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Lightweight Mash up Middleware for Coal Mine Safety Monitoring and Control Automation

Recently, the frequent coal mine safety accidents have caused serious casualties and huge economic losses. It is urgent for the global mining industry to increase operational efficiency and improve overall mining safety. This paper proposes a lightweight mash up middleware to achieve remote monitoring and control automation of underground physical sensor devices. First, the cluster tree based on Zigbee Wireless Sensor Network (WSN) is deployed in an underground coal mine, and propose an Open Service Gateway initiative (OSGi)-based uniform devices access framework. Then, propose a uniform message space and data distribution model, and also, a lightweight services mash up approach is implemented. With the help of visualization technology, the graphical user interface of different underground physical sensor devices could be created, which allows the sensors to combine with other resources easily. Besides, four types of coal mine safety monitoring and control automation scenarios are illustrated, and the performance has also been measured and analyzed. It has been proved that our lightweight mash up middleware can reduce the costs efficiently to create coal mine safety monitoring and control automation applications.