Overview

SnakeEyes is the most flexible, user customizable, and cost-effective FRC vision targeting solution available to FRC teams. This is made possible by keeping the FRC-specific hardware to a minimum, providing all of the kit components in one package. Purchase your SnakeEyes kit, then provide your own Raspberry Pi, camera, 3D printed case, and software application (PhotonVision!). Did we mention SnakeEyes is Open Source? Check out Appendix 2!

Features

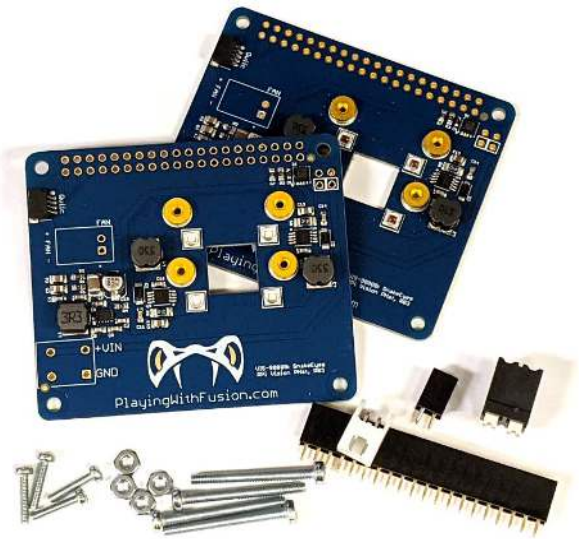
- Dual 1A LED drives, 2 LEDs each
  - 12W (green), 8W (far red) LED Pmax
  - High performance Cree XP-E2 LEDs
- ~7-36V input power range
  - Passive PoE or spring clamp input
  - Reverse polarity protected
- >90% efficient, 5.05V output to power your Raspberry Pi
- 2-pin JST XH connector for 12V case fan
- Qwiic-compatible SH connector (3.3V I2C)
- Conforms to the RPi mounting standards
  - 56mm x 65mm, 4x M2.5 standoffs
- RoHS Compliant

Kit Includes

- SnakeEyes RPi HAT in Green or Far Red
- 2x20 female header (RPi main)
- 2x2 female header (Passive PoE)
- 2-pin XH connector (fan)
- 2-pin spring clamp connector (alt power)
- 4x M2x10mm screws (mount camera)
- 4x M2.5x25mm screws (case assembly)
- 4x M2.5 hex nuts (case assembly)

Applications

- FIRST Robotics Competition



Description

Get the best cost *and* the best performance! SnakeEyes is the most powerful LED illumination solution available for FRC applications, using quad LEDs to paint the field in either 528nm Green or a more eye-friendly 730nm Far Red (Table 1). Dual dimmable buck LED drivers pump up to 1A through each LED, resulting in a maximum 12W or 8W drive power, respectively. Dimming is accomplished via PWM1 (GP13) on your Pi to optimize target illuminance.

Table 1: Orderable Parts

PwF Part No.	Emitter Color
VIS-90000-GRN	SnakeEyes, 528nm Green
VIS-90000-FAR	SnakeEyes, 730nm Far Red

SnakeEyes also includes a 5.05V, 3A power supply to feed your RPi from up to 36V. This can be fed from either the 4-pin Passive PoE header on the RPi (3B+ and up) or by using the included Weidmuller spring-clamp

connector. Both connections are protected by reverse polarity protection to avoid costly mistakes!

RPi Cams V1.3 and V2 are mounted to the back of SnakeEyes using four M2 bosses, which center the camera in the LED array. We've also included a 2-pin XH connector to power a 12V case fan and a qwiic-compatible connector for future I2C device expansion!

Application

SnakeEyes is designed with FIRST Robotics Competition teams in mind, so integration is relatively easy. You will have some decisions to make, including mechanical, electrical, and software.

Starting with mechanical integration, you can grab the SnakeEyes .step file from our website if you want to design your own case, or alternatively, just start with our example case (on our GitHub page!).

Electrically, we recommend starting with whatever Raspberry Pi and Pi Cam (V1.3 or V2) you happen to have lying around. Buying new? We suggest a RPi 3B+ or newer. This is because anything 3B and older is both slower and does not have Passive PoE capability, which is pretty convenient. Same with cameras. If you have a V1.3 on the shelf, start with that, as you can always upgrade later. If you're buying new, you may want to jump straight into a V2. SnakeEyes Green can be used with any of the V1.3 or V2 cameras, but we recommend using the NoIR version if you will be using SnakeEyes Far Red.

