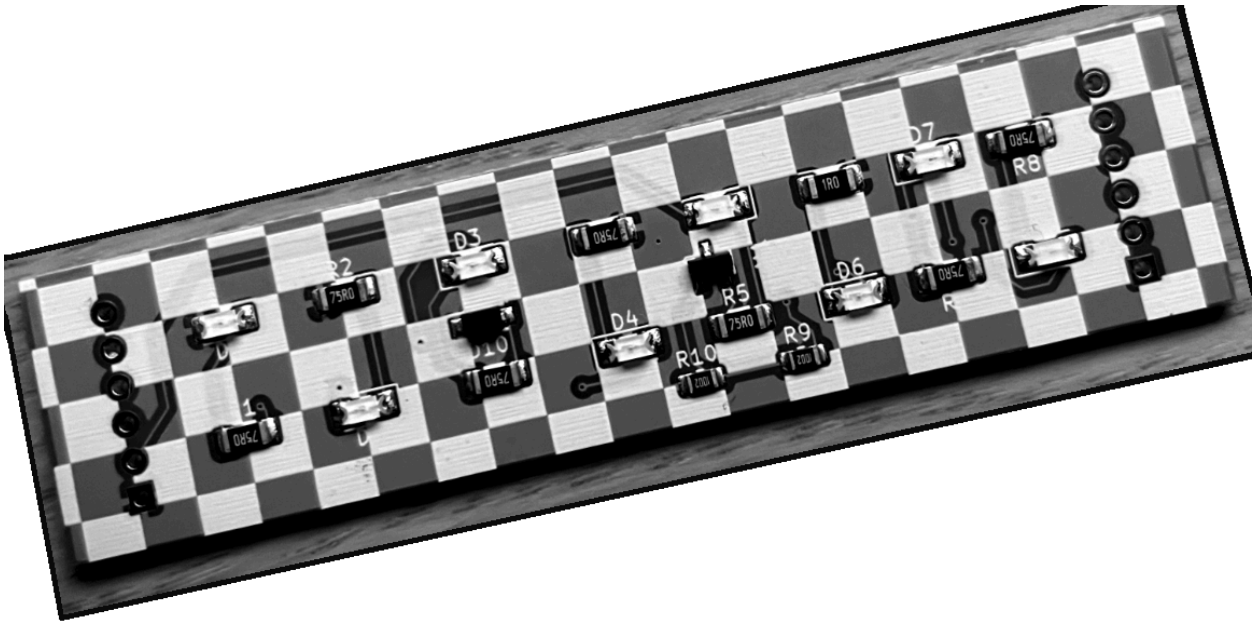
Key Card Addon: Binary LED Reader - 300 (BLR-300)

Knotty Solutions
Infinitly Complex

Reference Manual

Beta version 0.7.9 (Not for public distribution)

FLAG-ITS-RTFM-TIME!!



OVERVIEW

AT **Knotty Solutions** we create complex products. We firmly believe that by using more complex ways to build our solutions we improve the security of our products. This add-on represents the hard work we have put in order to reach a nice peak in security.

For our main product; the key card reader system, we created a special Addon, named the BLR-300, that allows our customers to access more information when interacting with the card reader. Through that addon, we are using an advanced communication system based on 8 LEDs designed to communicate with binary. This makes the debugging process much more efficient when using the card reader system.

Dev notes (TODO remove for final release):

We might have overdone the complexity this time... we have a hard time figuring what is wrong with our new release that we already distributed to our clients.

ADDON DISTRIBUTION AND INSTALLATION

Since the BLR-300 is not designed for public usage, and should not be distributed to the public, in order to reduce the cost, the initial package comes in separate pieces. You will need to assemble your own addon.

Note: Make sure you carefully assemble connection legs; they need to have a correct solder and correctly aligned for an easier insertion.

Note: For the installation of the addon on the key card, make sure you use this orientation:

Dev notes (TODO remove for final release):

Since there seems to be some issues with the current version of the board we suggest you do not install the legs right at the start. There are a lot of issues that need to be fixed before. If the legs are already installed, it might complexify the debugging process.

ADDON MAINTENANCE

If you are required to do some maintenance on the BLR-300, know this will void your warranty. This means in order to keep our technology super secret, we do not provide in-depth information on the construction of the add-on; so no BOM, or schematic. Which means you will have to re-order the add-on from us via your sales representative.

To further repel anyone that would even try to do reverse engineering on our product we even made the reading of the board harder with a special pattern printed on it to protect the BLR-300 from reverse engineering!

Dev notes (TODO remove for final release):

We have to look for another part supplier to further reduce the costs. It shouldn't be THAT hard to find a supplier that have lower cost for LEDs, diode, transustor and resistors.

Architecture Overview

The addon uses 8 LEDs to communicate. To have an efficient communication protocol, each LEDs is connected to its own port. Here is a small Communication PORT reference grid.

Port Name	Purpose		Port Name	Purpose
2	Connected to LED #2		8	Connected to LED #8
1	Connected to LED #1		7	Connected to LED #7
GPIO 3	Not used		6	Connected to LED #6
GPIO 2	Not used		5	Connected to LED #5
3V3	Auxiliary power		4	Connected to LED #4
GND	Is the Ground		3	Connected to LED #3

Dev notes (TODO remove for final release):

We tested the latest version of the board, and we have several issues that have appeared, some are easily fixable, some we are not sure what the issue is.

