DEVELOPMENT OF TRAJECTORY CONTROL OF A BOMB DISPOSAL ROBOT USING AN IMAGE PROCESSING AND INTERNET OF THINGS

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ABSTRACT

Indonesian government is actively promoting the tourism industry. To invite foreign tourist visitors, security assurance is completely crucial. Among the existing issues of security problems, the most striking problem is bombing. Therefore, this issue needs to be solved with smart actions. Technology for the prevention and early detection of bombs need to be improved. Bomb as a very dangerous object should be safely disable from safe distance therefore it does not endanger the security officers. Bomb disposal process also requires high accuracy therefore it needs monitoring locations based on field data. The objective of this study is to develop a bomb disposal robot occupied with a control system based on image processing and the Internet of things (IoT).

The study was conducted in 3 stages in the Department of Electrical Engineering Education (JPTE) Faculty of Engineering UNY namely: (1) developing the hardware of the bomb disposal robot with a camera as the bomb location detector and IoT basis to remotely monitor the movements of the robot wherever and whenever the robot is operated. The input and output of camera data in the form of spots that indicate the location of the bomb (2) developing software that integrates sensing camera to do image by image processing as an input for the robot's movements as well as monitoring the movements of the robot with a Graphical User Interface (GUI) through IoT, (3) Testing and validation of software and hardware of the bomb disposal robot using image processing and IoT. Furthermore, there is also a collaborative work with the intelligence unit of Indonesian police officers to perform the validation test of the bomb disposal robot's performance.

The objectives of this study are to: 1) Develop hardware of the bomb disposal robot with a camera as the bomb location detector and IoT basis to remotely monitor the movements of the robot wherever and whenever the robot is operated. 2) To develop software that integrates sensing camera to do image by image processing as an input for the robot's movements as well as monitoring the movements of the robot with GUI through IoT. 3) Analyse the effectiveness of the robot through joint validation test with the intelligence unit of Indonesian police officers through the performance test. 4) Improve intellectual and emotional abilities of security officers to conduct bomb disposal in a smart actions.

The results of this study were: (1) a unit of bomb disposal robot occupied with a control system based on image processing and IoT. (2) empirical data in the form of the robot's movements accuracy in finding the bomb location based on image processing and distant control using IoT, (3) performance improvement of the bomb disposal robot to assist and to facilitate the security officers.

Kata Kunci: *bomb disposal robot, image processing, IoT*