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#### CAVE A S S O C I A T I O N R E S E A R C H

## Cave Radio & Electronics Group

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#### innovative alternative to conventional laser scanners for capturing the geometry of cave passages in three dimensions

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Adding cross-sections to conventional cave surveys has tended to involve hand drawing infrequent sketches. Mike Bedford suggests a more accurate method.

#### Signal Phase Cannot Be Determined from a Fourier Transform of Sampled Data

The Discrete Fourier Transform is a well-established tool for obtaining a frequency spectrum from a set of sampled data. The coefficients obtained from the DFT are complex-valued and so both phase and amplitude can be extracted. However, David Gibson asserts that if the sampled data originated in the real world (say, as a recording from a broadband radio antenna) the phase of the spectral components cannot be determined. This, he claims, is an 'obvious' observation, but one that is not emphasised in textbooks. The details of the problem are left for the reader to work out, as an interesting 'examination question' in DSP.

#### Cave Flood Pulse Data Logging in OFD1

Stuart France describes a work-in-progress project to monitor flood pulses in the Ogof Ffynnon Ddu streamway that has been running since the summer of 2015. A data logger inside the OFD1 cave is currently being used, but a live feed to the Internet is to be developed, then the system is to be replicated in other caves.

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#### French Ground-based Communication in World War 1 17-18

Communication using earth current systems is by no means new. During the First World War, French trench-based forces moved from using wired communication to ground conduction systems. Their aim was to improve security between front-line trenches and rear echelon locations. John Rabson reports.

#### Capturing the World's Largest Cave in 360 Degrees 19-21

Martin Edström describes the technology he used to capture Vietnam's Hang Son Doong cave in high-resolution 360 degree format to provide an online virtual reality caving experience.

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#### Web Watch

Peter Ludwig comes up with yet another selection of links to interesting items that may otherwise have escaped your notice ...

#### Introducing ZEB REVO: a Major Improvement in Handheld 23-24 Laser Scanning

The ZEB1 handheld laser scanner is easy to use, it offers unprecedented speed of cave surveying and, in addition, generates a full 3D model. GeoSLAM's **Mark Reid** introduces the new ZEB REVO, which builds on the success of the ZEB1, while offering new levels of versatility and performance.

#### The Adventures of GREG

Illustrations by Adrian Higgins with words by Mike Bedford.

Front Cover: Two members of the Son Doong 360 expedition team in a view into the first doline, as seen from under the northern side of the collapsed cave ceiling.

Photo: Martin Edström