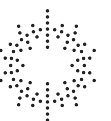copenhagen
atomics

Uploader
V1.3

CM4-based controller with 7 USB-C ports, 2 ethernet ports, and Wifi*. Power from 9 – 24 V DC.

Photo showing version 1.3

Introduction

Usage

This controller uses a Raspberry Pi Compute Module 4 (CM4) and includes 7 USB-C ports, two galvanically isolated 1 GBit ethernet ports (RJ45) and Wifi[1]. It take DC input power from 9 - 24 V and DIN rail mounting.

Using the TurboCtrl software these boards become very powerful as you can connect many of them in a start network and the system uses the RAFT algorithm to increase reliability. See this article for more information:

https://www.copenhagenatomics.com/news/copenhagen-atomics-reactor-control-system/

The uploader also has a connector for general purpose input / output. This could be used to alert the device to the presence of an emergency stop.

WebUI & programming

Programming happens in finite state machines. You can "draw" the state machine (flow chart) graphically through the WebUI or you can type in in a SCXML editor. In the future you can also use AI or upload a picture of a flow chart drawn by hand.

In the state machine you can only use values from the vector to cause the transformation between states. Simple math functions like <, > , <=, >=, =, != and +, −, /, * and delay. All output in states happens on entry and these outputs will result in new values being set in the vector. The vector will also record the new states after the state machine has executed.

The system supports hierarchical state machines and parallel state machines. It also supports alerts and nicknames on vector names. The code is automatically compiles on the local uploader to run there. The SCXML source files are stored in github. Github is used to distribute the code to other systems.

This video gives an introduction to TurboCtrl programming: https://youtu.be/MhT1DqOuWLE

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1. A second option without Wifi is also available, called PiHub. A system may typically be composed of a single uploader and multiple PiHubs.
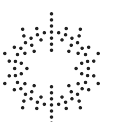
Introduction

Integration with TurboCtrl

TurboCtrl AutoConfig will detect the board and insert each channel in IO.conf as like for naming and configuring each sensor input/output.

This video gives an introduction to autoconfig: https://youtu.be/MhT1DqOuWLE

You can have one uploader or you can have several PiHubs and multiple uploaders too. The network uses the RAFT algorithm with floating leader, such that if one unit fails, another will take over in milliseconds. The system uses voting to make sure all the different boards and sensors agree.

TurboCtrl.ai supports many sensor and actuator types:
Temperatures, pressure, humidity, oxygen and other gasses, gas and liquid flow sensors, DC ports, AC ports, VFDs, current, voltage, oven controllers, light controllers, motors, audio, video, scales, position, liquid level, density, viscosity, integration with Festo and other pneumatics systems. And much more

Buy connectors

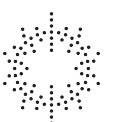This board uses KANGNEX WJ15EDGK-3.81-2P connectors for DC input.

You can buy the connectors here: https://lcsc.com/product-detail/Pluggable-System-Terminal-Block_Ningbo-Kangnex-Elec-WJ15EDGK-3-81-2P_C8466.html

The board come with a 2m CAT5e cable included and standard DIN rail mounting.

i   For more information, please contact sales@copenhagenatomics.com

Specs

Specification

Parameter	Condition	Value	Unit(s)
DC input voltage	min.	12	V
	typ.	24	V
USB Voltage	typ.	5	V
USB Source Current	max.	1	A
Simultaneous USB Source Current (All ports)	max.	7	A
Connectivity			
USB Communications Standard		2.0	
USB Communications speed	max.	480	MHz
Ethernet Communications Speed	max.	1	Gbps
WiFi Communications Frequency		2.4	GHz
WiFi Communications Speed		1	Mbps
GPIO			
Input Voltage	max.	24	V
	min.	7	V
Reverse Input Voltage	max.	6	V
Input Impedance	typ.	4.7	kΩ
Output Voltage	max.	24	V
Output drive	max.	5	mA

