

GLANCE SMART GLASSES



Glance Smart Glasses User's Manual

LWL-001



Lambda Wolf Labs

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Contact Information

For all inquiries including product information, usage, warranty claims, etc. you can contact me at:

lambdawolflabs@gmail.com

This product can be purchased at [the Lambda Wolf Labs Etsy store](#): (etsy.com/shop/LambdaWolfLabs).

Warranty claims, returns, cancellations and other transactions can also be handled through the Etsy platform.

This product is repairable and hackable, so full details including schematic, firmware, STL files and more can be found at [the Lambda Wolf Labs Github](#):

(github.com/lambdawolflabs/R6S-Warden-Glance-Smart-Glasses-LWL-001).

Introduction & Foreward

Hey you!

Yes you, awesome cosplayer or R6S fan! Thanks for buying the Glance Smart Glasses prop gadget, I genuinely hope you have a lot of fun with it either just as a novelty or as part of your Warden cosplay ensemble! Please help support the official game release too; this community is a wonderful thing that grew from a truly kickass game and hope it continues for years to come too.

Shout outs to the Roundtable of Operators group (@RoundTableR6) ! They do all sorts of cosplay (primarily R6S), games and more! Genuinely a wonderful group of talented and friendly people!

Also check out Andarne (@Andarne_), he's a very talented and incredible prop maker who provided a few tips/guidance whilst I was working on this.

Needless to say, thank you so much and go have fun with it! Mod it, hack it or customize it as you feel too!

Nick Winston (aka @Lorne Chrones)

Quickstart

Enough chatting about, let's get started! There's some minor assembly to the product shown below:

1. Remove the control box, back cable, USB charging cable and the glasses from the box.



Figure 1: Box Contents

2. Firmly plug in the back cable into both the control box and the glasses' connector.

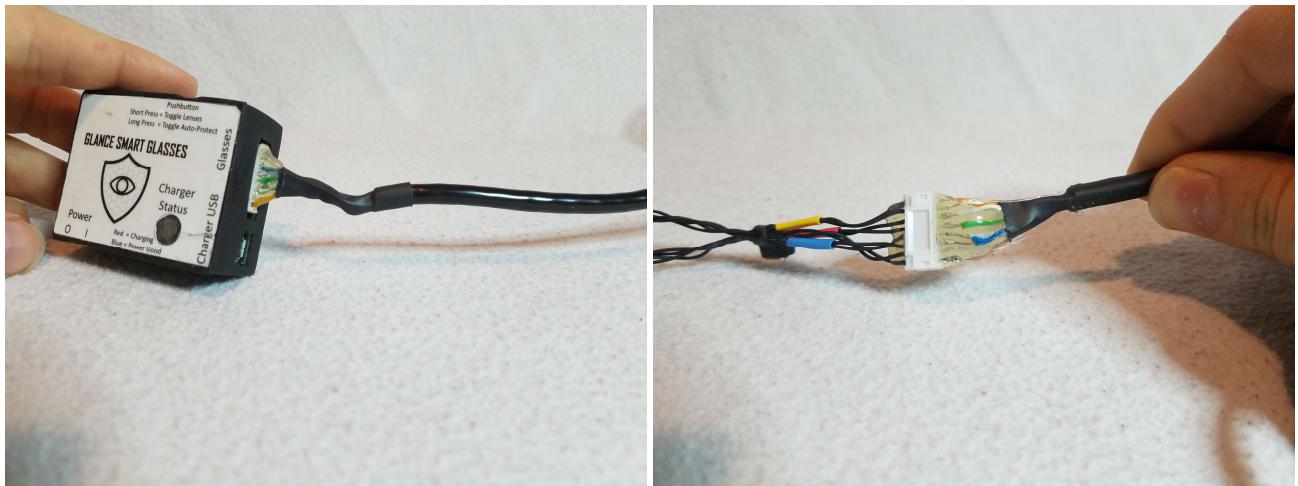


Figure 2: Back Cable plugged into the Control Box & Glasses.

3. Put on the glasses with the wires and back cable resting on your neck.



Figure 3: Complete assembled setup & wearing example.

4. Flip the power switch on the side of the control box to the right, both the left and right lenses of the glasses will together blink five times before going to a steady transparency.

