The Telegraph
calcutta, india

Early Warning System

Scientists have devised a landslide prediction system that is set to take off in the hottest tourist spot in kerala. **T.V. Jayan** reports

The hills around St Antony's Colony in Munnar will have nine sets of wireless sensors, and (below) Joshua Freeman demonstrates one

Hridayadas Mohan is filled with awe and admiration whenever he sees those little "honeybee boxes" atop the hill that forms a backdrop to his house in the picturesque Munnar town in Idukki district. Mohan believes the tiny structures, covered by hoods for protection against the sun and the rain, offer a good chance to the 3,000-odd residents of St Antony's Colony against Nature's fury.

Landslides, a common feature in this most popular tourist spot in Kerala, are a bane for the people living in the area. The last human casualty may have occurred three years ago, but every year the district witnesses a number of landslips that bring down tonnes of mud and rocks, causing untold misery. "People here live in constant fear," says Mohan, a community worker belonging to the predominantly Tamil-speaking population that moved there centuries ago to work in the tea plantations. An abandoned government college and a partially damaged temple bear testimony to this fact.

The frequency with which landslides ravage Munnar brought Maneesha Ramesh and her colleagues at Amrita School of Engineering (ASE), near Quilon, to the sleepy town. Together with several European universities and firms, they are installing a network of wireless sensors that can pick up the slightest of rumblings in the earth in order to alert the people to an impending landslide in real time. "If we can pick up the right signals, we stand a good chance of informing the people about any threat days in advance," says Maneesha.

The scientists have deployed a number of wireless sensors in and around St Antony's Colony. They are buried a couple of metres into the soil and can measure the moisture content, pressure, vibration of the earth and several other geological parameters. The data are subsequently relayed via a satellite to a simulation lab on the ASE campus some 200km away.

The researchers are using the information to simulate the behaviour of the soil in Munnar. "We got tonnes of soil from Munnar for creating the facility as soil properties vary from place to place," says A. Kailash, a team member. They are even inducing rainy conditions using artificial precipitation and subjecting the soil to vibration through mechanical means.

"Landslide prediction is a complex science, but we expect to get a handle on it," says Joshua Freeman, a US engineer who is on the ASE faculty and has been instrumental in setting up the simulation studies. Freeman thinks it is important to weed out false alarms as that would lead to people losing faith in the system.

While the Amrita researchers are involved in the simulation studies and actual deployment of the sensor network, nine European institutions — including the University of Rome, the University Polytechnic of Catalonia in Spain and Ecole Polytechnique in Lausanne, Switzerland — are handling the design and fabrication of the sensors. The project, called Winsoc (Wireless Sensor Network with Self-Organisation Capabilities), seeks to mimic biological systems.

"Living systems are intrinsically robust against cells dying or being damaged," says Sergio Barbarossa of the University of Rome, the overall coordinator for the Winsoc project. "The behaviour of most organs is an interesting feature, resulting from the interactions of many cells, where no one cell is particularly robust or even aware of the whole behaviour." A good example of this, he says, is the rhythm of the heart, which is controlled by the interaction of several thousand pacemaker cells, each of which can be seen as a pulse oscillator. Even though the individual oscillators are not particularly stable or reliable, the heart as a whole is extremely stable and can readily adapt to changing conditions.

"This sets Winsoc apart from earlier similar attempts," says Maneesha. While the sensor network is based on many individual censors, it acts as a single, coherent system. The network is self-organising because even if a few censors are damaged, the others take over their task. Sensors are bound to fail as they work under the harshest of conditions.

With the European partners shipping in the wireless sensors soon, the Munnar landslide prediction project is all set to take off. For the time being, the Amrita researchers are using sensors procured from elsewhere. "We hope the network to be ready by the next rainy season," says Maneesha. They also intend to install similar systems in other parts of the district.

The consortium is planning to use the self-organising wireless network for other natural disasters as well. For instance, a team of researchers from the Centre for Science and Society in the Czech Republic is readying such a system for advance detection of forest fires.

The ASE researchers may still be months away from successfully operating a landslide warning system, but the inhabitants of St Antony's Colony are already confident of its usefulness. The people, who normally move to safer places whenever there is a heavy downpour, did not shift out of their homes this monsoon as they were hopeful of getting advance information about any devastating event.

email this page Print this page