Hacklace Applications

The Hacklace2 is extremely versatile. Get inspired! There are countless possibilities.

Here I introduce some applications of the Hacklace that are well suited for learning, experimenting and having fun. Use them as a source of inspiration.

If you like to try several applications it might be handy to solder a pin header connector to the sensor port.

Applications with pre-coded Apps

Battery Monitor and Voltmeter

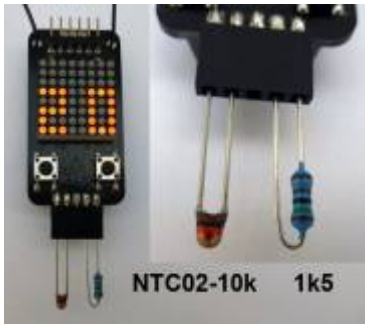
Using the battery monitor und voltmeter app one can practically explore fundamental topics like Ohm's law or voltage dividers.

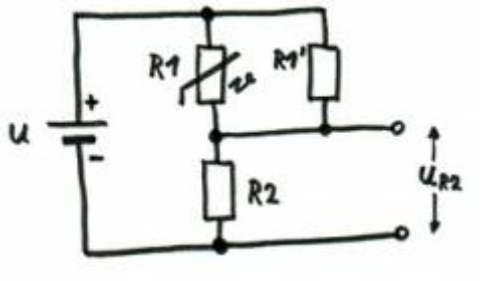
It takes only two additional resistors to enable the Hacklace to monitor its own battery voltage. If you use smd resistors of type 0805 they fit snugly onto the board. Solder a 22 kΩ resistor between pin 1 and pin 2 and 10 kΩ between pin 4 and pin 5.

Thermometer

An NTC thermistor is an element that changes resistance with temperature. If in the voltage divider a resistor is replaced by an NTC the Hacklace is able to measure temperature. The non-linear characteristic of an NTC will lead you to the question of how to linearize its output. Try to calibrate your thermometer by finding suitable offset and slope parameters. There is a lot of know-how to discover in a simple room thermometer.

Look at the thermometer app. With only two components, a NTC02-10k thermistor and a 1k5 resistor, you turn the Hacklace into a thermometer. An OpenOffice spreadsheet will help you with adapting the characteristics.





Photoresistor

A LDR reacts on light.

With a photoresistor or light-dependent resistor (LDR) the Hacklace reacts on light. The circuit is very similar to the thermometer. How about controlling the display intensity in accordance with the surronding light? Can you use the Hacklace to build a photometer?

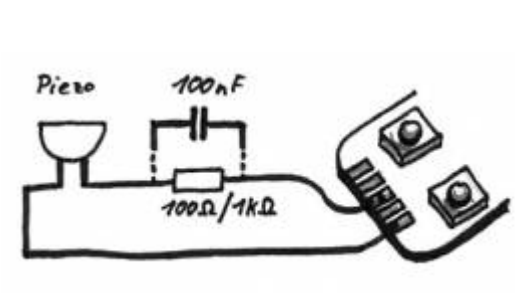
Switching Output

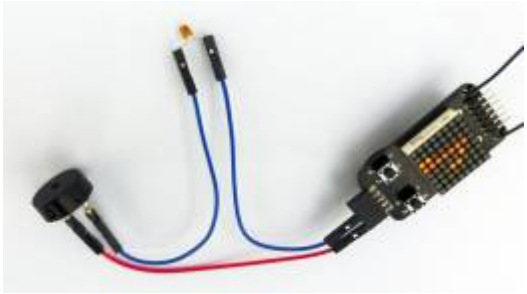
If pin 5 (signal PD3) of the sensor port is configured as output it can drive a standard led. Connect the led anode (long wire) in series with a resistor (470 Ω to 1 kΩ) to pin 5 and the led cathode to ground (pin 3). The resistor limits the current to protect the led. What happens if you reverse the polarity of the led?

For larger currents you need a transistor. Even larger currents can be switched with a relay that is controlled by the transistor.

Jukebox

In addition to a constant voltage pin 5 of the sensor port is also able to generate frequencies. If you connect a piezo buzzer in series with a resistor to pin 5 you can hear the frequencies. The second pin of the buzzer goes to ground (pin 3). Now it is easy to play a simple melody. The jukebox app will show you how to do it.

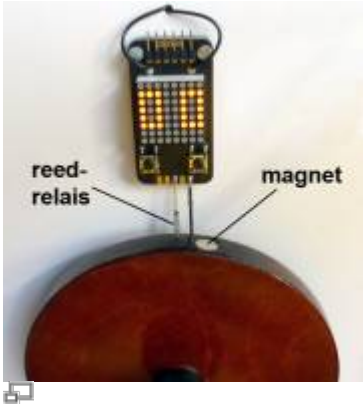




Try to use different resistors (100 Ω, 1 kΩ, 10 kΩ) and watch the effect. Exchange the resistor for an NTC or LDR. What happens?