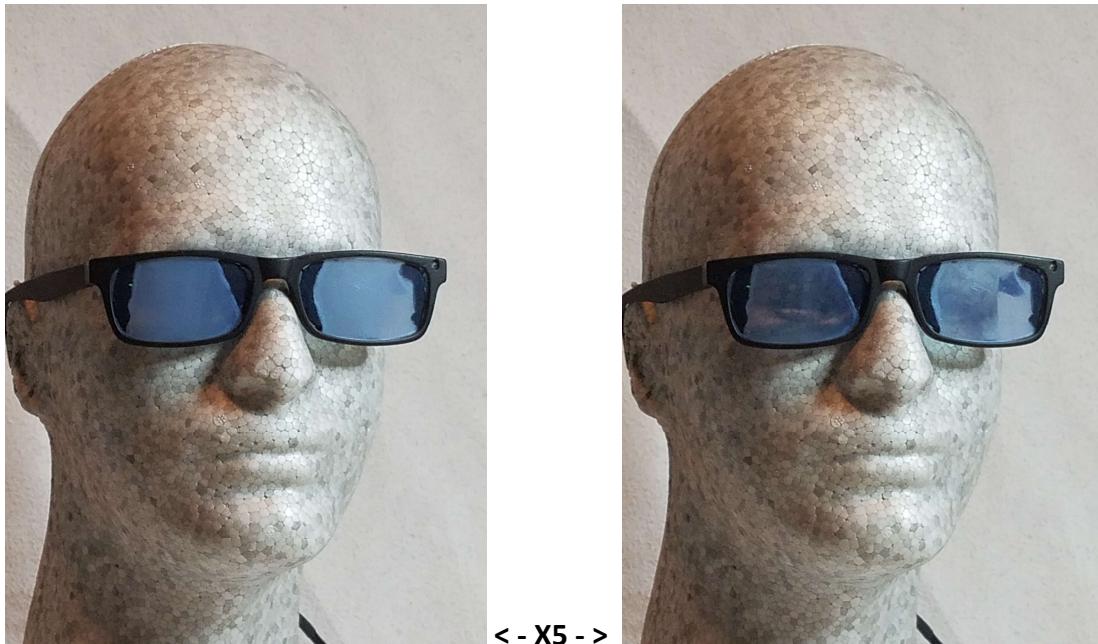


Figure 4: Wearing & power up sequence.

5. You can now short press (<1 second) either the pushbutton on the side of the control box or the remote trigger pushbutton to toggle the lenses between transparent and opaque.

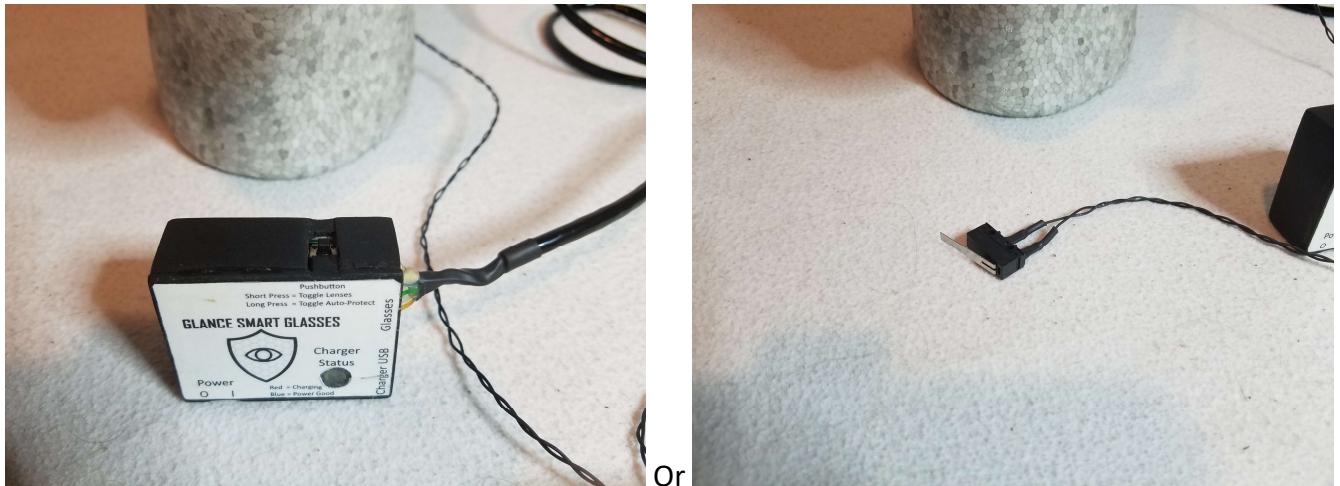


Figure 5: Control Box pushbutton or Remote Trigger pushbutton.

