FH Brandenburg
University of Applied
Sciences - Project IAS

RCUBE
Platform for autonomous intelligent systems

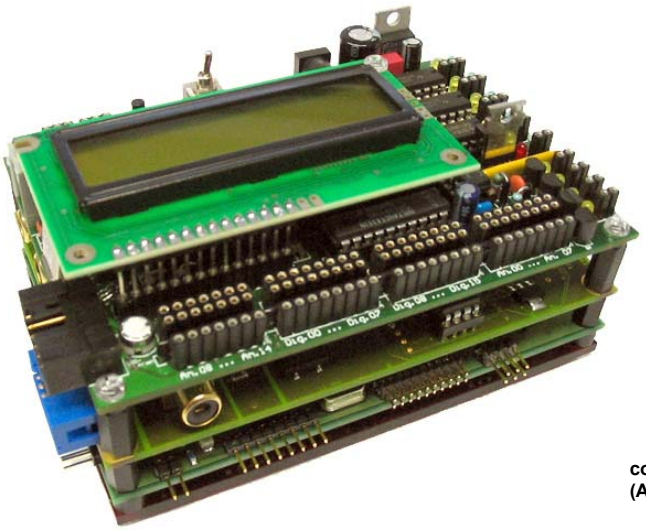
Description

A platform for autonomous intelligent systems with vision capabilities has been developed by the University of Applied Sciences in Brandenburg. The system is particularly suitable as a research and education platform for universities, a basis for industrial applications and for private developers of robots.

The platform consists of a series of boards of identical format, whereby any number of modules can be connected via a fieldbus.

The RCUBE architecture stands out from the crowd compared to other solutions for autonomous systems due to its

- configurability
- computing power
- integration of sensors, actuators and
- image processing



configuration example RVISON (AKSEN + VIO + CPU)

Advantages

- autonomous
- with configurable modules
- integrated, freely programmable image processing
- freely programmable application program
- small and low-current
- programs persistent without power supply
- enough computing power for e.g. machine learning
- ports for digital and analogue sensors
- motor drivers and universal power drivers
- native open source software (linux, GPL compilers sdcc, gcc)
- reasonably-priced

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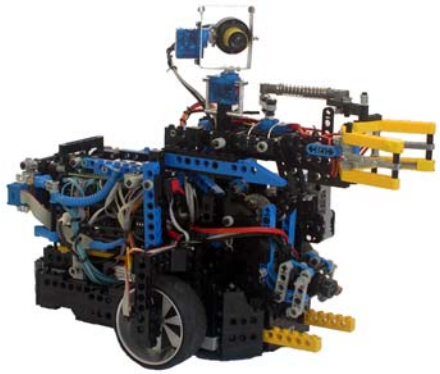
3 main modules

AKSEN board
- server for sensors and actuators
- analogue and digital inputs
- digital outputs
- motor and power drivers
- modulated infrared
- 64 KB flash, 8 KB ram

VIO board
- video digitizing
- 4 PAL inputs (mux)
- 25 fps @ 320x280x24
- 10 fps @ 768x576x24
- RGB or YCbCr
- video output

CPU board
- computing power
- StrongARM
- ARM-Linux
- 8MB flash, 32 MB ram
- optional bluetooth

All modules are combinable in any number via CAN-bus



Autonomous seeing robot with RVISION (variant of RCUBE)

Application Fields

Education and research: education and research at universities in the field of service robotics, intelligent systems, mobile image recognition, energy autonomy

Industry: basis for fast industrial pilot projects in the field of service robotics, intelligent cameras, reactive controllers

Hobby: construction of reactive robots by home constructors (line following, navigation etc.)

Art: interactive / reactive / mobile / solar powered installations

There is the possibility of further developments and application studies in cooperation with the University of Applied Sciences in Brandenburg.

The architecture is usable under exclusive licence in Germany and internationally.

Project IAS
- 2001 – 2003
- development of a platform for autonomous intelligent systems
- RCUBE – a modular low-current architecture for mobile systems
- subproject: AKSEN board
- supported by the *MWFK des Landes Brandenburg*

Lab for Artificial Intelligence
- integrated applications of computer science (e.g. mobile autonomous systems)
- knowledge processing and methods of artificial intelligence
- soft computing, fuzzy systems, neural networks, artificial life, artificial evolution
- LISP und PROLOG
- semantic signal analysis

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