LED 1: Does not light up in normal condition. A lil touch up fixed it.
LED 2: The LED does not light up. We had to [redacted]
LED 3: The issue is only about the [redacted]
LED 4: We are not sure, but the electricity seems to be taking a [redacted]
LED 5: We added a special switch on the addon to fix a bug in the code; [redacted] but the pysical fix does not seem to work like if it's missing [redacted]
LED 6: We have to be careful with this one. The LED has a tendency to die more easily if lighted up for a longer time.
LED 7: This one lights up, there might be no issues, right?
LED 8: This one lights up, there might be no issues! right?

Communication Protocol

The Addon will communicate with the LEDs in a specific pattern. It will output messages in a binary format using all 8 LEDs. So it's very important that all the LEDs are functional. In order to make sure you get all the messages we have a special communication header and footer that indicates you everything is functional like it should.

After connecting the augmented badge with an add-on to a station, the LEDs will start displaying data.

IF the addon has been rewired to apply the scrambled key correctly, the following will be displayed:
Communication Header Pattern:

All LEDs ON
All LEDs OFF
All LEDs ON
All LEDs OFF
Bottom LEDS ON Only
Top LEDS ON Only
All LEDs ON
All LEDs OFF
All LEDs ON
All LEDs OFF

Communication Data:

Normal Binary Data

Communication Footer Pattern:

All LEDs ON
All LEDs OFF
All LEDs ON
All LEDs OFF
Top LEDS ON Only
Bottom LEDS ON Only
All LEDs ON
All LEDs OFF
All LEDs ON
All LEDs OFF

Dev notes (TODO remove for final release):

Expected Communication Pattern on a non re-wired addon:

11110101

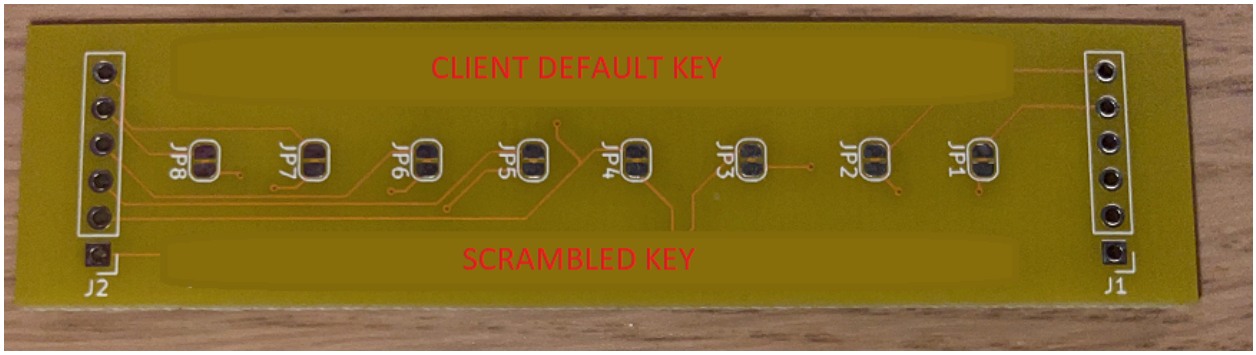
00001010

...

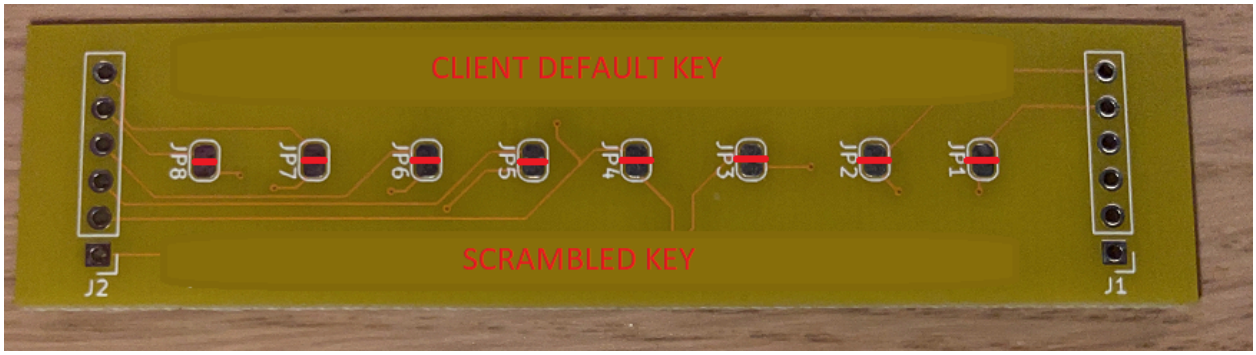
Encoded system

To further improve the security of our addon, we personalize the addon connection for each client. We create a unique key that links the addon to the stations provided so they don't work at our other client's stations. In other words the stations provided use the encoded scrambled key and the Addon must be rewired to match your stations.

By default the addon is using the default wiring to use the default non-scrambled key.



To make the addon work with your stations, first you must cut the default connection and then rewire the connection to match the scrambled key.



Note: The printed version of the scrambled key also has been passed through a substitution cipher to protect it.

Extra notes