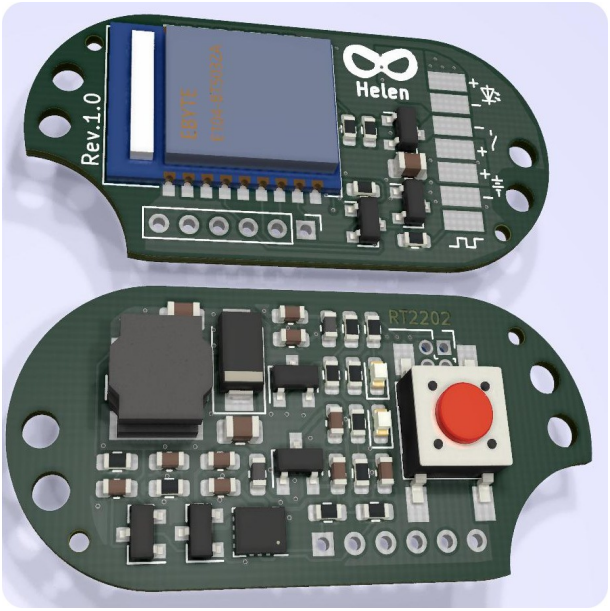
Helen



User Manual

1 Preface

Helen is an alternative driver for the popular Yinding or KD2 Headlight Cycling Lamp with following features:

- One 3A Step-Down constant current sources, capable of driving up to three white LEDs in series.
- Bluetooth interface for wireless remote control, lamp-to-lamp connection and Smartphone based configuration.
- Integrated temperature regulation to prevent lamp from overheating.
- Smooth output power reduction when battery is low.
- Low standby current (less than 100µA).
- Works with input voltages between 3V and 4.25V (only one LED), 6V and 8.5V (up to two LEDs in series) and between 9V and 12.75V (up to three LEDs in series).
- Optionally: Integrated motion sensor to drive the LED in dependency of the head inclination, resulting in a nearly constant brightness level, no matter if you're looking down or straight forward.
- Optionally: One 3A PWM source.
- Optionally: One multi functional com pin, which can be either configured for a singe-wire communication interface, a wired external button or a low power PWM source

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2 Connections

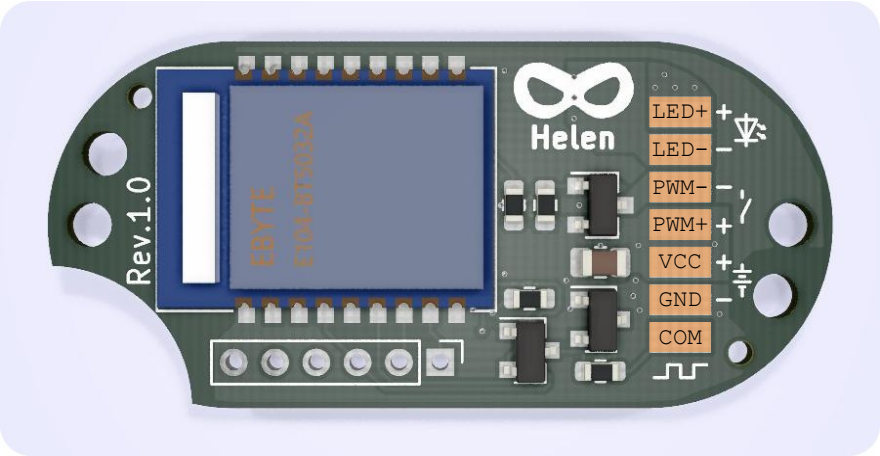

Image 1: board connections

Pad	Function	additional information
LED+	connection for LED anode	the sum of forward voltages of in series connected LEDs must be lower than the supply voltage
LED-	connection for LED catode	
PWM-	return path for PWM load	this is an active low PWM channel, the +pad is connected to VCC, the -pad is switched to GND with a MOSFET capable of driving 3A (there is no protection, make sure the connected load does not draw more current)
PWM+	source for PWM load	
VCC	positive power supply	max. operational voltage: 13.5V no reverse polarity protection!
GND	negative power supply	
COM	multi functional pin	open drain interface, max. voltage VCC, max. sink current 5mA

3 Usage

3.1 Modes and Groups

Helen has 8 individual configurable modes, which can be organized in different groups.