6. See the Usage & Operation section for more details including photoflash mode, have fun!

Features & Specifications

- *Warden approved!*
- PDLC Based Smart Glass Lenses
- Photoflash Automatic Protection System
- IP 51 Rated (Dust Resistant, Water Drops Resistant)
- EU RoHS 3 Compliant
- UN 38.3 Certified Protected Lithium-Polymer Battery
- IEC 60038 Extra Low Voltage System
- IEC 61000-4-2 Level 4 ESD Protected
- MicroUSB Smart Recharging
- 24 Hour Battery Life
- 6 Hour Recharge Time

Note: Typical specifications are at +25°C (+77°F) unless otherwise noted. Minimum & Maximum specifications are across the full Operating Temperature Range.

| Specification | Conditions / Notes | Min | Typ | Max | Units |
|---|---|--------------|--------------|---------------|----------------|
| Operating Temperature Range | Device powered on, connected to glasses, lenses toggling, etc. | -10 (+14) | +25 (+77) | +50 (+122) | °C (°F) |
| Charging Temperature Range | Device either on or off, glasses connected or disconnected, etc. +5V USB power applied. | +5 (+41) | +25 (+77) | +40 (+104) | °C (°F) |
| Storage Temperature Range | Device switched off and not charging. Glasses connected or disconnected. | -10 (+14) | +25 (+77) | +50 (+122) | °C (°F) |
| Operating, Charging or Storage Humidity Range | Non-condensing | 10 | 50 | 95 | % RH |
| Operating Altitude/Elevation | Relative to sea level air pressure. | - | - | 6 (20) | km (k-feet) |
| Storage Altitude/Elevation | Relative to sea level air pressure. | - | - | 15 (50) | km (k-feet) |
| Battery Life | Fully charged, across operating temperature, lenses transparent. | - | 24 | - | Hours |
| Recharge Time, Non-Operating | Device switched off while charging. Battery is completely discharged. +5V USB power applied. | - | - | 5.5 | Hours |
| Recharge Time, | Device switched on while | - | - | 6 | Hours |

| | | | | | |
|---|--|------|------|-------|------|
| Operating | charging, glasses connected and operating. Battery is completely discharged. +5V USB power applied. | | | | |
| microUSB Port Recharging Voltage Range | Device either on or off, charging or idle, glasses connected or disconnected, etc. | +4.6 | +5 | +5.25 | VDC |
| MicroUSB Port Recharging Current Draw | Device either on or off, battery charging, glasses connected or disconnected, etc. | - | 100 | 111 | mA |
| Photoflash High Sensitivity Trigger Threshold | Cool White LED flashlight light source, Extech EasyView 30 Lux Meter. Device on, photoflash enabled and triggered. | - | 1500 | - | Lux |
| Lenses On Visible Light Transmittance | Device switched on, lenses set transparent. 400 – 700nm range. | - | >80 | - | % |
| Lenses On Visible Light Turbidity | Device switched on, lenses set transparent. 400 – 700nm range. | - | <4 | - | % |
| Lenses Off Visible Light Turbidity | Device either on or off, lenses opaque. 400nm – 700nm range. | - | >96 | - | % |
| Lenses Off UV Opacity / Block | Device either on or off, lenses opaque. <400nm range. | - | >99 | - | % |
| Lenses Off IR Opacity / Block | Device either on or off, lenses opaque. >700nm range. | - | >90 | - | % |
| Lenses Turn On / Turn Off Time | Device switched on, lenses toggled between opaque and transparent. | - | 20 | - | mSec |

Warnings, Safety & Regulatory Compliance

Warnings:

Do not puncture, crush, incinerate nor heat the control box above 60°C (140°F)! Risk of lithium-polymer battery fire, if done so.

Safety Disclaimer:

This product does not provide nor guarantees any ballistic, impact or bright light/UV protection to the user's eyes! It is not intended nor recommended for use in airsoft, welding or other environments where there is risk of injury to the user's eyes. It is intended only for cosplay and prop use only!

Do not wear whilst driving or operating machinery!

Regulatory Compliance & Notices:



This product is designed and built to be European Union RoHS 3 compliant.



Li-ion This product contains a UN 38.3 certified protected lithium polymer battery.



This product is designed and built to be European Union WEEE Compliant.



WARNING: This product may expose you to chemicals including carbon black, metallic nickel and residual trace amounts of ethylbenzene, which is known to the State of California to cause cancer. For more information, go to www.P65Warnings.ca.gov."

