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Robotic Solution for Nuclear Facility Safety and Monitoring System

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Abstract : An effective identification of breakdowns is of premier importance for the safe and reliable operation of Nuclear Power Plants (NPP) and its associated facilities. A great number of monitoring and diagnosis methodologies are applied and used worldwide in areas such as industry, automobiles, hospitals, and power plant to detect and reduce human disasters. The potential consequences of several hazardous activities may harm the society using nuclear and its associated facilities. Hence, one of the most popular and effective methods to ensure safety and monitor the entire nuclear facility and imply risk-free operation without human interference during the hazardous situation is using a robot. Therefore, in this study, an advanced autonomous robot has been designed and developed that can monitor several parameters in the NPP to ensure the safety and do some risky job in case of nuclear disaster. The robot consisted of autonomous track following unit, data processing and transmitting unit can follow a straight line and take turn as the bank greater than 90 degrees. The developed robot can analyze various parameters such as temperature, altitude, radiation, obstacle, humidity, detecting fire, measuring distance, ultrasonic scan and taking the heat of any particular object. It has an ability to broadcast live stream and can record the document to its own server memory. There is a separate control unit constructed with a baseboard which processes the recorded data and a transmitter which transmits the processed data. To make the robot user-friendly, the code is developed such a way that a user can control any of robotic arm as per types of work. To control at any place and without the track, there is an advanced code has been developed to take manual overwrite. Through this process, administrator who has logged in permission to Dynamic Host Client Protocol (DHCP) can make the handover of the control of the robot. In this process, this robot is provided maximum nuclear security from being hacked. Not only NPP, this robot can be used to maximize the real-time monitoring system of any nuclear facility as well as nuclear material transportation and decomposition system.

Keywords : nuclear power plant, radiation, dynamic host client protocol, nuclear security
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