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An IoT-based Automatic Dust Monitoring and Suppression System for Coal Warehouses and Processing Areas with a Reduction in Water Consumption

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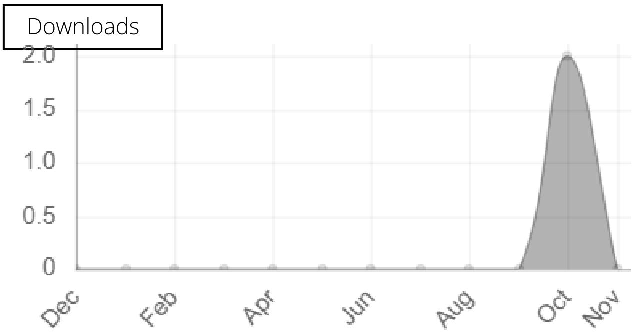

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Duy-Huy Nguyen
Hanoi University of Mining and Geology

Cao-Phong Khong
Hanoi University of Mining and Geology

Van-Thinh Nguyen
Hanoi University of Mining and Geology

Abstract

Dust is a serious problem at coal warehouses and processing areas of coal mines in Vietnam. At present, almost coal mines use high pressure mist machines to suppress dust. Several coal mines build fixed mist spray systems for dust suppression. These systems are manually controlled. This could lead to use too much water for suppressing dust and affect negatively coal quality. IoT is a new technology and applied to various fields such as smart home, smart city, smart agriculture, smart retail, smart health as well as in industry etc. This article presents a new IoT model for automatically monitoring and suppressing dust with a reduction in water consumption. Specially, the proposed model not only automatically monitoring dust density and warning when it is greater than the limit value but also automatically adjust open angle of water valve to save water according to the measured dust density.

The simulation results demonstrate that the proposed model stably operates and uses less water for suppressing dust. In addition, the system allows to automatically/manually turn on/off the water pump as well as water valve according to the dust density. This will save more water and even energy. Furthermore, in order to protect sensor data when transmitted over wifi network, we use WPA wifi security protocol, and to reduce effects of noise, Kalman filter is applied to the proposed system.

Author Biographies

Cao-Phong Khong, Hanoi University of Mining and Geology

He is the Dean at the Faculty of Electro mechanics (FEM),
HUMG, besides being an Associate Professor at the Department of Automation. Prior to joining FEM-HUMG, he worked as a PhD student in Electrical Engineering/Power Electronics and Control of Electrics Drives, TU Darmstadt, Germany for 4 years. He has a wide range of electronic equipment, power electronics and automation control. He
has over 10 published research papers in international journals/conferences. Assoc. Prof.
Cao-Phong Khong got a MS degree in Measurement and Control Techniques form HUST,
Vietnam. He completed his PhD from TU Darmstadt, Germany. His research interests are
in electronic equipment, applied power electronics in mining industry, power electronics
and control of electric drives, and linear motor. He is now a member of HUMG council.

Van-Thinh Nguyen, Hanoi University of Mining and Geology

He is the Deputy-Head of Department of Underground Mining,
Faculty of Mining, HUMG. He has done his MS in Mining Engineering from HUMG.
Next, he has completed his PhD in the field of Mining Engineering in 2019. He has more than 15 years of teaching Experience. He has over 10 published research papers in
international journals/conferences. He has worked on many research projects during his
MS and PhD programs as projects at national and ministry levels. His research interests are in Underground ventilation, effect evaluation of coal dust for worker's health, applied
informatics in underground mining

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