Software-wise, the world is your oyster. However, we did all of our development and testing with PhotonVision. PhotonVision is an open source vision processing software made with FIRST in mind. They have TONS of documentation on their GitHub Page, and are actively maintaining the project!

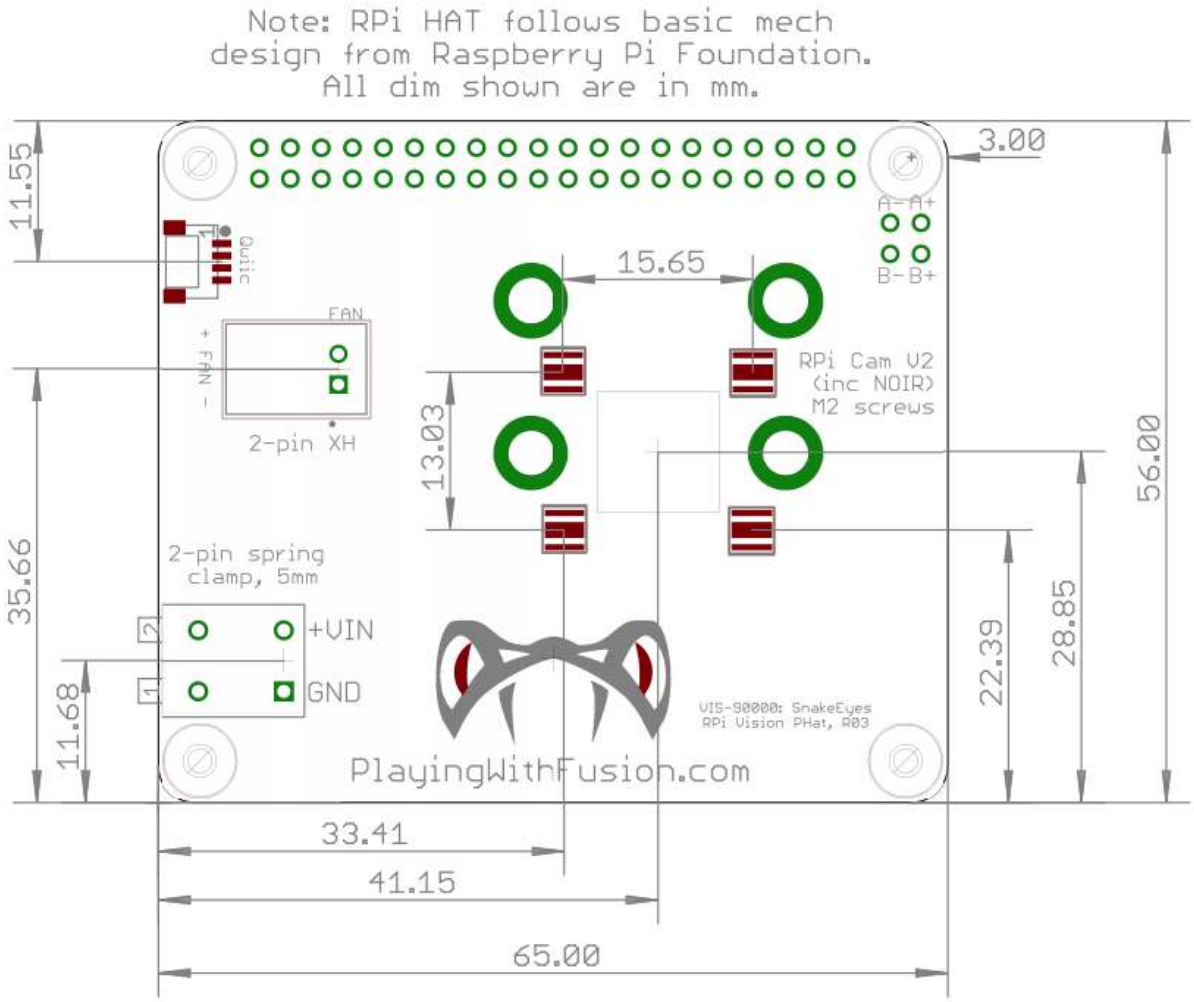
All of that said, Table 2 has a list of other important operating parameters for SnakeEyes.

