Review on "Checking the Robot Control System for Live Maintenance of Substation Equipment"

Summary of the report

This report introduces a robot control system designed for improving the robotized powering ability of substation. Then prism is served as probabilistic tools to verify the reliability of the system. Two frameworks are also presented, the first one is with hierarchical structure, the arrangement of this architecture is three layers based framework, the first hardware layer is responsible for gathering various devices such as sensors and actuators, next controlling layer is designed for controlling and data transmission, the last layer is planning layer, functioning motion planning and security protection. On the other aspect, module structure is another different framework, it breaks the hierarchical structure with discrete modules took place, which could be considered as a new combination of hierarchical since most components play the same role, thus, these two frameworks are full of comparability. In the fifth part — impact, it conducts 5 experiments. The impact of different failure rates for safety modules, the different failure rates of motion control module and visual processing module, and the impact of data acquisition module. The last one is the impact of control and communication framework module.

Workload

The work load is tremendous for checking the robot control system. Since firstly a huge quantity of components are required to be taken into consideration, including control module, processing module, ROS technology, etc. Therefore, analyzing how individual component impacts the whole system is time consuming and strenuous. In addition, 5 experiments could be sufficient enough to verify the influence factors. In conclusion, this research is meaningful and instrumental for researches to create a reasonable model and save energy for substation staffs.

Novelty

In the framework part, two models suggested are original, which breaks the traditional embedded CTMC model. The first hierarchical gives an intuitive and explanatory framework, dividing components explicitly. And the second framework displays compactly with coordination of different modules supporting the whole system. Thus, the frameworks of this report could be the biggest lightspot.

Advantages

- Excellent academic writing as far as vocabulary, the depth of article, and grammar use.
- The topic is original which indeed discovers the current urgent emergency and suggesting two meaningful frameworks.
- Conducting thoroughly through the passages and discussing every possible failure condition of the whole system.
- The arrangement of report is standard, fulfilling IEEE style.

Disadvantages

- The curves of the Figures nearly overlap
- The first framework is too vague to display how different components work with each other. For example, in the hardware layer how does sensors interact with actuators just within this layer?
- It is suggested to compare two framework to recommend a more reliable one.