

Monitoring system designed to make railway operations much safer

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Researchers from the Hefei Institutes of Physical Science (HFIPS) of the Chinese Academy of Sciences have developed a monitoring system to ensure communication and operation safety in railway sections by

sending early warnings using fiber detection technology.

Rail transportation plays an increasingly important role in the busy transportation network in China with the country's rapid economic development. Railway networks are managed section by section, as is the signal distribution. The current communication system can generally identify the section in which the train is, but no one knows the train's precise position within the section, which can lead to severe injuries or even death, especially if there are construction workers on the track.

To solve this problem, the researchers proposed a comprehensive solution with a combination of many technologies.

They used distributed detection technology to detect and receive the vibration signal sent from an optical fiber that has been laid alongside [railway track](#). Then [artificial intelligence](#) was used for big data processing since a huge amount of the raw data needed to be processed very quickly.

Finally, an [early warning](#) could be send to each terminal, like a computer, APP and acousto-optic alarm etc., that has been networked by cloud platform that also served as the database.

The proposed solution model is ideal, but the real environment was much more complicated than they could imagine. In a 30-kilometer railway section that the China Railway Shanghai Group Co., Ltd., opened to the team for real testing, the researchers have faced many challenges.

In the operating environment, there were many interference factors that caused missing signals, difficulties in identification, location and direction determination and so on.

The researchers have spent two years in the lab or alongside the railway

tracks overcoming these challenges one by one. They used threshold determination to identify the target signal from other interference factors. Precise positioning was solved by map correlation positioning and field calibration and surveying.

The project has reached its goals in the current phase. But researchers will continue to enhance the data processing in order to achieve an earlier warning system. In addition, the team is also expecting to extend their test railway section to 300 kilometers and upgrade the system to monitor the [railway](#) track itself.

Provided by Chinese Academy of Sciences

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