

	<b>FORM FOR PROPOSING A TOPIC IN THE SECOND CYCLE OF STUDIES</b>	Oznaka	
		Datum usvajanja	09.04.2020
		Datum/Br. revizije	-
		Stranica	1/1

Department	Information Technologies
Master thesis title:	LEGACY MACHINES INCORPORATION IN INDUSTRY 4.0
Mentor/professor - contact:	Assoc. Prof. Dr. Slobodan Lubura
Co-mentor/professor contact:	Assoc. Prof. Dr. Jasmin Kevric

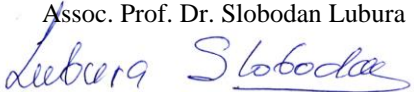
Thesis background:	<p>Industry 4.0 is inevitable change that is already happening, and with new industrial machines that are fully digitalized and automatized, Industry 4.0 is an even easier step in regard to previous industrial revolutions. But there are always some obstacles. Industrial machines are having a lifespan of 30 years on average, and there are a substantial number of legacy machines currently in use. Legacy machines are lacking connectivity and sensors that new machines have, and that represents a big problem with their incorporation into the Industry 4.0 systems. This master thesis will propose a solution to that problem, taking into consideration the whole solution architecture, from a network of smaller devices, a broker controlling them and application that would consume all of the data produced by the network. Some of the devices are Workpiece Measurement Device (WMD), Machine State Sensing Device (MSSD) and System Authentication Device (SAD). Devices are enabling simple machine vision, machine state detection and an authentication system for legacy machines that are lacking these. Thesis will consist of research that will cover selection of best suited hardware and communication protocols that will be used in the solution. Result of this thesis will be a system of prototype devices that will communicate and exchange data with a monitoring application through a custom made proxy.</p>
Thesis objective:	<ol style="list-style-type: none"> <li>1. Make research on most fitting components for devices</li> <li>2. Make research on possible communication protocols</li> <li>3. Design system architecture</li> <li>4. Develop Workpiece measurement device prototype</li> <li>5. Develop Machine state sensing device prototype</li> <li>6. Develop System authentication device</li> <li>7. Develop Control application</li> </ol>

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Literature:	<p>Jónasdóttir H., Dhanani K., McRae K., Mehnen J. (2018) Upgrading Legacy Equipment to Industry 4.0 Through a Cyber-Physical Interface. In: Moon I., Lee G., Park J., Kiritsis D., von Cieminski G. (eds) Advances in Production Management Systems. Smart Manufacturing for Industry 4.0. APMS 2018. IFIP Advances in Information and Communication Technology, vol 536. Springer, Cham</p> <p>L. Bassi, "Industry 4.0: Hope, hype or revolution?," 2017 IEEE 3rd International Forum on Research and Technologies for Society and Industry (RTSI), Modena, 2017, pp. 1-6.</p> <p>M. A. O. Pessoa, M. A. Pisching, L. Yao, F. Junqueira, P. E. Miyagi and B. Benatallah, "Industry 4.0, How to Integrate Legacy Devices: A Cloud IoT Approach," IECON 2018 - 44th Annual Conference of the IEEE Industrial Electronics Society, Washington, DC, 2018, pp. 2902-2907.</p> <p>F. Lima, A. A. Massote and R. F. Maia, "IoT Energy Retrofit and the Connection of Legacy Machines Inside the Industry 4.0 Concept," IECON 2019 - 45th Annual Conference of the IEEE Industrial Electronics Society, Lisbon, Portugal, 2019, pp. 5499-5504.</p> <p>G. M. B. Oliveira et al., "Comparison Between MQTT and WebSocket Protocols for IoT Applications Using ESP8266," 2018 Workshop on Metrology for Industry 4.0 and IoT, Brescia, 2018, pp. 236-241.</p> <p>Moon, I., Lee, G. M., Park, J., Kiritsis, D., &amp; von Cieminski, G. (Eds.). (2018). Advances in Production Management Systems. Smart Manufacturing for Industry 4.0. IFIP Advances in Information and Communication Technology. doi:10.1007/978-3-319-99707-0</p> <p>Erumban A. A., "LIFETIMES OF MACHINERY AND EQUIPMENT: EVIDENCE FROM DUTCH MANUFACTURING" Review of Income and Wealth Series 54, Number 2, June 2008</p>
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