3.1.1 Preferred Mode

One of the 8 available modes can be selected as the preferred mode. If the preferred mode is not selected, the lamp will shut off whenever the preferred mode is selected. If one mode is selected as the preferred mode the lamp will shut off, if it already is in the preferred mode. Otherwise it will jump to the preferred mode.

3.1.2 Temporary Mode

One of the 8 available modes can be selected as a temporary mode. If a mode is selected as temporary mode, it is possible to jump directly into this mode. When leaving the mode, Helen jumps back to the previously used mode.

3.1.3 Off Mode

One of the 8 available modes can be selected as the off mode. If a mode is selected as off mode, this mode will be used when the lamp is shut off. When the lamp enters stand-by mode (after three minutes without movement) it will completely shut off.

3.2 Remote Connection

Helen can manage up to 4 connections, 3 as a central (e.g. a remote control or another lamp) and 1 as peripheral (e.g. a smart phone or another lamp).

Although it is possible to pair with several remote controls, it is not possible to connect to more than one remote control simultaneously.

If two lamps are connected to each other, the lamp with the peripheral connection will break its connection with a remote control and won't reconnect as long as it is connected with the other lamp.

3.2.1 Central connection

To initiate a connection as central (e.g. if you want to connect to a remote control or initiate a central connection with another lamp), you have to

- shut of Helen,
- make sure, that all other unwanted compatible devices are shut of or out of range,
- press Helen's button for at least 2 sec.

Helen will indicate the search process with a fast blinking blue status LED. As soon as a connection is established the blue status LED will be constantly on. If no device is found within 30 sec. the lamp will stop searching and starts a 30 sec. window where it is open for peripheral connections (see next chapter).

This procedure is only necessary for the initial connection. The lamp will store all necessary information and automatically reconnect if the device is available.

3.2.2 Peripheral connection

To initiate a connection as peripheral (e.g. if you want to connect to a smartphone or initiate a peripheral connection with another lamp), you have to

- shut of Helen,
- make sure, that all other unwanted compatible devices are shut of or out of range,
- press Helen's button for at least 2 sec until the blue led blinks fast,
- wait 30 sec until the blue led stops fast blinking.

Now you can start the connection procedure on the central device.

This procedure is only necessary for the initial connection. The lamp will store all necessary information and you can establish future connection as soon as Helen is powered on.

3.3 Button Control

There are 4 button control commands:

- next mode:
  This command jumps to the next mode.
  If the ignore flag for this mode is selected, it will be skipped.

If the last mode within a group is reached, it will roll over to the first mode.
If the light is currently off it jumps to the first mode.

- next group:
  This command jumps to the next group.
  If the group only contains ignored modes, it will be skipped.
  If the current group is the last group, this command will jump to the first group.
  If the light is currently off, it jumps to the first mode in the second group.

- preferred mode:
  If the preferred mode is not set, the light will shut off.
  If the preferred mode is set, the light will jump directly to the preferred mode.
  If the light is already in the preferred mode, it will shut off.

- temporary mode:
  If the temporary mode is set, the light will jump into the temporary mode and jumps back to the previous mode.

3.3.1 Integrated button

- short click:
  next mode command

- long click:
  next group command

- press and hold > 2 sec., light is off:
  initiate connection procedure
  hold button again for 2 sec. to delete all bluetooth bonding data
- press and hold > 10 sec., light is off:
  initiate a factory reset
- press and hold > 2 sec., light is on:
  preferred mode command

3.3.2 External button (if available)

- short click:
  next mode command
- long click:
  next group command
- press and hold > 2 sec.:
  preferred mode command

3.3.3 Xiaomi Yi remote control

- main button, short click:
  next mode command
- main button, press and hold > 0.5 sec.:
  enter temporary mode as long as button is pressed
- secondary button, short click:
  next group command

Image 2: Xiaomi Yi RC

- secondary button, press and hold > 0.5 sec.:
  preferred mode command

3.3.4 Pearl/Auvisio remote control

- next track button, short click:
  next mode command
- previous track button, short click:
  previous mode command
- volume up button, short click:
  next group command
- volume down button, short click:
  previous group command
- play/pause button, short click:
  preferred mode command

Image 3: Pearl/Auvisio remote

3.4 Remote Synchronization

If Helen is connected to another lamp, both lamps will synchronize their current mode. This means if one light receives a button command, it will change its mode according to the description in the previous chapter and then relay this new mode (the number, not the configuration!) to the other lamp.

