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Xianwei Hu, Tie Li, Zongzhi Wu, Xuan Gao, Zhiqiang Wang

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Xianwei Hu [a b d *], Tie Li [a b], Zongzhi Wu [b c], Xuan Gao [e], Zhiqiang Wang [f]

[a] State Key Laboratory of High-efficiency Mining and Safety of Metal Mines under Ministry of Education, University of Science and Technology Beijing, 100083, Beijing, China

[b] School of Civil and Resource Engineering, University of Science and Technology Beijing, 100083, Beijing, China

[c] State Administration of Work Safety, 100713, Beijing, China

[d] China National Oil and Gas Exploration and Development Corporation, 100034, Beijing, China

[e] China National Offshore Oil Corporation Research Institute, 100028, Beijing, China

[f] Richfit Information Technology Co,Ltd., 100007, Beijing, China

Abstract: As perimeter intrusion detection is of great value to security defense, an innovative intelligent intrusion detection system is analyzed and applied. The system is systematically designed through network topology, consisting of Infrared Image Collection and Pre-processing Module, Data Transmission Module, Intelligent Analysis and Automatic Alarm Module. Infrared Imagery Pre-processing is achieved through innovatively application of FLIR Tau 2336 based on advanced wavelet algorithm, considerably minimizing noises and enhancing details. Besides, synergistic action of intelligent analysis and automatic alarm are achieved through intelligent comparison between extracted imagery and models of pedestrian and vehicle. Moreover, innovative deployment plan of thermal infrared cameras is applied to avoid blind zone of intrusion detection. Through mix deployment of clockwise and anti-clockwise cameras, full coverage of security perimeter is achieved through only 14 thermal cameras, which is of great economic advantage. Finally, accuracy analysis methodology is proposed and test results are obtained - Detection Rate for all test locations is 100%, and more than 90% of test locations are with high alarm accuracy (above 90%). Alarm Accuracy and Missed-Alarm Rates are dependent on the distance between test and cameras, and the best alarm distance is 175.72m. The proposed intelligent intrusion detection system is applied and its results are acceptable, being of great efficiency and economic advantage.

Keywords: Intrusion Detection System, Intelligent Analysis, Accuracy Analysis, Automatic Alarm, Thermal Infrared Imagery

1 Introduction

Perimeter intrusion detection is of great value to security defense, as it's the first line of defense for protection of people, facilities and assets. Accuracy is the key indicator of intrusion detection, while nuisance alerts or misdetects completely undermine security system. When an intruder strikes, it's imperative that triggered alerts are believable and actionable. The more efficient the perimeter intrusion detection is, the shorter the security response time will be. In order to increase the efficiency of perimeter

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