Do not discard the device into a landfill; recycle the device as e-waste with a lithium-polymer battery according to local waste handling authority.

Usage & Operation

It is recommended to only use the device when connected to the glasses via the back cable. The device will not be damaged if it's not connected, however the control box glasses connector will be exposed to potential electrostatic damage, mechanical damage or short circuit damage.

Power-Up

Whenever the power switch is flipped and the device powers up, the lenses will blink between opaque and transparent in unison five times within ~2.5 seconds testing both the lenses and indicating power-up. It will then default the lenses to constant transparent afterward.

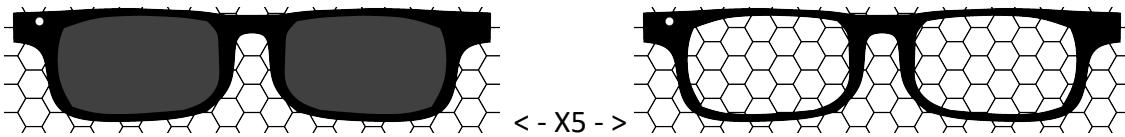


Figure 6: Power-Up Lens Animation

Normal Lens Toggle

While the device is on, the control box pushbutton or the remote trigger pushbutton can be short pressed (<1 second) to toggle the lenses opaque to transparent or vice-versa.

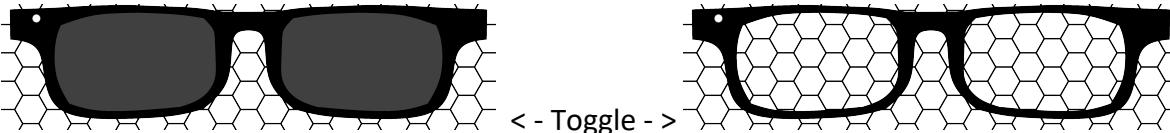


Figure 7: Normal Lens Toggle Due To Short Button Press

Photoflash Mode / Auto-Protect

The device has a secondary mode which will force the lenses to be opaque whenever bright light (either flashing, pulsed or constant) shines upon the user's face. When the bright light is removed, the lenses will return to the previous state they were set to. The photoflash photodiode sensor responsible for detecting light levels is next to the left lens when wearing the glasses, so do be mindful to not obscure it.

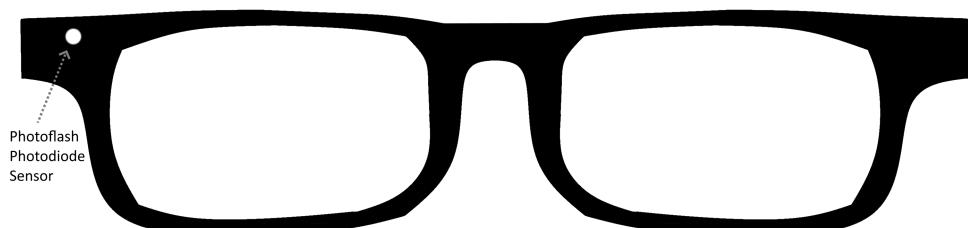


Figure 8: Photoflash Photodiode Location On Smart Glasses

By default, on power-up, this mode is disabled. To enable Photoflash Mode, long press (>1.5 seconds) the control box pushbutton or the remote trigger pushbutton. After long pressing, the device will acknowledge and notify that photoflash mode has been enabled by briefly turning the right lens opaque and blinking only the left lens four times within ~2 seconds. Afterwards, both lenses will return to their previously set state. Note that whilst Photoflash Mode is enabled, normal lens toggle will be change to only temporary toggles.

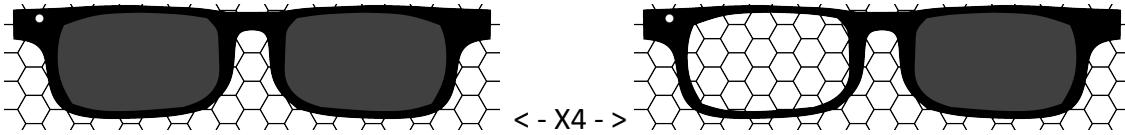


Figure 9: Photoflash Mode Enable Animation

In order to disable Photoflash Mode, long press the control box pushbutton or the remote trigger pushbutton. After long pressing, the device will acknowledge and notify that photoflash mode has been disabled by briefly turning the left lens opaque and blinking only the right lens four times within ~2 seconds. Afterwards, both lenses will return to their previously set state. Likewise, normal lens toggle will revert to normal operation.