A capacitor is a component that blocks direct current (dc). Check it out with your multimeter by measuring the dc resistance of a capacitor. What happens if you replace the resistor by a capacitor (100 nF)?

Bicycle Speedometer

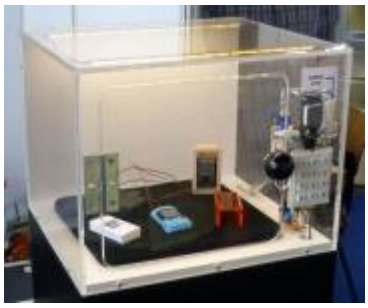


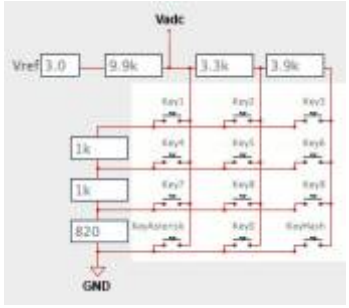
A reed relais senses each revolution.

Use the Hacklace to pimp your bike. A digital speedometer shows you how fast you are riding and what distance you have traveled. You only need to attach a reed relay to pin 3 and pin 5 of the sensor port. The relais will be activated by a small magnet that is fixed to the wheel. With every revolution of the wheel a short impulse is sent to the hacklace. The speed is then calculated by the circumference of the wheel and the frequency of the pulses. Use the same principle to measure the revolutions per second of your drilling machine.

Codelock

Your Hacklace can become a codelock. Use a few resistors to connect a numeric keypad to the analog input of the sensor port (see figure, connect Vadc to the analog input, Vreg to VCC and GND to GND). The digital output controls a standard servo motor. Now select the codelock-app. When entering the correct code the door is unlocked.

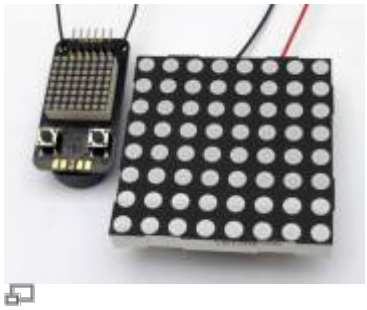




Serial Display

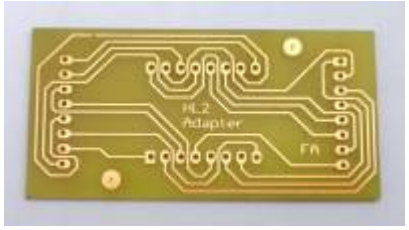
If you want to display short text messages in an appealing way you might use the Hacklace as a serial display. Attach it to your pc to signal new incoming emails, show the weather forecast or display the latest twitter tweets. Also microcontrollers are happy the get a unique display that is not as boring as the common 16 character lcd. Just use the Display-App.

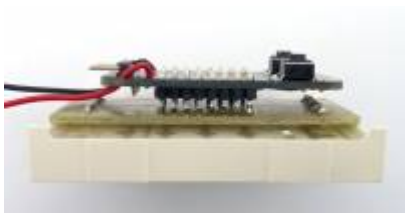
Kingsize-Hacklace



If size does matter...

If you want to make a really big impression build yourself a kingsize Hacklace. Simply replace the dot matrix display of the Hacklace with a larger type. Watch out to get the assignment of the pins right. The connections can be made with short wires or more elegantly with a small adapter board. The simple single-sided layout makes it easy to etch the board yourself. To have the push buttons accessible the big display is mounted on the opposite side.





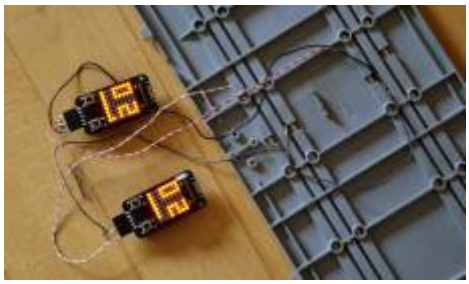
With a higher voltage and appropriate drivers you can build even larger displays which use several

leds for each pixel.

Applications by Users

Hack-Race

A really speedy application was developed by Frank Pliquett. Two Hacklaces work as lap timer for his slot-car racing track. The circuit is quite simple: A pull-up resistor from PD3 to VCC and a reed contact between PD3 and GND. The associated app has been derived from the stopwatch app.



Video

Hacklace, electronics, kit, applications

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