

Bulwarks with brains: automatic alarms

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Siemens is researching a monitoring technology that detects damage to levees at an early stage. The researchers expect that with the help of sensors it will be possible to monitor the stability of the protective walls, with measurements accurate to within one meter. On the basis of the measurements, self-controlling software can then forecast dangerous situations before they happen, making it possible to implement measures in good time. The systems is currently being field-tested at Livedijk in Eemshaven, the Netherlands. Siemens Corporate Technology in Russia is developing the technology together with partners for the UrbanFlood research project funded by the European Commission, as the research magazine *Pictures of the Future* reports.

Worldwide there are 136 coastal cities with populations of over one

million that rely on the protection of dikes and levees. The pressure on these protective barriers is mounting because the climate change tends to cause the [sea level](#) to rise, and gives us good reason to expect more frequent storms. Until now, levees have been secured by either building them higher or reinforcing them, but this only buys time. Another strategy is the analysis of levees to identify sections that are at risk of being breached. “Smart bulwarks” could even predict fractures or the impact of flooding before they have a chance to happen.

For the levee monitoring the [Siemens](#) experts are using software designed for the monitoring of production facilities and providing it with new parameters. They determine these parameters from measurements taken at test levees and dikes that were intentionally destroyed using different methods, including by eroding the back side of a dike. This is what led to the disaster of the North Sea flood of 1953, for instance. Another test involves simulating the effects of water that bores a tunnel through the levee, which was one of the reasons for the devastating flooding in New Orleans. Now the software in use at Livedijk is learning to correctly interpret the data measured by the [sensors](#) under real conditions. In order to incorporate seasonal influences such as precipitation and wind directions in the analysis, this field test is being conducted for two years.

Other project partners are working on alarm notification options, for example via all mobile phones or navigation devices registered in the region at risk. In a next step, the researchers will equip levee and dike sections in Amsterdam and Saint Petersburg with the early warning system and monitor critical changes by means of an Internet-based software platform. In the long term they want to connect all levees and dikes worldwide to this platform and thus create a global monitoring system.

Provided by Siemens

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