

Low-Cost Pressure Sensor for Quantifying Flowrates from Mine Discharges

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Abstract: Quantifying the flowrate of a mine discharge is one of the first steps in developing a plan for remediation. Flowrates are typically measured using weirs, pressure sensors, pipes, acoustic doppler velocimeters, among others. Of these methods, a weir in conjunction with a pressure transducer can be used to continuously measure flowrates over an extended period of time, allowing quantification of daily and seasonal fluctuations in flowrate from mine discharges. While pressure transducers are great for continuously monitoring flowrate, they are often in excess of 500 dollars, making it cost prohibitive for volunteer-based groups and watershed organizations. The purpose of this project was to develop a low-cost pressure logger that could be used for water reclamation projects, education and outreach activities, and monitoring efforts by citizen scientists. To create this sensor, low-cost electronics similar to those used in commercial pressure transducers were researched, purchased, and mounted to a circuit board designed in EAGLE that could measure atmospheric pressure and water pressure while storing the pressure data, date, and time on an SD card. After several prototypes, a low-power battery timer was also added to the circuit board, conserving battery power, and allowing the sensor to function for months on 4 C-cell batteries. The circuit board and the sensor assembly instructions were also simplified, allowing easy assembly for students and volunteers interested in building the pressure logging system. Thus far, the sensor has been tested under lab conditions and is able to accurately record pressure data over various time intervals. Future experiments will help confirm that the sensor can be deployed in the field for long periods of time while collecting and recording accurate data.

Additional Key Words: Pressure transducer, monitoring flowrates, citizen science, do ityourself.

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