Table 2: Standard Operating Parameters

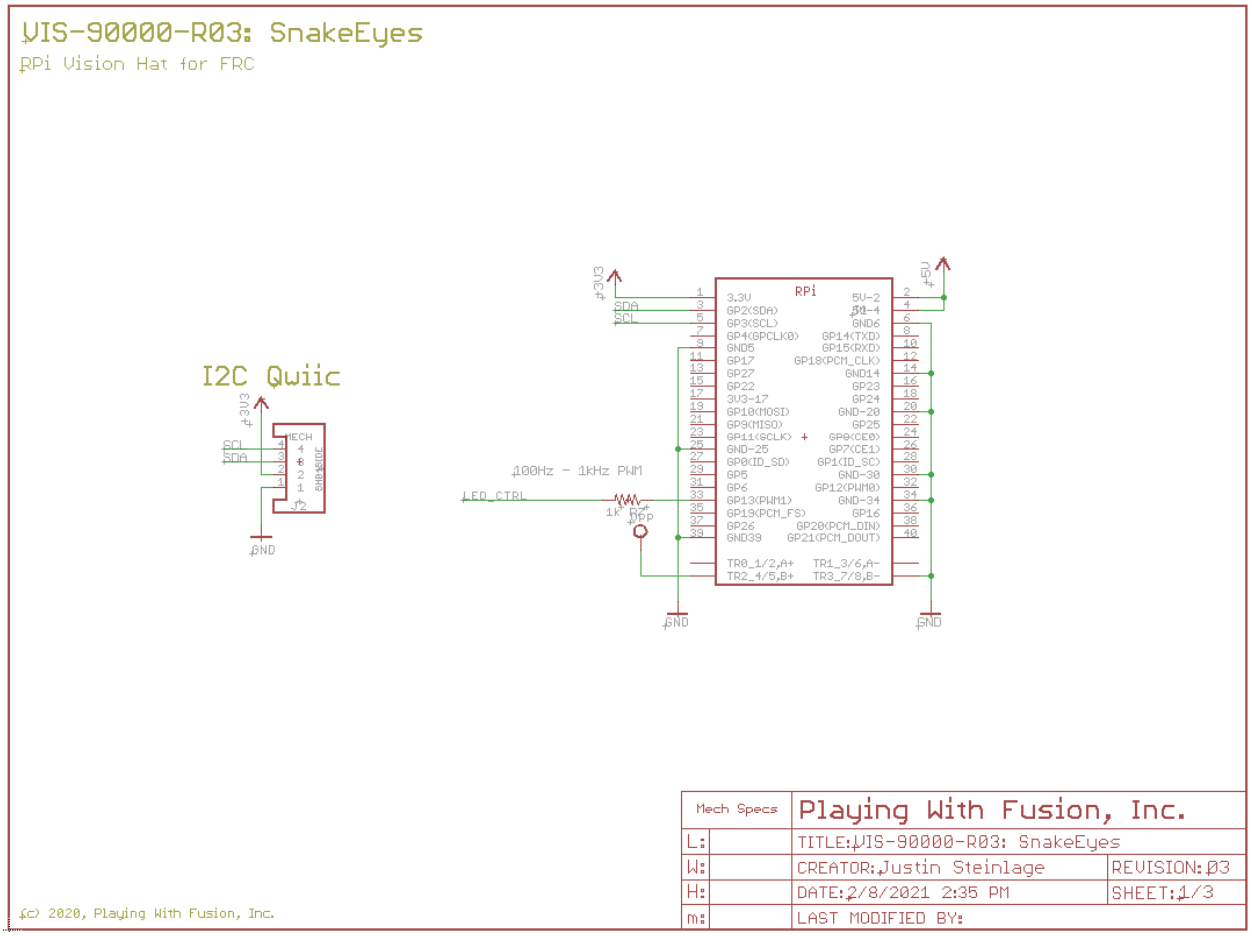
Parameter	Value	Units
Supply Voltage	7.0 - 36	V
Reverse Polarity Protection	50	V
Operating Temperature (1)	0°C - 65	°C
Storage Temperature	-20°C - 85	°C
LED Viewing Angle, Green	135	°
LED Viewing Angle, Far Red	140	°
LED Current, min	0	A
LED Current, max	1	A
LED Power, max, Green	12	W
LED Power, max, Far Red	8	W
RPi Supply Voltage, nominal	5.05	V
RPi Supply Voltage, tolerance	±0.075	V
RPi Supply Current, max	2.5	A

