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farm-ng

Amiga Intelligence Kit Datasheet

Product Version 2.01

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1. Introduction

The Amiga Intelligence Kit is a modular expansion system developed for the Amiga rover product line by farm-ng. This datasheet provides detailed specifications and technical information about the components and functionality of the Amiga Intelligence Kit product version 2.01.

2. Features and Benefits

With the integration of advanced hardware and software upgrades, the Amiga Intelligence Kit aims to enhance the performance and versatility of the Amiga rover, facilitating more precise and efficient farming operations across a variety of agricultural applications. Please note that this product is intended for advanced users with computer programming skills and is not a consumer product. It is sold "as is" and may require technical expertise for proper integration and use.
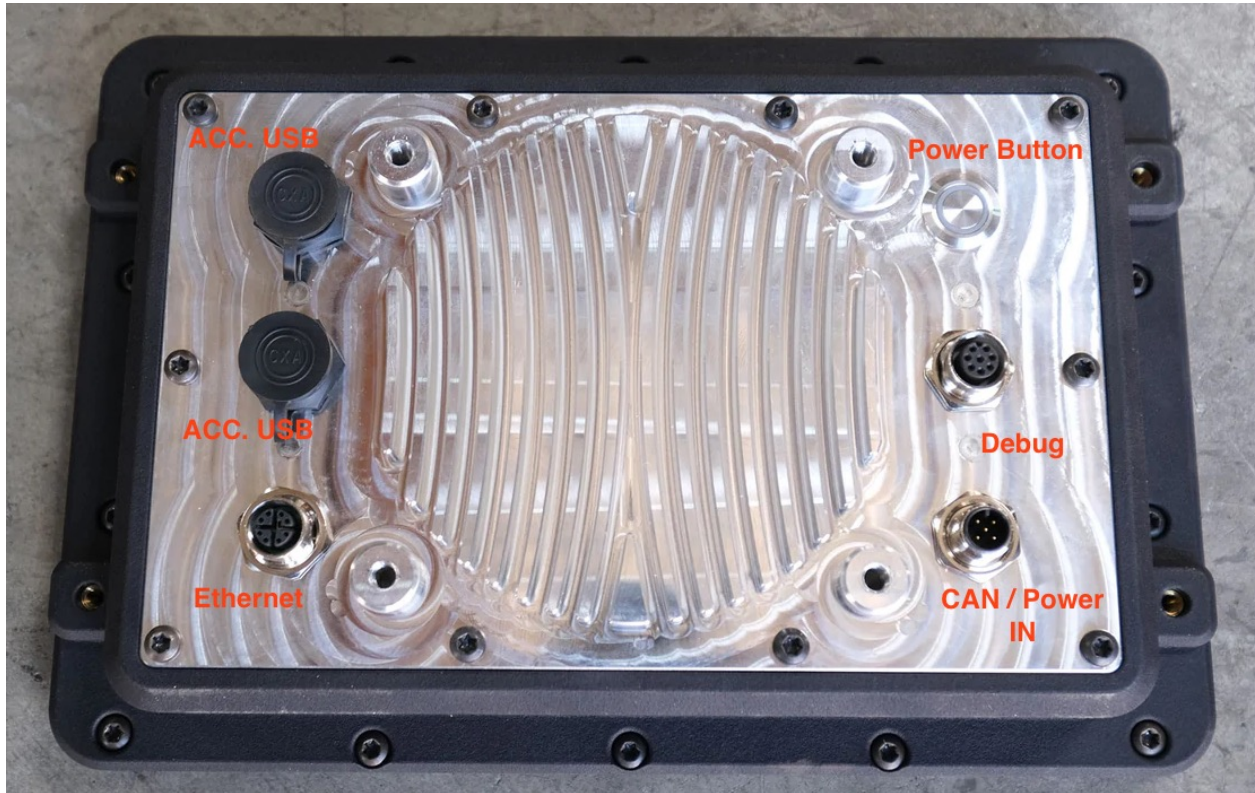
3. Specifications

3.1. Connections Diagram

3.2. Brain Computer

3.2.1. Connections

3.2.2. CAN/Power Input

PIN	Description	Typical Wire Color	Notes
1	Shield	Bare/Green	Should only be grounded at one end
2	Supply +24vdc	Red	farm-ng uses 24v

3	GND	Black	
4	Can_High	White	Needs at least one termination, and two devices to function.
5	CAN_Low	Blue	Needs at least one termination, and two devices to function.

