

Rika Project

« A sensor network for detecting dangerous CO_2 emissions after carbon capture and storage »

Background

Carbon capture and storage (CCS) is the approach of capturing CO_2 produced by fossil fuel power plants and storing it permanently, e.g. in subterrestrial, geological formations. This poses the risk of gas abruptly leaking back to earth's surface, for instance, due to an earthquake. Being heavier than air, CO_2 can concentrate in depressions blocking out oxygen, killing animals and humans. CO_2 leaks thus need to be detected quickly to warn humans in the area. A promising approach is the use of sensor networks with CO_2 sensors.

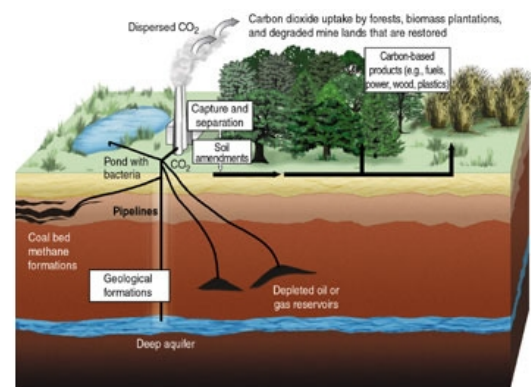


Figure taken from: http://www.ornl.gov/info/ornireview/v33_2_00/research.htm

Goals of the project

The goal of this project is to develop a sensor network detecting the abrupt increase of CO_2 in areas such as geographical depressions. To prevent false alarms, the network shall only raise an alert, if several sensor nodes detect the increase, because the increase at a single sensor may have natural reasons. Alerts should be given as audio signal and by SMS. Aside from alerts the percentage of CO_2 and anomalies in concentration shall be monitored and graphically displayed at a central system.

The system is ment to be a demonstrator suitable for presentations to a broad audience demonstrating the applicability of sensor networks in this field that is important to the public (e.g. at TUHH open house, or "Nacht des Wissens"). This requires a pleasant monitor application to be shown on a beamer. Procedures have to be developed how to demonstrate the system.

The sensor network will consist of IRIS sensor network nodes having CO_2 sensors connected to each node. It is programmed in the language nesC for the operating system TinyOS. Development needs to cover evaluation of sensor signals, suitable radio protocols and means to alert humans. A PC is used to configure the system (e.g. critical values), to save monitored data, and for displaying values.

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