An IoT-Based Early Warning System for Settlement Monitoring Using Differential Pressure Static Level

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***Abstract*—This paper presents an IoT-based automated settlement monitoring system that aims to meet the diverse requirements of applications and the increasing demand for settlement monitoring. The system consists of a perception subsystem, data transmission layer, IoT cloud platform, and application terminal. The differential pressure static level sensor transmits the sensor serial port raw data to the 4G DTU through the RS-485 bus interface. Then, the 4G DTU converts it into a 4G network and transmits the data to the IoT cloud platform via the MQTT protocol. The IoT cloud platform analyzes and processes the collected data to generate reports, visualize data to generate curves, and perform real-time anomaly identification on the data. Finally, it implements viewing of settlement monitoring data and curve changes, as well as monitoring status warnings at the application terminal. The practical engineering application results show that this system can provide effective safety monitoring and an early warning scheme for slope, tunnel, bridge, and building safety monitoring.**

***Keyword*—IoT, Differential Pressure Static Level, Settlement Monitoring, MQTT, Early Warning System, Cloud Platform**

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