3.2.3. Specifications

Specification	Description
Operating System	Linux
Input Power	24 volts (14-28vdc)
Power Consumption	Typically less than 35 watts
Screen	10.1" High brightness (850cd/m2) optically bonded IPS display, 1280x800 resolution
Touch	Industrial capacitive touch screen controller, tunable for gloves and wet environment, Multitouch capable
Environmental Rating	IP65
USB	1x USB 3.1, Debug connector for firmware updates and serial terminal
Network	1 x M12-8 X-coded with 1Gb Ethernet capability

Specification	Description
WiFi	Built-in with OS drivers
CANbus	1x M12-5pin A-coded breakout, standardized industrial DeviceNet / NMEA2000 pinouts and hardware specifications
Computing module	NVIDIA Jeston Xavier NX
AI Performance	Up to 21 TOPS (Tera Operations Per Second)
CPU	6-core NVIDIA Carmel ARMv8.2 64-bit
GPU	384-core NVIDIA Volta, 48 Tensor Cores
Memory	16 GB 128-bit LPDDR4x

3.3. Debug Cable

The Debug Cable is used to update and debug farm-ng products. It includes reset functionality along with USB and serial communication.

The `debug cable` has a single circuit board with two ports connected to it.
On the left is the USB / debug breakout, and on the right is the serial interface.

Pinout

PIN	Description	Typical Wire Color	Notes
1	RESET	Black	
2	TTL RX(3.3v)	Brown	Connect to TX of interface
3	TTL TX(3.3v)	Red	Connect to RX of interface
4	USB D-	Yellow	
5	USB D+	Green	
6	USB VBUS	Blue	
7	NC	Gray	
8	GND	White	

3.4. Dual-band GPS Antenna

Specification	Description
Product	TOPGNSS
Manufacturer datasheet	https://cdn.sparkfun.com/assets/b/4/6/d/e/TOP106_GNSS_Antenna.pdf
Frequency Bands	L1 - 1555~1615MHz L2 - 1198~1278MHz

Specification	Description
Gain	Gain: ≥5dBi
Impedance	50 ohms
Antenna Dimensions	148mm diameter, 55.5mm tall
Connector	Female TNC

3.5. RTK GPS Module

Specification	Description
Product	UBLOX ZED-F9P
Manufacturer datasheet	https://cdn.sparkfun.com/assets/8/3/2/b/8/ZED-F9P_Data_Sheet.pdf
RTK Horizontal Accuracy	1 cm + 1 ppm RMS
RTK Vertical Accuracy	1.5 cm + 1 ppm RMS
Update Rate	Up to 20 Hz

Time to First Fix (TTFF)	Cold start: <45s, Hot start: <1s
Operating Temperature	-40°C to 85°C (-40°F to 185°F)
Environmental Rating	IP65 (housed inside the Brain enclosure)
Power Consumption	Typically 1W

3.6. Luxonis OAK-D W PoE Robotic Cameras

Specification	Description
Product	Luxonis OAK-D W PoE
Manufacturer datasheet	https://docs.luxonis.com/projects/hardware/en/latest/pages/NG9097w.html
Image Sensors	3x 1/2.3" Sony IMX477 CMOS sensors
Resolution	2x 12MP (stereo pair), 1x 12MP (RGB)
Depth Range	0.1m to 10m (variable depending on configuration)

Specification	Description
Depth Accuracy	±1% at 1m distance
Depth Resolution	1280x720 pixels
Field of View (FOV)	81.6° H x 60.5° V (RGB), 69.4° H x 42.5° V (stereo pair)
Processor	Intel Myriad X VPU
Interfaces	USB 3.1 Type-C, SPI, I2C, GPIO, UART
Power Supply	Power over Ethernet
Power Consumption	Typically 2.5W
Operating Temperature	0° C - 80° C * Temperature range 10° C - 60° C when using dot projector features.
Environmental Rating	IP65
Dimensions	95mm x 38mm x 25mm (3.74" x 1.5" x 0.98")
Weight	45g (1.59oz)

Specification	Description
Software Support	OpenCV, DepthAI API, ROS, TensorFlow, PyTorch, ONNX

3.7. PoE Switch

Specification	Description
Product	IGS-604HPT-M12
Manufacturer datasheet	https://www.planet.com.tw/storage/products/48896/C-IGS-604HPT-M12_s.pdf
Number of total ports	6 PoE-enabled ports
PoE Standards	IEEE 802.3af (PoE), IEEE 802.3at (PoE+), IEEE 802.3bt (PoE++)
Total power available for PoE devices	120W
Maximum PoE Power per Port	15.4W
Switching Capacity	6 Gbps aggregate non-blocking throughput of the switch

Specification	Description
MAC Address Table	8K entries in the MAC address table
Packet Buffer	Amount of packet buffer memory (e.g., 1.5 MB, 3 MB)
VLAN Support	Support for VLANs, including number of supported VLANs
Link Aggregation	Support for link aggregation (e.g., LACP, static)
Management	Web-based management, CLI, SNMP, or no management (unmanaged)
Energy Efficiency	Energy-efficient Ethernet (EEE) compliance, or other energy-saving features
Environmental Rating	IP67
Power Supply	Input voltage (e.g., 100-240V AC, 50/60Hz) and power consumption

4. Compatibility

The Amiga Intelligence Kit is compatible with the Amiga operating system Artichoke.

