VITALISING ICT RELEVANCE IN AGRICULTURAL LEARNING

Smart Farming: A Case of Automatic Cow Milking System

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VIRAL

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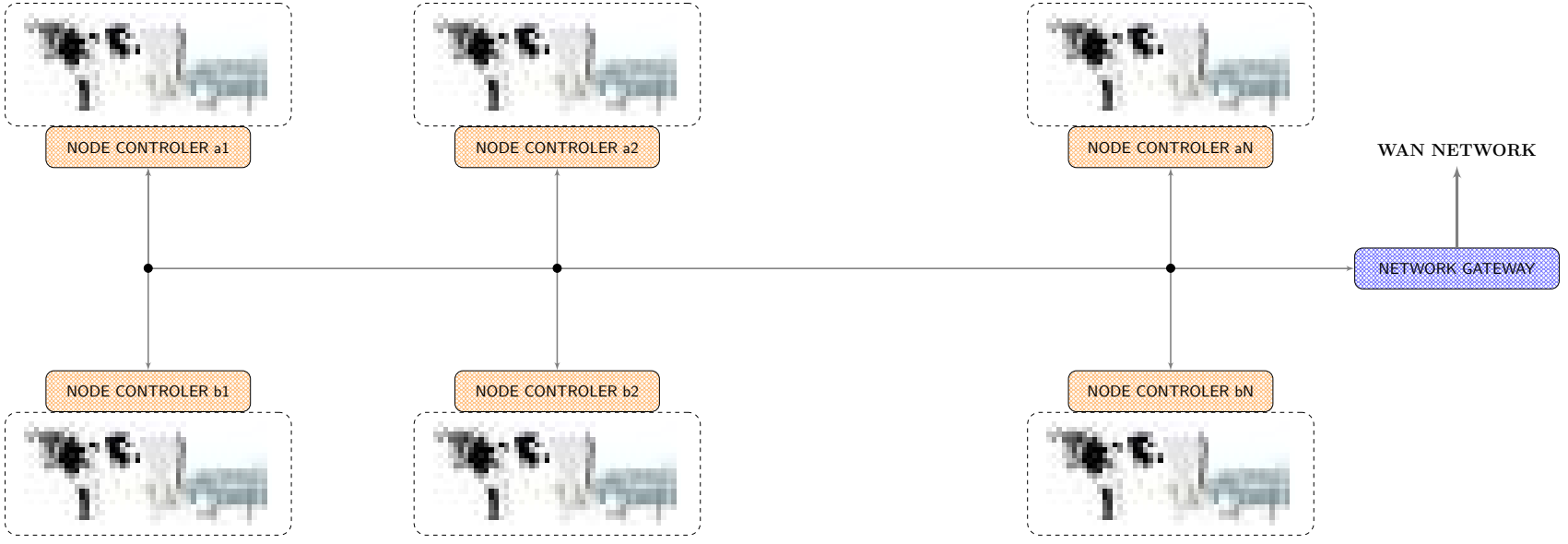
- ***World population*** in 2018 was 7.6 billion, ***by 2030*** it will be ***8.5 billion*** and 9.7 billion by 2050 and exceed 11 billion in 2100.
- Rapid growth in world population ***requires*** mass and ***efficient food production*** worldwide.
- Sustaining population growth requires a ***smarter farming approach***.
- ***Smart Farming:*** application of ICT technologies in order to achieve an optimized farming system.
- … by utilizing the ***technological advancements***, smart farming strives to ***reduce workload*** of farmers and improve their quality of life.
- Smart ***farming technologies*** can be categorized into three following groups: autonomous robots, sensors and Internet of Things.

Smart Farming: concept

- ... besides the traditional machinery it includes ***electronic devices*** specifically designed to monitor and ***improve*** the plants and ***live stock growth***.
- Wide range of ***sensors***: environmental (water, pressure, temperature), soil composition (analysis of chemical elements), air quality (gas sensors), light spectrum (intensity, UVB, UVC, IR...), wind...
- Wireless and wired ***communication networks*** (transceivers) to reach remote locations.
- Data mining and analysis in order to improve the growth and quality of farming.

