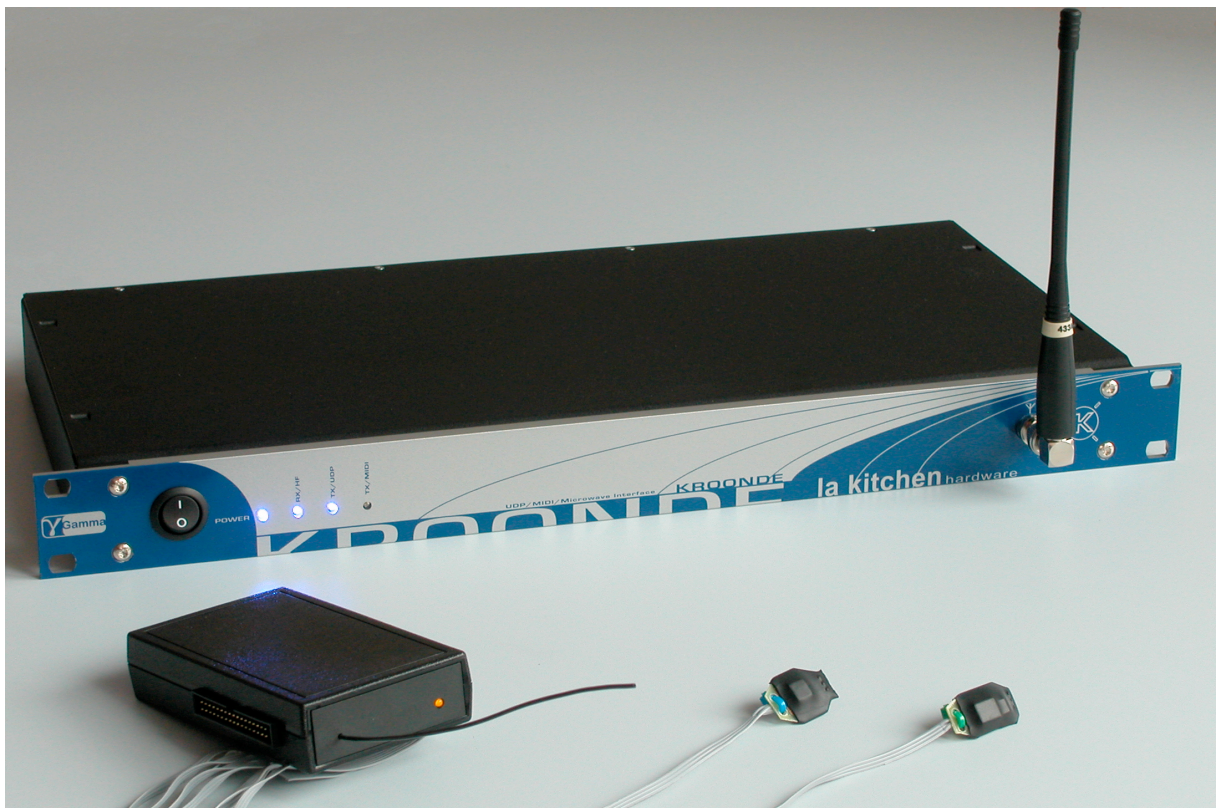


KROONDE

Gamma



16 sensors wireless UDP interface



La Kitchen hardware

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I. Presentation

The Kroonde Gamma is a wireless sensors interface dedicated to real time applications.

The data acquisition system (4,5 x 2,7 x 1 in) can simultaneously integrate up to 16 sensors. It has a battery life of about 10 hours with a 9V battery depending on sensors used, and weighs less than 5,3 oz with the battery.

The sensors are connected to the wireless transmission box by two connectors (maximum 8 sensors per connector).

The effective wireless range varies from 100 ft (in a difficult environment), to 300ft (outdoors, on 914Mhz frequency).

The wireless base (1U Rack) receives information from the sensors and transmits this information through a high bandwidth connection (Ethernet (10MB/s), UDP network protocol) to a computer, with a precision of **10 bits** per sensor. The Kroonde can also send the sensors data over MIDI.

II. Performances

When only one connector is plugged in, data is acquired only from the first 8 sensors, thereby reducing latency time. The wireless link has a latency of 1 ms.

UDP

8 sensors : data is transmitted every 9ms, with 10 bits precision.

16 sensors : data is transmitted every 15ms, with 10 bits precision.

MIDI

8 sensors : data is transmitted every 7ms, with 7 bits precision.

16 sensors : data is transmitted every 12ms, with 7 bits precision.

