

Low Energy Wireless Imaging System (LEWIS)

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Abstract

The objective of the LEWIS project (in the frame of the ESA Technology Research Programme) is to demonstrate the concept of a wireless imaging system suitable for exploration missions and generic spacecraft monitoring. A compact and elegant demonstrator (Figure 1) was designed and implemented with an emphasis on low mass, low energy and low integration complexity. A starting point was a survey of existing space cameras which provides relevant information about their electrical and data interfaces, power, mass, data rates, imaging sensor, and other available information. Technology trade-offs and analyses were also performed for all the relevant aspects of the LEWIS system. Trade-offs on the level of components was performed as well as trade-off on the level of hardware architecture and integration. Electronics design was iterated several times and the prototype cameras were produced using flex-rigid PCB technology. Both the wireless cameras and the wireless access point (WAP) contain their own dedicated MCU as well as a wireless module which is on itself an SoC. The WAP also implements a custom SpaceWire to SPI bridge. The cameras contain non-volatile flash memory and run a simple custom-developed file-system. The firmware/software drivers as well as the communication protocol were all custom developed for this project and run on bare metal. Tests and verifications on the LEWIS system (2 wireless cameras and 1 wireless access point) were successfully performed. Roadmapping towards a flight model is also provided.

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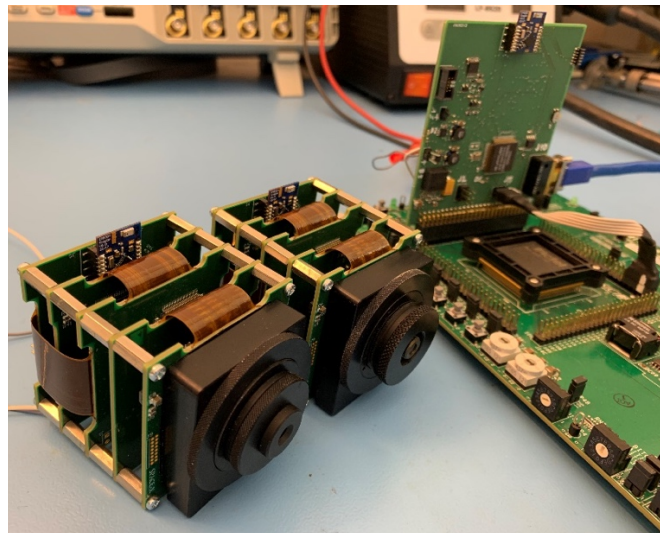


Figure 1 : The Wireless cameras and the access point of the LEWIS