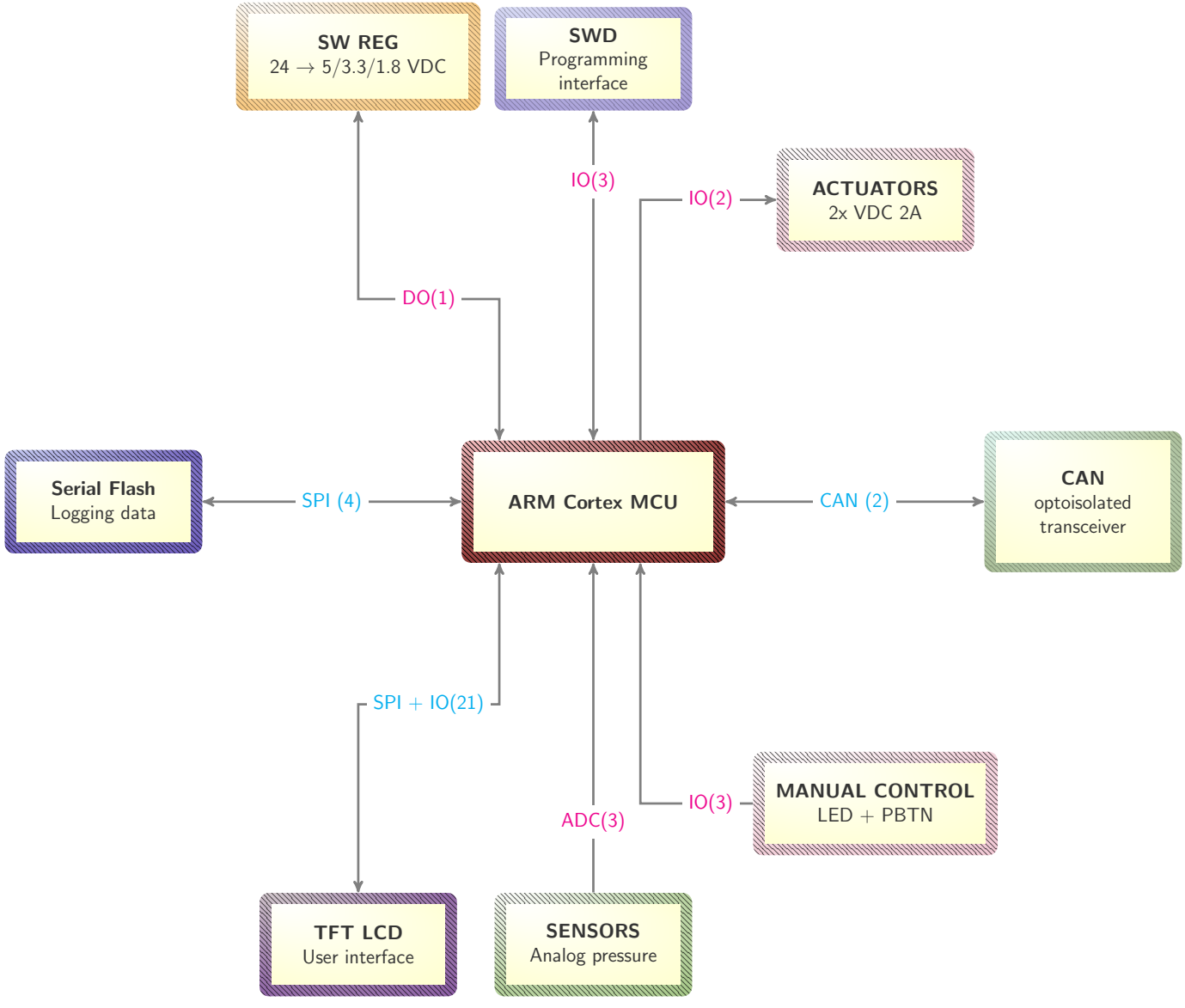
- ***Improve milking process*** for animal and farmer.
- Node ***remote control***: activity monitoring, process parameter adjustment and firmware upgrade.
- ***Scalability***: allow for many nodes (100+) to be controlled.
- ...easily control the duration and milking profile.
- ***Plug and Play:*** simple installation and maintenance.
- ***Safety guides***: AC power utilization prohibited...
- Offline event logging...
- Expected network throughput per node: 10-100 Bps.
- ...wired or wireless network?