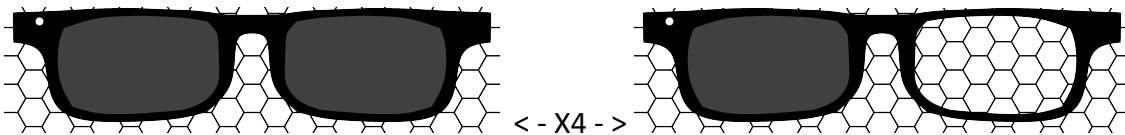


Figure 10: Photoflash Mode Disable Animation

Power-Up Photoflash Sensitivity Select

Photoflash mode has two sensitivity levels that the user can configure based upon the user's own bright light tolerance: High Sensitivity and Custom Sensitivity. This is configured at device power-up depending upon if the user holds down or releases the control box pushbutton or the remote trigger pushbutton. If either pushbutton is left released at power-up, the device will default to High Sensitivity. See the Features & Specifications section for the approximate Lux level of High Sensitivity level.

For setting the Custom Sensitivity level, wear the glasses and look at whatever light source you deem bright. Align the bright light source in your left eye so the photodiode picks up on it. Then hold down either pushbutton and power up the device. After a half second, the device will be configured for the Custom Sensitivity threshold in Photoflash Mode. This Custom Sensitivity is reset at every power up.

Battery Charging

The device is powered by an on-board protected lithium polymer battery with a built in charger from common microUSB type B power. To charge the device, plug in any standard USB type A to microUSB type B cable to the microUSB port on the right side of the control box and charge it from any USB phone charger, USB power bank or standard USB ports on laptop, smartphones, etc. If the USB power is valid and stable, a blue LED will light through the Charger Status window. If USB power is valid and the battery is charging, a red LED will also light through the Charger Status window. When the battery is fully charged, the red LED will turn off.

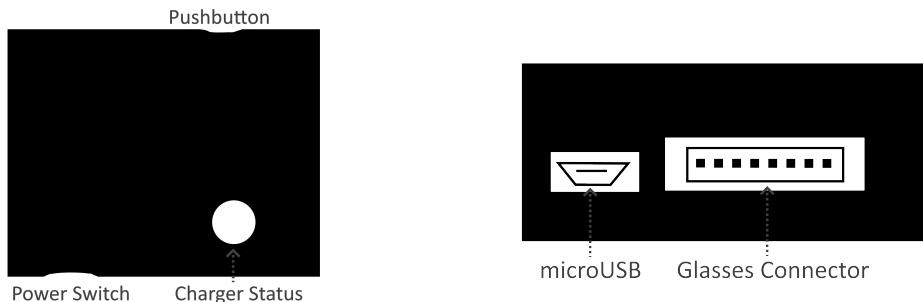


Figure 11: Device Charger Status & microUSB Connector Locations

The device can charge during normal use. However the device only charges within a set temperature range, see the Features & Specifications section for typical recharge times and recharge conditions.

Low Battery Notification

The device includes measures to detect for and notify the user when the battery becomes low. Whenever the device detects a low battery, it will send a notification to the user approximately once every 5 minutes. The low battery notification animation alternates between the left lens opaque / right lens transparent and vice-versa for four times within ~4 seconds. Once the animation is finished, the lenses will return to their previously set state.

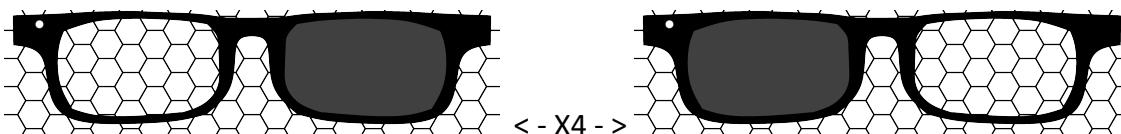


Figure 12: Low Battery Notification Animation

If the battery is low but charging, these notifications will be blocked. The low battery notifications will cease when the battery is charged above the low battery threshold. The device is still able to be used in a low battery state, however if use continues without a recharge, the device will eventually force shutdown and require a recharge.

Care & Cleaning

Clean only with filtered, pure, distilled or tap water and lightly wipe with a soft rag or microfiber cloth. Do not wipe, clean with or expose to solvents/solvent mixtures such as acetone, isopropyl alcohol, paint thinner, etc. Do not wipe, clean with or expose to any detergents or soaps. Avoid cleaning with or exposing the device to abrasive cleaners, strong acids, bases or oxidizers.

