

Advantages and Requirements for a Successful Introduction of an Industrial Tele Maintenance System

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Abstract

In the projects MainTelRob and BayernDigital, it was clearly shown that there is an huge need for tele maintenance systems in the industrial context. While most systems focus on remote access on machines, in many cases it is way more important that remote experts and local technicians can communicate and work in a tight collaboration to get tasks like commissioning, repair and optimization done. Not only for a better situation awareness, but also for security it is also important to have multiple cameras to get different perspectives simultaneously. This needs to work not only within a site, but also worldwide in case of medium to big enterprises. In such cases it is crucial that the tele maintenance system is flexible and efficient at a wide range of available bandwidth and line characteristics. Also security needs to be an integral part of such systems. The Zentrum für Telematik has invented and demonstrated such a system.

But there are also many requirements which need to be fulfilled for a successful introduction of such systems. In major enterprises only approved devices are allowed to be used, especially on the job floor to minimize security risks. In many cases, the network infrastructure, firewalls and access control systems aren't designed for such usages. This holds for local WLAN coverage (which, if rolled out, is primarily used for time uncritical systems with low traffic demands), for access to internal machine networks (even if the connections do exist physically), the firewall between office and job floor (in most cases it is either not possible to connect from the office floor to the job floor, there is no firewall and hence a high risk, or the firewall is very static), the site network (e.g. not sufficient performance on the plant's backbone) and the connection between the sites.

Additionally, many internal processes like escalation plans and documentation need to be adapted. Ways of getting the cost-value ratio for different usage scenarios of such systems are very important for many deciders. This is also true for additional changes like the introduction of call centers. Also there need to exist clear arrangements of responsibilities between the remote and the local individuals. One big obstacle are often the privacy laws – theoretically such systems do enable both video supervision and an accurate rating of single employees.

This paper gives an insight about these challenges and provides approaches to cope with them. The Zentrum für Telematik has gained much experience during introducing and evaluating its system in several little and major companies.

Keywords

Tele maintenance, security, processes, introduction, privacy laws

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Biographies

Michael Fritscher is a research associate at the Zentrum für Telematik since 2011. He has received his diploma at computer science in the University of Wuerzburg, Germany. His main interests are complex network systems, embedded systems, security, software engineering and control. At the Zentrum für Telematic he started his research with management of many mobile robots in the field of civil object surveillance, and works at the field of industrial tele maintenance and network control since 2013.

Christian Lilge is a research associate at the Zentrum für Telematik since 2016. He has received his diploma in control engineering at the University of Bremen, Germany.

Markus Krauß studied computer science with a specialization on technical systems at the University of Würzburg. He is doing his PhD in the field of coordinating Multi Robot Systems. His interests are robots, both mobile and industrial, network and security, control mechanisms, embedded systems, administrating virtualization solutions and coordination tasks involving both machines and human beings and is working on the Zentrum für Telematik since 2011.

Prof. Dr. Klaus Schilling is Professor and Chair for Robotics and Telematics at University Wuerzburg. He is President of the research company "Zentrum für Telematik" and awarded an ERC Advanced Grant as well as an ERC Synergy Crant. Additionally, he is member of the International Academy of Astronautics, coordinating chair for the field "Computers and Control" in the International Federation on Automatic Control (IFAC) His research interests include autonomous and adaptive control strategies, telematics methods, sensorics, mechatronic systems, and control of distributed systems. These techniques are applied in design and tele-operations of pico-satellites, industrial mobile robots, sensor systems, tele-education and medical systems.