This lamp will then also jump into this mode, nevertheless if this mode is used or not. With this behavior it is possible to generate configurations where one lamp is on and the other not.

3.5 Status LED

Helen is equipped with a red and blue status LED, which is visible through the transparent button cap.

The blue LED gives information about the wireless connection. If is on, Helen is connected to a remote or another lamp. A fast blinking indicates, that Helen is searching for any compatible device. A slow blinking blue LED indicates, that Helen is searching for a already known device.

The red on turns on whenever the output is limited due to high temperature or dropping input voltage.

When Helen enters standby mode, the Status LED is shut off for minimum current consumption (but an established connection or the scanning for a known device will not be stopped).

4 Configuration

4.1 Connecting with the App

To connect to your lamp open the app and press the SEARCH button.
The App will then search and connect to all compatible lamps in range. Tap on the the light you want to configure.
If it is the first connection you have to follow the procedure in 3.2.2. In this case your phone will also ask you to pair with the light, which you have to confirm.

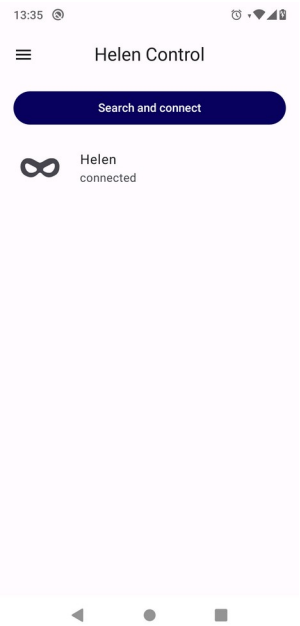

Image 4: Connecting

4.2 Light status

The STATUS page gives you information about the current state of the lamp.
If you tap at the control icon in the top bar you can also select any of the light modes or shut it off.

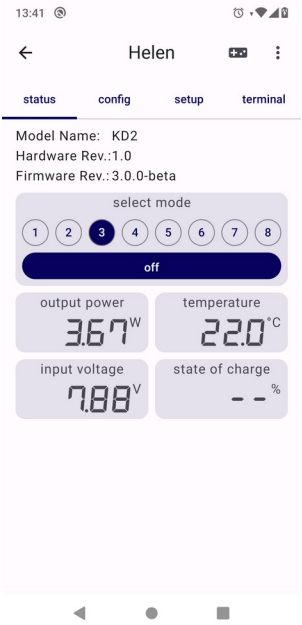

Image 5: Helen status

4.3 Configuration

On the CONFIG page you see an overview of your modes and the group arrangements. To change the group arrangement simply drag and drop the group dividers. To add a group you can drag and drop from the top or bottom. To change a mode configuration tap on the mode. There you can select if the mode should be ignored, used as preferred, temporary or off mode and you can also select the intensity of the light and the PWM channel, and if the motion sensor should be used for to adjust the light depending on your head inclination.

Image 6: Helen configuration

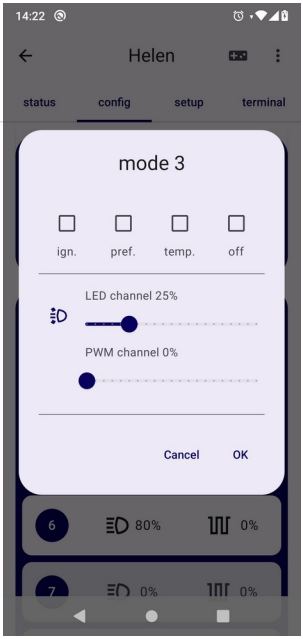

Image 7: Mode configuration

4.4 Setup

On the `setup` page you can select how you want to use the communication pin.

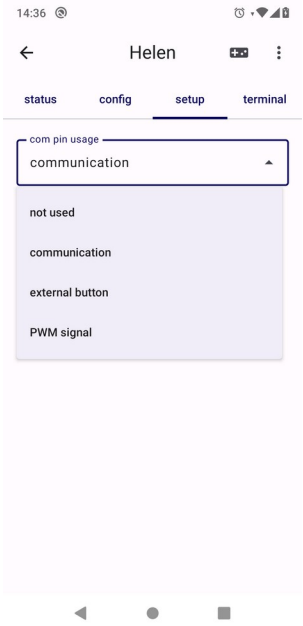

Image 8: Setup