Setup

Can be networked via WiFi. Automatically starts as a WiFi client – can be switched to WiFi hotspot by pressing the WiFi button. Scan the QR code on the box for more information.
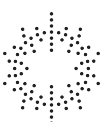
Product photos
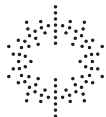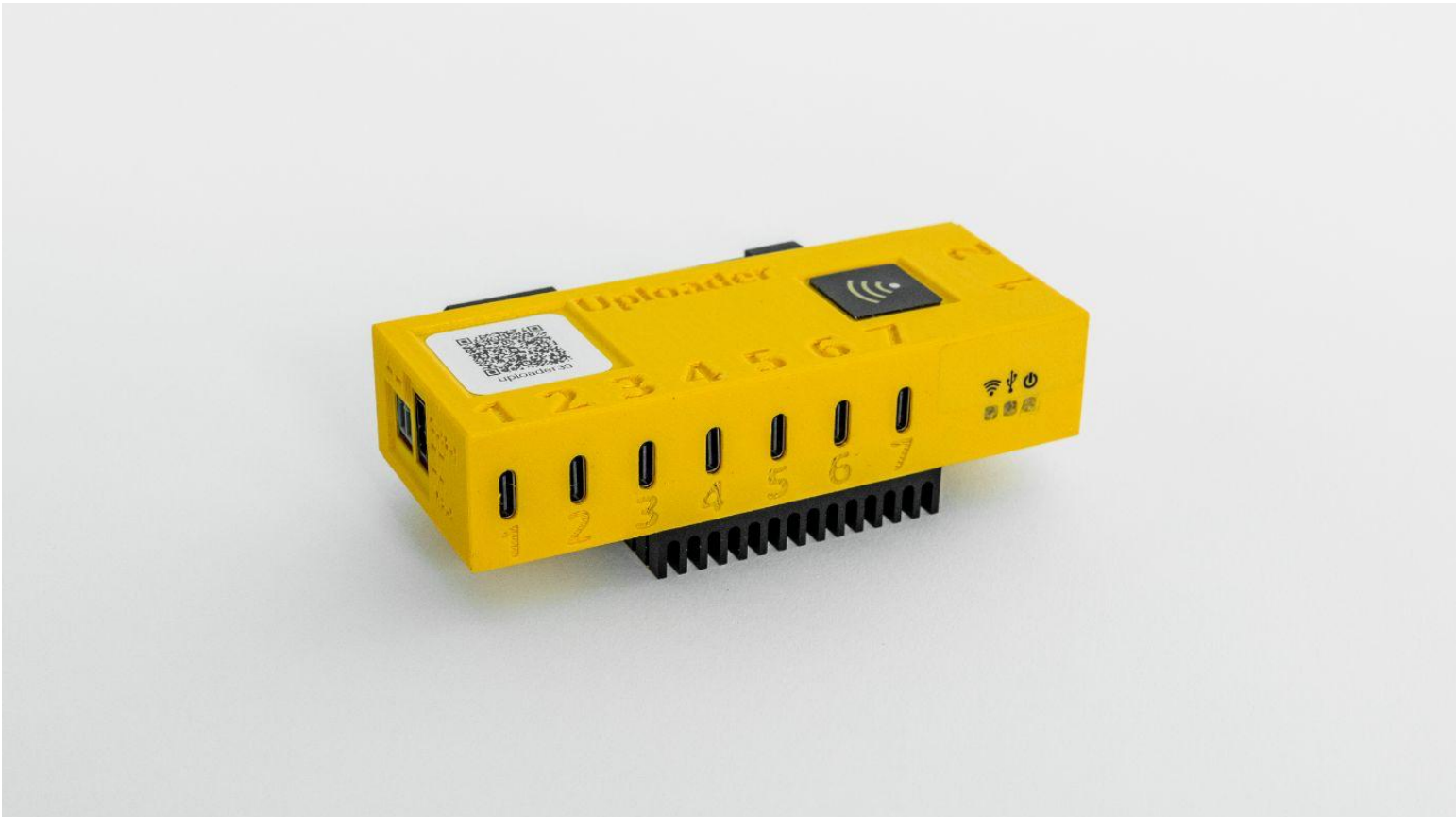
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