Opportunity

To accelerate the development of this technology through licensing or direct investment, contact

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Landslide prediction

Early warning of open-pit mine landslides and their boundaries

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The technology

- A robust method for predicting landslides up to 15 days in advance, using standard data collected from sensors such as ground-based radar.

Market need

- Landslides in open-pit mines have potentially devastating productivity costs, but current prediction methods allow only enough time for personnel evacuation.

Technology status

- The technology has been shown to be robust across various datasets. Further validation is required.

Saving lives and mining equipment through better landslide prediction. Picture: Shutterstock

Market need

Landslides in open-pit mines are common and have potentially disastrous human and financial cost. As such, open-pit mines are generally monitored for potential landslides using data from ground-based radar and/or X-ray sensors. However, current methods often give only hours of notice of an event. This is sufficient for evacuating people, but not for removing valuable equipment or machinery.

An example is Rio Tinto's Bingham Canyon Mine, a copper mine in Utah, USA, which was evacuated only 12 hours before a massive landslide in April 2013. The loss of equipment and subsequent shutdown of the mine cost hundreds of millions of dollars in production.

Solution

University of Melbourne researchers, led by Professor Antoinette Tordesillas, have developed a method for the earlier prediction of landslides using standard data collected for monitoring open-pit mines. Their method is based on knowledge of interactions in granular material and the effects of forces, motion and interstitial pore matter.

When applied retrospectively to raw data obtained from the monitoring of open-pit mines, the method located the spatial boundaries of landslides 15 days in advance. The method has also been demonstrated to out-perform current prediction systems.

The early prediction of a landslide and an indication of its boundary would enable mine operators to employ measures to prevent costly landslides.

When prevention is not possible, the early warning would give operators time to save lives and salvage valuable equipment.

Technology and IP status

The method is based on comprehensive mathematical, scalable modelling of forces, motion and interactions of particles. When applied to datasets typically collected for monitoring purposes, the method can discern the boundaries of where the landslide is likely to occur, and provide a statistical probability of when it will occur.

The robustness of the method has been demonstrated on sample datasets. Further validation and software development would provide a mine operator with an automated early-warning system for predicting landslides.

A provisional patent application was filed on 24 April 2017.

Tech name and number:	**2016-063** Landslide prediction
Researchers:	Professor Antoinette Tordesillas, Professor Robin Batterham
Publications:	Tordesillas A, Zhou Z, Batterham R. 2018. A data-driven complex systems approach to early prediction of landslides. *Mechanics Research Communications*
Patents:	The method is the subject of an Australian provisional patent application AU2017901479
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