Abstract

Redundancy in critical control systems and ship’s machinery in order to increase safety on ship, is necessary in modern ships. The project that was designed, implemented and is presented in this thesis, is trying to increase safety of a board, through the construction of a backup system that is able to control seawater valves. The installed SCADA system does not have a redundant control system for seawater valves which is a disadvantage. Control of the valves is achieved through the ship’s installed SCADA system. The SCADA system consists of an HMI, the PLC in which the automation and control of the valves is executed, and the AS-i Bus (Actuator Sensor Interface). AS-i Bus (Network) consists of the AS-i Master (Gateways) that receives data from the PLC, through Profibus protocol and converts it to AS-i protocol in order to send data over AS-i cable to AS-i slaves. It also consists of AS-i cable that transfers data and power to the slaves. In order to create a backup system to control the seawater valves we have to program and install an HMI, a PLC and AS-i Master. The technology of the installed Control & Monitoring System dates back to the first half of 2000. It is a question the compatibility of AS-i modules and PLC that are going to be used with the slave modules that have already been installed in the
References

1. AS-Interface Organization. (n.d.). retrieved from https://www.as-interface.net/?lang=en
2. Berger, H. (2016). Automating with SIMATIC (6th ed.). Erlangen: Publicis.
3. Berger, H. (2013). Automating with SIMATIC S7-1200 (2nd ed.). Erlangen: Publicis.
4. Berger, H. (2017). Automating with SIMATIC S7-1500 (2nd ed.). Erlangen: Publicis.
5. Berger, H. (2014). Automating with SIMATIC S7-300 (2nd ed.). Erlangen: Publicis.
6. Bolton, W. (2015). Programmable Logic Controllers (6th ed.). Waltham MA: ELSEVIER.
7. Hansen, D. (2015). Programmable Logic Controllers A practical approach ti IEC 61131-3 Using Codesys. John Wiley & Sons, Ltd.
8. IDC Technologies. (2007). Practical Industrial Programming using 61131-3 for PLCs. IDC Technologies.
9. IDC, T. (2012). Industrial Automation. IDC Technologies.
10. Kamel, K., & Kamel, E. (2014). Programmable Logic Controllers Industrial Control. N.Y.: McGraw-Hill Education.
11. Karl-Heinz, J. (2010). IEC 61131-3: Programming Industrial Automation Systems. N.Y.:Springer.
12. Krutz, R. (2013). Industrial Automation and Control Principles. ISA.
13. Lamb, F. (2013). Industrial Automation . Hill.
14. Manesis, S., & Nikolakopoulos, G. (2018). Introduction to Industrial Automation. CRC Press.
15. MCCRADY, S. (2013). Designing SCADA Application Software. London: Elsevier.
16. Petruzella, F. (2017). Programmable Logic Controllers 5th ed. New York,: McGraw-Hill Education.
17. Pigan, R. (2008). Automating with PROFINET_Industrial Communication Based on Industrial Ethernet. Erlangen: Publicis.
18. Reynanders, D. (2005). Practical Industrial Data Communications. Elsevier.
19. SIEMENS. (2013, 04). AS- Interface AS-i Master CM 1243-2 & AS-i data decoupling unit
20. DCM 1271. Nurnberg, Germany: SIEMENS.
21. SIEMENS. (2017, 12). STEP 7 and WinCC Engineering V15 System Manual. Nurnberg, Germany.
22. SIEMENS. (2018, 08). S7-1200 Programmable controller, System Manual.
23. Sunit Kumar Sen. (2014). Fieldbus and Networking in Process Automation. CRC Press.
24. TANENBAUM, A. (1992). Computer Networks. (N. Papandonis, & K. Karaikos, Athens: Papasotiriou
25. Wilamowski, B., & Irwin, D. (2011). Industrial Communication Systems. CRC Press.
26. Zurawski, R. (2015). Industrial Communication Technology Handbook. CRC Press.
27. Marandidis, N. (2000). Automation with SIMATIC S7. Athens: SIEMENS.

Index Terms

Computer Science  Information Sciences
Keywords

SCADA, PLC, AS-i Bus (Actuator Sensor Interface Bus), HMI, Valves