Automatic milking system: structure

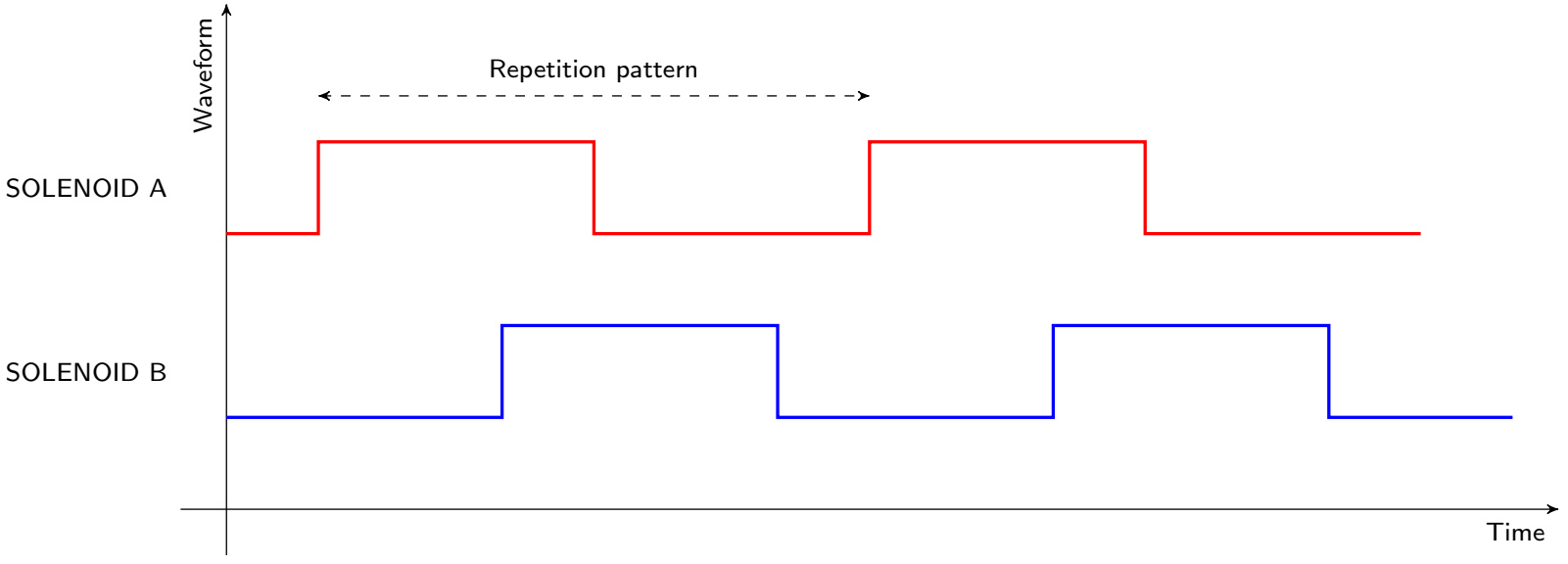


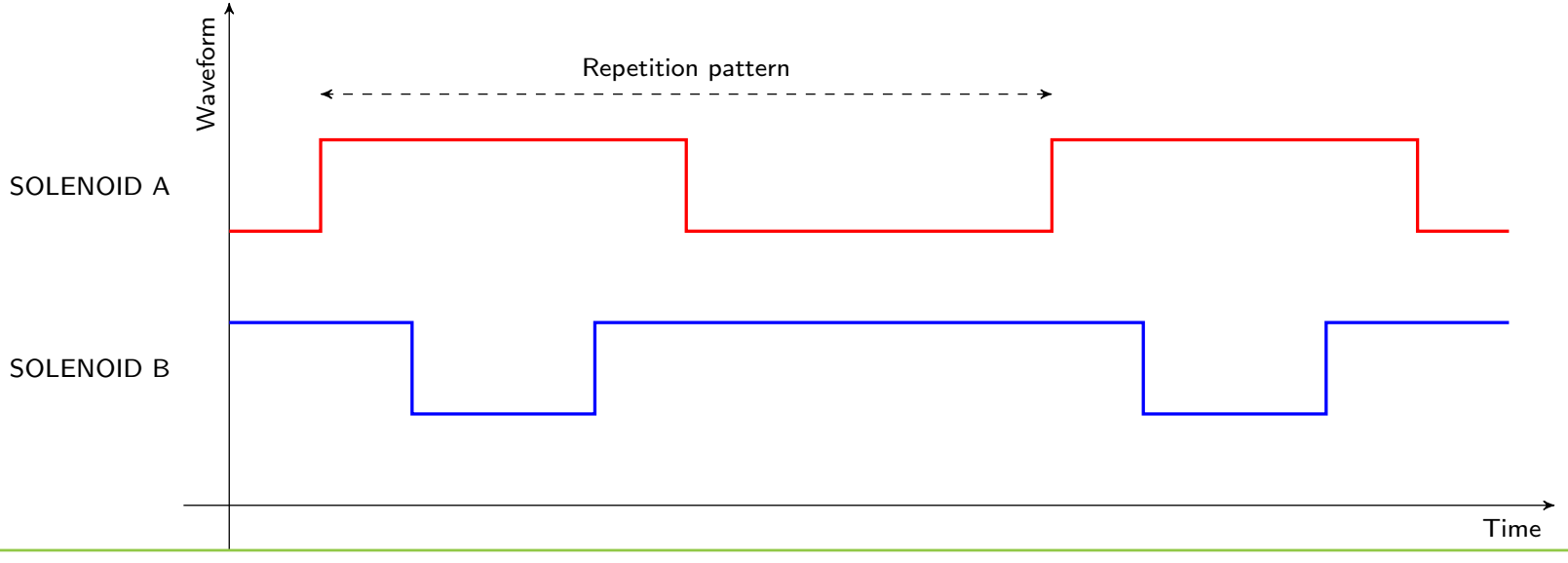
- Options for communication ***network protocol***: CAN, LIN, RS485, MODBUS, Ethernet,...
- CAN selected due to simple network structure and transceiver/controller chip price.