5. Installation and Setup

Reference is made to the Connections Diagram in section 3.1 above.

1. Unpack the Amiga Intelligence Kit and ensure all components are present.

2. Assemble the mast and mounting hardware. Attach the dual-band GPS antenna, Luxonis OAK-D cameras, and any additional sensors to the mast.

3. Connect the GPS antenna to the Brain using the SMA connector.

4. Connect the Luxonis OAK-D cameras to the PoE switch using the M12 X-Coded Ethernet to A-coded cable connectors. Ensure the connectors are securely fastened.

5. Connect the PoE switch to the Brain using the provided Ethernet cable.

6. Mount the Brain, PoE switch, and mast assembly to your Amiga setup as directed in the user manual.

7. WARNING: The CAN cable intended for the power bucks and POE switch must not be used for the Amiga Brain. Doing so may result in electrical or thermal damage to the Amiga Brain unit.

8. Power on the Brain and ensure all components are recognized and functioning properly.

9. If needed, install a NTRIP GNSS RTK Base Station (not provided in the kit). Please see this Sparkfun tutorial for building and installing a DIY NTRIP GNSS RTK Base Station: https://learn.sparkfun.com/tutorials/how-to-build-a-diy-gnss-reference-station/all

6. Operation and Usage

6.1. Image Recording

On the Home screen use the touchscreen interface on the Brain to access the Recorder application. Here you will be able to select the desired camera(s) to use. Using the "Settings" tab adjust settings such as aperture, ISO, and focal range. Decide if you would like to take a photo or video by selecting either the "Photo" or "Video" tab. Once selected, begin recording by pressing the "Record" button, represented by the red circle.

6.2. Gallery Application

Open the Gallery application to view, organize, and delete recorded images and videos.

6.3. Metadata Tagging Services

In the Recorder application access Metadata Tagging Services via the "Metadata" Tab to add annotations, location information, and other metadata to images and videos. This information can also be viewed in the Gallery application later.

6.4. Brain Configuration

Access the Brain Settings tab by tapping the gear icon in the top right corner. Here is the hub to monitor the status of connected devices, update firmware, and configure device settings.

6.5. File Transfer

Connect a USB drive or external hard drive to transfer files from the Brain or Gallery to your connected storage devices.

6.6. Processing GPS Information

To access the u-blox GPS module, connect via the USB Serial interface, usually found at /dev/ttyACM0, and ensure the user is a member of the dialout group.

For more sophisticated applications, like acquiring GPS information through Python, consider utilizing libraries like: https://github.com/semuconsulting/pyubx2.

For system-level access, employ an application like GPSD: https://manpages.ubuntu.com/manpages/bionic/man8/gpsd.8.html

See in 5. Installation and Setup for details about installing a NTRIP GNSS RTK Base Station.

7. Maintenance and Troubleshooting

Regularly inspect all components for damage or wear, especially cables and connectors.

Keep the Brain's touchscreen clean and dry for optimal performance. Regular cleaning and removal of dirt and debris can extend its lifespan and reduce the likelihood of corrosion or premature component failure.

Ensure all firmware and software updates are applied as they become available.

For help with issues, join our community at https://discourse.farm-ng.com/ or check out the Amiga Development Kit (ADK) at https://amiga.farm-ng.com/ for docs, tutorials, and API info.

8. Warranty and Support

THIS PRODUCT IS SOLD "AS IS" WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE PURCHASER OR USER ASSUMES FULL RESPONSIBILITY FOR THE PROPER INSTALLATION, INTEGRATION, AND USE OF THE PRODUCT, AS WELL AS FOR ANY MAINTENANCE OR TROUBLESHOOTING THAT MAY BE REQUIRED. NO TECHNICAL SUPPORT OR ASSISTANCE IS PROVIDED BY THE MANUFACTURER OR ITS AFFILIATES. ANY ISSUES OR DEFECTS DISCOVERED AFTER PURCHASE MUST BE ADDRESSED THROUGH THE PURCHASER'S OWN RESOURCES AND TECHNICAL EXPERTISE. NO RETURNS OR EXCHANGES WILL BE ACCEPTED, AND NO REFUNDS WILL BE ISSUED FOR THIS PRODUCT.

9. Regulatory and Compliance Information

The Amiga Intelligence Kit has multiple components, each with its own regulatory and compliance requirements. Check each manufacturer's datasheets, manuals, or documentation for details on certifications, safety standards, and environmental regulations to ensure lawful operation.

10. Ordering Information

The Amiga Intelligence Kit can be purchased online through the farm-ng website at www.farm-ng.com, subject to availability. Please note that new versions of the kit may be released periodically, featuring updated or different components. In such cases, the existing version may be replaced by the latest iteration.

11. Revision History

Datasheet ref #:   024-00001

Revision #:   0001

Document Date: May 4, 2023