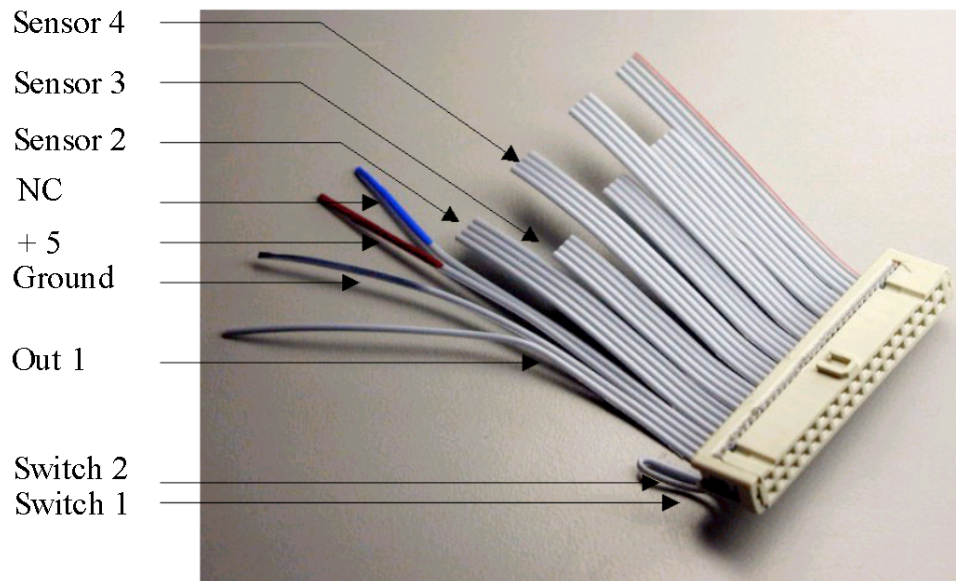
III. Sensors

The sensors are connected in groups of 8 by a female HE10 34 pin connector. They are powered in 0 / +5V and transmit analog information. The analog voltage (0,5V) of the sensors' outputs is converted into digital (10 bits) before wireless transmission.

Any sensor that transmits analog signal between 0 and 5 volts is compatible with the Kroonde. Some examples are pressure, flexion, acceleration, rotation speed, magnetic field, and light sensors.

Interfacing

The connectors are arranged as follows:



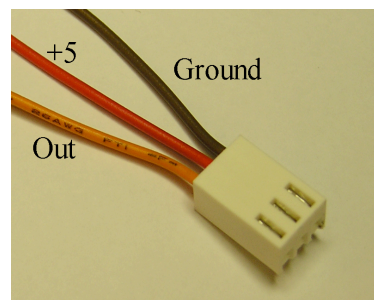
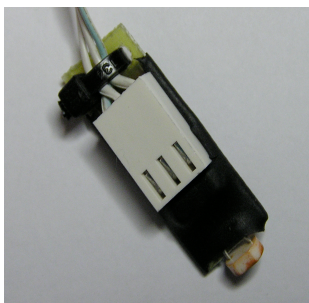
The first two wires (switch 1 and switch 2) must always be linked together. The other wires are identical, in groups of 4 for each sensor.

Ground : The electric ground.

+5V : sensor battery power supply.

output signal of sensor : this wire carries the analog signal of the sensor. It corresponds with a high impedance input (20 Kohm) of the wireless transmitter. The voltage carried by this wire is digitized, then transmitted to the computer.

To change sensors, remove the cable clamp, unplug the sensor and connect another sensor.



IV. Wireless Transmitter



The transmitter has two connectors, a working LED and a flexible antenna

Note : do not to cut the antenna.

The LED lights up when the transmitter is on. The transmitter is on when something is plugged into the first female 34 pin connector (the one located next to the LED). The sensors plugged into the first connector are numbered 1 to 8, those plugged into the second connector are numbered 9 to 16. When only connecting one set of sensors the first 34 pin connector must be used.

On the back side, the Kroonde transmitter has a configuration of 4 micro-switches. When micro-switch 1 is switched to the "ON" position, no entries are scanned. This is useful in avoiding possible electric current fluctuations when disconnected. The other micro-switches are not used on this version.

U. Receiver



The receiver is a 1U rack, with a power switch, 4 LED's and a antenna in the front.

On the rear there is a 9 V AC 500mA power supply, 1 MIDI Out connectors, a RJ45 jack for the Ethernet connection (10Mb/s) and 8 configuration microswitches.

Lighted LED's indicate (from left to right) :

Power : The module is switched on.

RX : The module receives valid information from the transmitter.

UDP : The module transmits information in UDP.

MIDI : The module transmits information in MIDI.

UI. Communication with the computer

The Kroonde system allows communication through three different protocols : OSC, Binary and MIDI

All UDP communications is transmitted via socket N° 1234 to socket N° 5677 or 5678.

a) OSC

The OpenSoundControl Protocol is compatible with many different software environments including Max/MSP and pd.