Communication node: block diagram

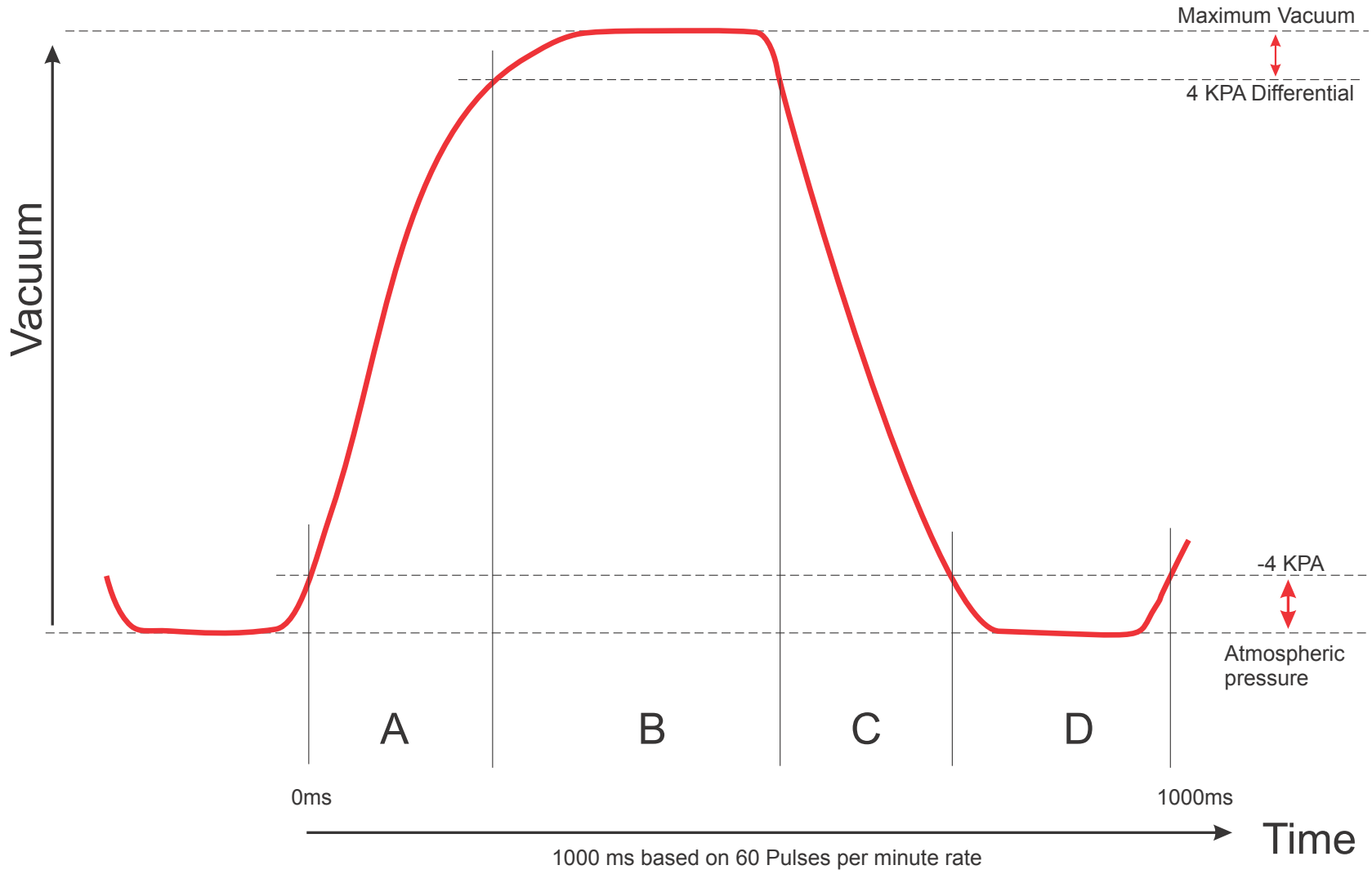


Communication node: pressure valve - actuator pattern





Communication node: pressure sensor profile



Communication node: actual device

- ARM Cortex 32 bit MCU with external serial flash for offline logging.
- Optoisolated CAN transceiver,
- 3x Pressure sensors and 2x actuators 60VDC/2A,
- TFT LCD graphic interface.

