed in China due to different mine accidents in 2019 and 14 among them were due to a gas explosion in a coal mine in Shanxi province of Northern China.
These accidents, necessitate the requirement of locating mine workers. Positioning is such safety measure used in mining industry. However, the environmental constraints in the underground mines immensely influence in designing and installation of such automated systems. In fact, environmental constraints create many trade-offs when designing wireless systems in underground mines. Henceforth, it is the responsibility of system designers to be vigilant on the possible consequences and drawbacks architectures. The design selections should be prioritised solely to fulfil the aims of particular system installation. This paper addresses the contemporary issue of powering underground stationary devices which has been affecting many mine-IoT applications over the years. There are range of low power advanced wireless technologies commonly used in IoT. But the existence of power limitations in underground mines, necessitates the ubiquitous need of a power optimisation mechanisms for mine-IoT. Besides communication to the destination nodes should be arranged power efficiently. This paper presents power efficient designing prospects of positioning systems.