When cleaning the lenses and glasses as a whole, use a microfiber cloth lightly dampened only with water and gently wipe both sides of both lenses as well as the rest of the glasses. Compressed air can also be used to blow away any particles trapped in corners, dust trapped in the control box or tough to reach spots of the glasses.

Turn off the device before storage or disassembly. Recommend storing the device in a cool/dry area in the included boxes; most indoor environments are suitable for this. See the Features & Specifications for allowable storage and operating conditions.

Should the device be exposed to water either by accidentally dropping in water or splashes, immediately turn the device off, disconnect the glasses from the back cable and control box. Towel dry the affected components as much as possible. Then place the control box in a sealed bag of rice or silica desiccant for a minimum of 24 hours to let all the water be absorbed out. Please note that water damage is not covered under warranty.

Repair & Modifications

Be aware that any DIY repair or modifications will void the warranty!

For any cosmetic damage, cyanoacrylate glue ("CA Glue" or "Superglue"), sodium bicarbonate ("Baking Soda"), hot-melt adhesive ("Hot Glue"), light grit sandpaper, acrylic paints, permanent markers ("Sharpie") or diluted solvents like acetone or isopropyl alcohol can all be used for touch up or structural repair work.

For wiring damage to the back cable or glasses (not including the lenses), most solder, heat shrink tubing, electrical tape and wire gauges will work. Cat 5E Ethernet riser cable is used.

For repairing the lenses, do be very careful if attempting to repair the lenses as they are very delicate and sensitive to heat. PDLC lenses with copper tape electrodes are used if wanting to buy and DIY cut replacement lenses.

Repairing or modifying the electronics the electronics in the control box requires advanced skill in surface-mount electronics repair. A hot air reflow station and/or fine tip soldering iron are recommended. The board is fully reprogrammable too, with its programming port accessible on the board by an easy to access 3-pin connector. The remote trigger pushbutton can be shortened, replaced by a different pushbutton or even driven by an external circuit through a MOSFET or relay. Schematics, board overview image and release firmware images are provided in the product's Github page, see the **Contact Information** section for details.

The housing is 3D printed and STLs of the housing are available in the product's Github page as well, see the **Contact Information** section for details.

Theory of Operation Summary

The device has two main parts to it, the control box and the glasses themselves. This section is best accompanied with the schematic and other resources found in the **Contact Information** section.

The control box consists of three main chips, a battery charger IC to charge the Li-Po battery, an EL driver chip to generate the voltages and drive the lenses and a microcontroller running the whole show. The microcontroller is utilized to the absolute max with all of its GPIO being used as well as a significant portion of its internal peripherals like timers, RTC clocks, analog comparator, DAC, voltage reference, brown-out detector, etc. All of these GPIO and peripherals are for things like timing lens behavior, monitoring light levels from the photodiode, user interaction through the pushbuttons, device feedback to the user via controlling the lenses, monitoring the battery level, charging status, etc.

The EL driver chip was chosen for its flexibility, configurability and ease of use. It has been configured to provide optimal drive for the glasses' PDLC lenses while still being within the IEC Extra Low Voltage safety rating.

Likewise with the battery charger IC, it provides safe regulated battery charging whilst monitoring the ambient temperature to ensure the battery is only charged within safe charging temperatures.

The photodiode circuit is a simple transimpedance amplifier to convert the current signal from the photodiode into a readable voltage range by the microcontroller.

Using PDLC lenses for the glasses was chosen as it's the most available off-the-shelf solution whilst still being affordable. Other technologies were simply not available, cost advantageous or required special processing and driving.

Warranty

The Glance Smart Glasses are warranted to be free from defects in materials and workmanship for a period of 1 month from the date of purchase. If within the warranty period your device should become inoperative from such defects, the device will be repaired or replaced at Lambda Wolf Lab's option.

This warranty covers normal use and does not cover damage which occurs in shipment or failure which results from alteration, tampering, hacking, accident, misuse, abuse, accidental water damage, neglect or improper maintenance. Unless otherwise stated in this document.

A purchase receipt or other proof of original purchase date will be required before warranty repairs or replacement will be rendered. See **Contact Information** section for how to make a warranty claim.

Revision, Misc & Meta

| Revision Date | Revision Details |
|---------------|------------------|
| 20 Sept 2020 | Beta Release |
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