Communication node: actual device screens

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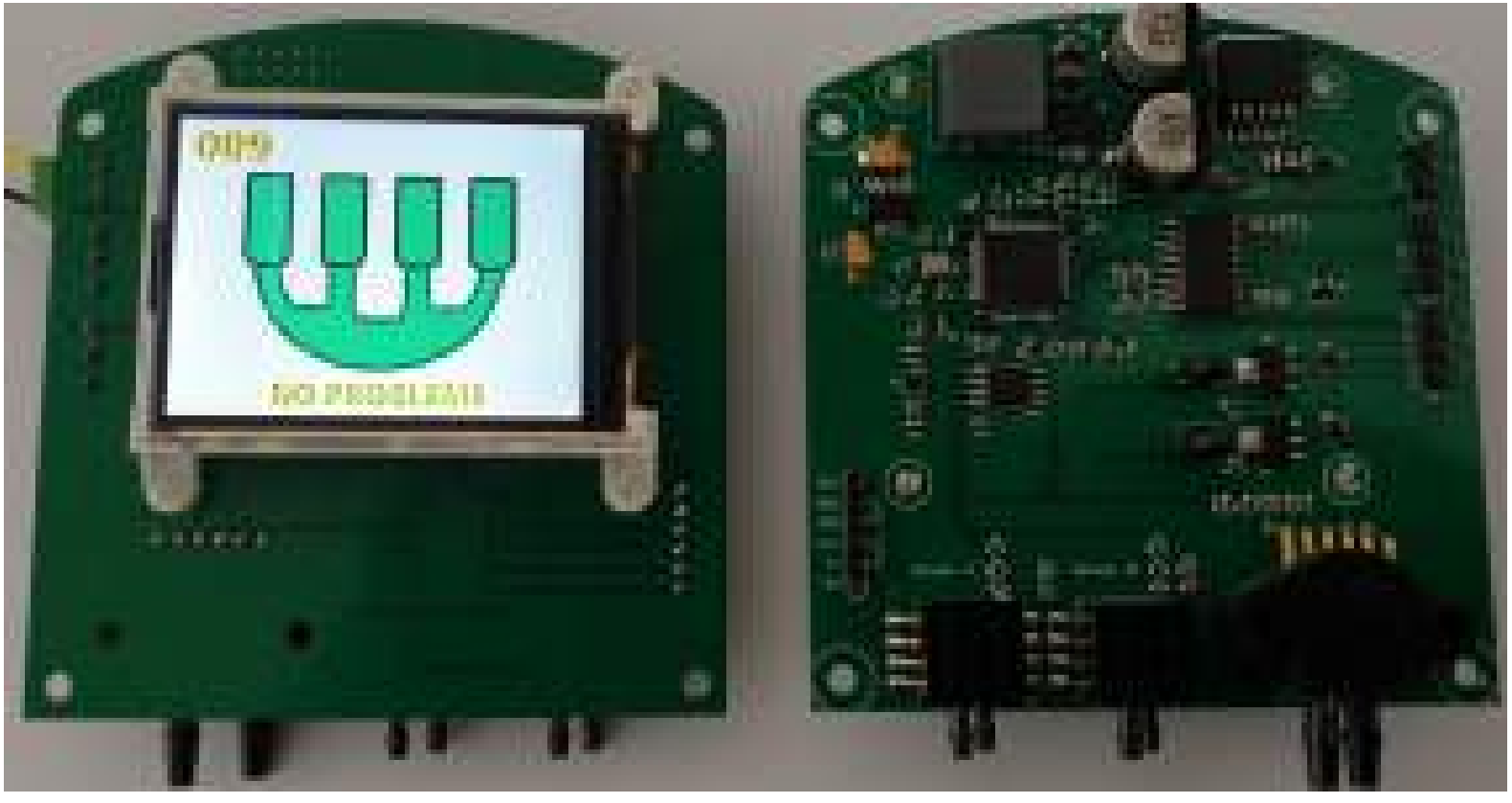

Communication node: actual device screens

Thank you

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