Note 1: SnakeEyes should always be operated with a cooling fan to avoid overheating

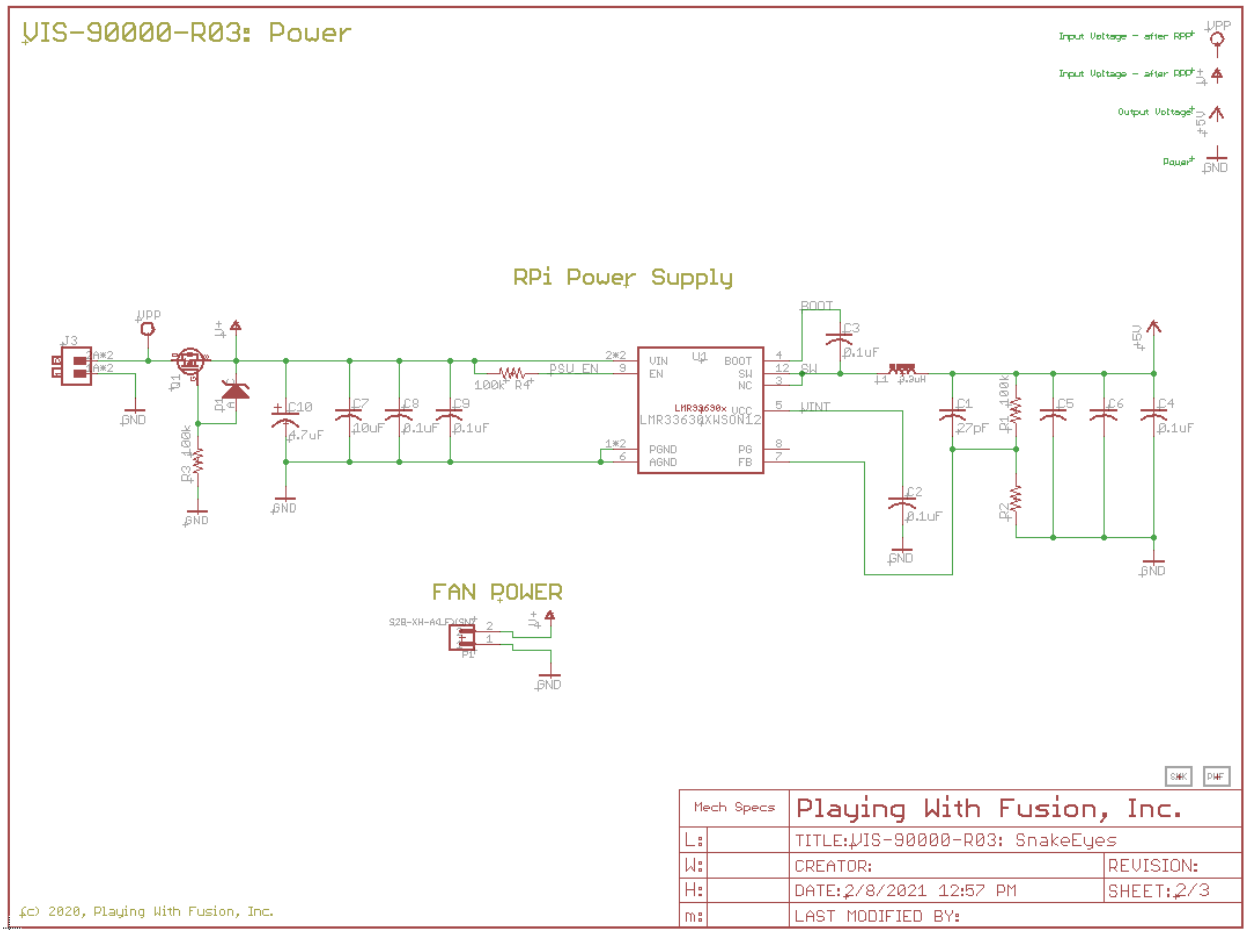
Appendix 1: Mech Drawing (Top View)



