Thesis title: OPC UA on Raspberry Pi in mining application

Background
A modern mine involves increasingly smart and connected products that are integrated in a mine automation system. Integration enable many possible applications that could substantially aid in achieving the goals of increased safety and productivity of the mine operation including the machine maintenance process. For instance, combining diagnostic data from a Load-Haul-Dump machine, LHD, with production, and maintenance planning systems could enable a much more efficient service planning procedure. A modern mine is thus an example of the trend towards the internet-of-things, IoT, where more and more products are connected to the Internet and to a local networks. Data is shared and more and more analyzes can be made to make visible and optimize system performance. The trend towards the internet of things is strong in mining and mine automation and could enable new applications and data analyses to enable major benefits and increases in efficiency for heavy machinery.

Boliden runs mines that make use of Loader machines. In the Wroomm project we are demonstrating technology for tele-remote control and increased integration of machines into the mine automation system. This work focus on the maintenance data and how it can be shared and used to improve maintenance of loader machines.

The Wroomm project
The work is to be performed within the Wrooomm project. A collaborative project with several industry partners. Volvo Construction Equipment AB, ABB AB, Boliden AB, Oryx Prototyping AB, Luleå tekniska Universitet, SICS Swedish ICT Västerås AB.

Thesis description
Designing an OPC server with relatively low cost components is an attractive alternative for some construction equipment applications. This thesis work aims to define a software solution that can run on a Raspberry Pi hardware platform and provide an OPC UA interface to external systems. Analysis of pros and cons, as well as identifying limitations in the mining machine context is expected.

Expected result
The goal of the work is to define a specification for a OPC UA server running on a Raspberry Pi platform, and produce analysis of how the solution would work in the loader machine used in the mine situation. The server will listen to CAN data via some of the interfaces on-board.

- Identification of the system needs and usage context (connections, dev tools, etc)
- Specification of OPC UA server solution on Raspberry Pi
- Test of concept with simulation/implementation
- Analysis – technical risks, technical opportunities, expected benefits and limitations for use in the mine maintenance process.
Work plan

Full time 30hp, 20 weeks

Supervision by SICS and VCE. Some of the testing and interfacing the machine will have to be done at VCE in Eskilstuna.

As a part of the demonstration, there is a possibility to do a field visit to a work site.

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Application:
Applications should include a brief personal letter, CV, and recent grades. In your application, make sure to give examples other projects that you consider relevant for the position. Candidates are encouraged to send in their application as soon as possible. Suitable applicants will be interviewed as applications are received.

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