A demonstration patch for Max is available on the CD.

Protocol information for OSC is available at the following address:

<http://cnmat.cnmat.berkeley.edu/OSC/>

latest version of the OSC object for MAX can be found here :

<http://cnmat.cnmat.berkeley.edu/OpenSoundControl/Max/>

OSC messages sent by the Kroonde are lists of sensor values. When using one set of 8 sensors, the Kroonde will send an 8 member list as an argument to the message `"/kroonde"`. In this list, each integer element corresponds with the value of its respective sensor. When using two sets of 8 sensors, the transmitted list has 16 elements corresponding to the values of the 16 connected sensors.

More specifically, the sent OSC message is comprised of:

bytes 1 - 8 : `"/kroonde"` (in ASCII)

bytes 9 -11 : 0 (in binary)

(bytes from 1 - 11 are the OSC address pattern)

bytes 12 - 29 : `",iiiiiiiiiiiiiii"` (in ASCII)

bytes 30 - 32 : 0 (in binary)

(bytes from 12 - 32 are the OSC type tag string)

bytes 33 - 36 : a 32 bit integer corresponding to the value of the first sensor. The last 10 bits are non-zero.

bytes 37 - 40 : identical, for the second sensor.

bytes 41 - 44 : . . .

b) Binary (FUDI)

The binary output mode is compatible with the native pd `"netreceive"` object.

The messages sent by the Kroonde are of the following type :

Kroonde 132 234 343; (in ASCII) followed by character 10 (carriage return)

For example, in the case of transmission of three sensors with respective values 132 234 and 343.

c) MIDI

Control Change messages are transmitted from 0 - 7 or 0 - 15 depending on the number of sensors, on MIDI channel 11.

VII. UDP/MIDI Configuration

The Kroonde has 8 configuration micro-switches on its back.

a) Configuration of transmission format

3 micro-switches enable the configuration of the transmission format :
micro-switch 1 activates the OSC protocol (for MAX/MSP).
micro-switch 2 activates the binary (FUDI) protocol (for pd).
micro-switch 3 activates MIDI transmission.

Simultaneous selection of several protocols is possible. The Kroonde will transmit data according to the specified format, though this may increase latency time.

The OSC protocol is selected by default (factory configuration).

b) IP Address Configuration

Micro-switches 5 to 8 enable standard IP address configurations.
These configurations are only taken into account when the Kroonde is started up.
Micro-switches 4 and 5 are used for the Kroonde IP configuration :

| Microswitch 4 | Microswitch 5 | Kroonde IP |
|---------------|---------------|----------------|
| Off | Off | 192.168.0.10 |
| Off | On | 192.168.0.11 |
| On | Off | 192.168.255.10 |
| On | On | 192.168.255.11 |

Micro-switches 6 and 7 are used for the destination of the UDP messages :

| Microswitch 6 | Microswitch 7 | destination IP |
|---------------|---------------|-----------------|
| Off | Off | 255.255.255.255 |
| Off | On | 192.168.255.12 |
| On | Off | 192.168.255.13 |
| On | On | 192.168.0.12 |

Micro-switch 8 is for the destination port of the messages :
The port is 5677 if the micro-switch is Off, 5678 if microswitch 8 is On.

If the Kroonde is connected to one computer, use a crossover cable.

If the Kroonde is connected to a local network, it will broadcast informations to all computer connected to the network (whatever is it's IP address) using 255.255.255.255 as destination.

VIII. Installation

No installation is required for the Kroonde. The Kroonde will automatically transmit information to a target identified by its IP address.

For use with a Pure Data, the Kroonde is totally compatible with standard objects. For use with MAX, Open Sound Control (OSC) of CNMAT must be installed.

This is available at the following address:

<http://cnmat.cmat.berkeley.edu/OSC/Max/#downloads>

Version 2.4 is included on the CD.

For OSX, you should replace otudp object by the one in the 2d archive.

The CD contains software which enables visualisation of the on-line information. This software can be found in the "ethereal" folder of this CD.

Examples can also be found on the CD for both Pure Data and MAX/MSP.

IX. Summary

Microswitch 1 : OSC : on, off
Microswitch 1 : FUDI : on, off
Microswitch 1 : MIDI : on, off
Microswitch 1 : IP
Microswitch 1 : IP
Microswitch 1 : Remote IP
Microswitch 1 : Remote IP
Microswitch 1 : port : 5677, 5678

X. Guarantee

The Kroonde has a one year manufacturer's defect guarantee.
Problems arising from abnormal use of this product are not warranted.

Electric current only in 9V.

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