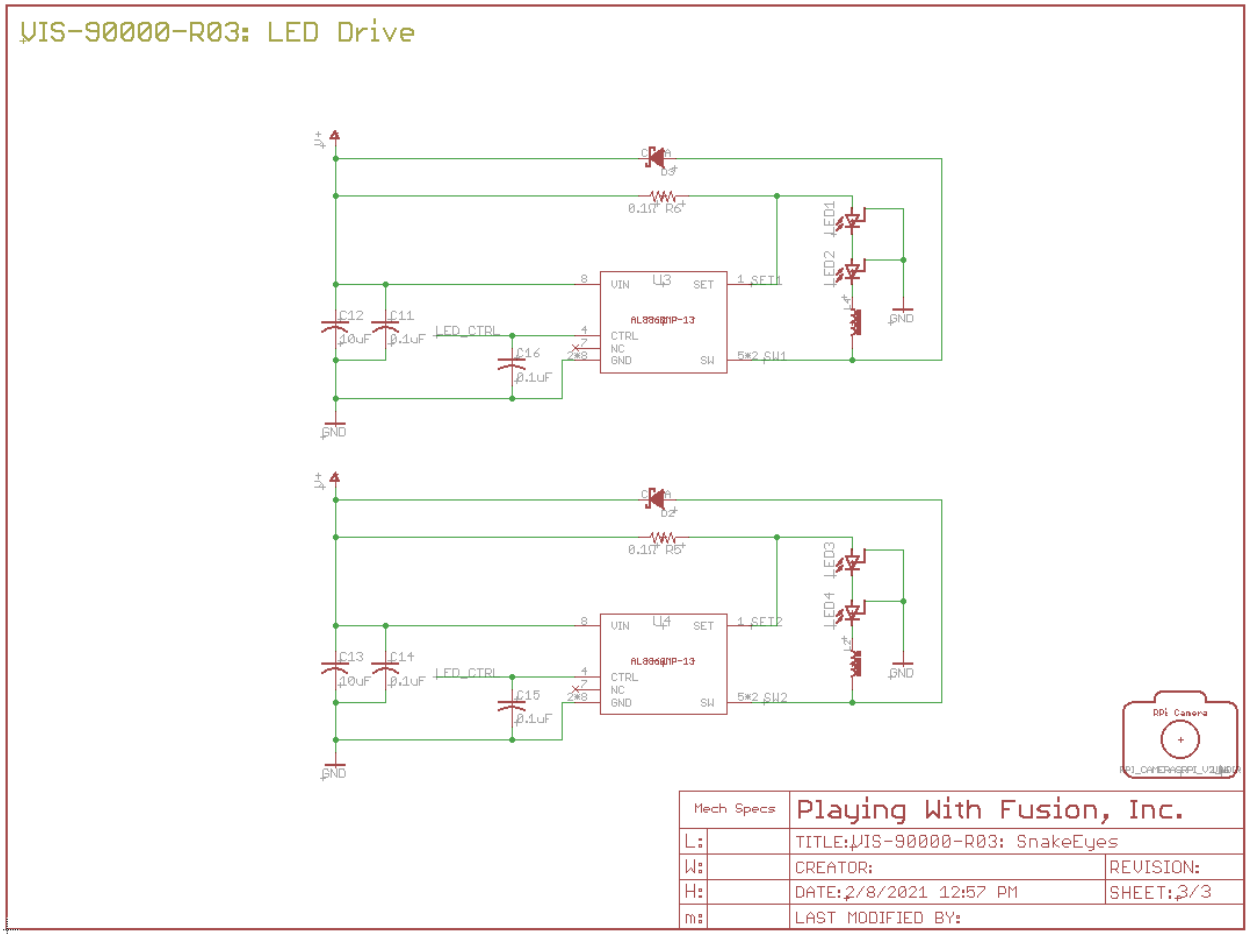
Appendix 2: Electrical Schematic (1/3)



Appendix 2: Electrical Schematic (2/3)



Appendix 2: Electrical Schematic (3/3)



Revision History

Date	Author	Notes
12/31/2020	J. Steinlage	Original release