

Description	Cost	Qty	Item total	Vendor	Part #
<b>Illumination</b>					
660 nm LED	\$66	1	\$66	Thorlabs	M660D2
730 nm LED	\$54	1	\$54	Thorlabs	M730D2
850 nm LED	\$59	1	\$59	Thorlabs	M850D2
<b>Detection</b>	<b>Subtotal</b>		<b>\$179</b>		
USB3 monochrome camera	\$450	1	\$450	Edmund Optics	BFS-U3-13Y3M-C
Tripod mount adaptor	\$25	1	\$25	Edmund Optics	88-210
35 mm C mount lens	\$295	1	\$295	Edmund Optics	59-872
<b>Optics</b>	<b>Subtotal</b>		<b>\$770</b>		
16 mm collimating lens	\$28	3	\$84	Thorlabs	<a href="#">ACL25416U-B</a>
50 mm achromatic lens	\$89	1	\$89	Thorlabs	AC254-050-B
2" silver mirror	\$106	1	\$106	Thorlabs	PF20-03-P01
700 nm shortpass dichroic	\$119	1	\$119	Edmund Optics	69-206
800 nm shortpass dichroic	\$119	1	\$119	Edmund Optics	69-208
Linear polarizer	\$112	2	\$224	Thorlabs	LPNIRE100-B
NIR DMD and controller	\$1,525	1	\$1,525	Keynote Photonics	LC4500-NIR-EKT
<b>Optomechanics</b>	<b>Subtotal</b>		<b>\$2,266</b>		
Lens mount	\$15	3	\$45	Thorlabs	LMR1
Fixed mirror mount	\$16	1	\$16	Thorlabs	FMP1
Rotating mount	\$86	1	\$86	Thorlabs	RSP1
Mirror mount	\$77	1	\$77	Thorlabs	KM200
Clear edge mount	\$38	1	\$38	Thorlabs	PFM1
Adjustable lens mount	\$43	2	\$86	Thorlabs	LH1
Mount for DMD	\$97	1	\$97	Thorlabs	KM100C
Rods for DMD mount	\$6	2	\$12	Thorlabs	ER1.5
Optical Breadboard	\$188	1	\$188	Thorlabs	MB1218
Delrin bar, black (0.25" thick x 2')	\$8	1	\$8	McMaster-Carr	8662K23
<b>Electronics</b>	<b>Subtotal</b>		<b>\$653</b>		
Arduino Uno	\$23	1	\$23	Digikey	1050-1024-ND
LED driver	\$14	3	\$42	Digikey	788-1107-ND
LED power supply	\$25	1	\$25	Digikey	102-4668-ND
DMD power supply	\$12	1	\$12	Digikey	102-3432-ND
Power to pins	\$3	1	\$3	Digikey	839-1459-ND
HDMI to mini-HDMI cable	\$12	1	\$12	Digikey	1175-1675-ND
USB2 cable	\$2	1	\$2	Digikey	AE1450-ND
USB3 cable	\$7	1	\$7	Digikey	Q549-ND
<b>Misc</b>	<b>Subtotal</b>		<b>\$126</b>		
Thermal epoxy	\$19	1	\$19	Digikey	473-1220-ND
Solderable breadboard	\$5	1	\$5	Digikey	1568-1082-ND
Solderless breadboard	\$6	1	\$6	Digikey	1528-2143-ND
Heatsink	\$2	3	\$6	Digikey	345-1105-ND
Solder	\$10	1	\$10	Digikey	243-1363-ND
Stranded wire	\$8	2	\$16	Digikey	CN502R-25-ND/CN50
Solid wire	\$1	1	\$1	Digikey	C2003Y-5-ND
1/16" heat shrink tubing 4'	\$1	1	\$1	Digikey	Q2F116B-ND

2-56, 1/2" Socket Head Screw	\$6	1	\$6	McMaster- 92196A081
0-80 1.5" socket head screw	\$9	6	\$54	McMaster- 92196A942
0-80 Hex nut	\$8	1	\$8	McMaster- 91841A115
2-56 Hex nut	\$3	1	\$3	McMaster- 91841A003
1/2" posts, 1" long	\$5	6	\$30	Thorlabs TR1
1/2" posts, 4" long	\$6	9	\$54	Thorlabs TR4
1/2" posts, 6" long	\$7	6	\$42	Thorlabs TR6
1/2 posts, 8" long	\$8	4	\$32	Thorlabs TR8
Post holders	\$9	13	\$117	Thorlabs PH4
Post holder bases	\$5	13	\$65	Thorlabs BA1S
Right angle clamp	\$10	9	\$90	Thorlabs RA90
1/4-20 screw kit	\$114	1	\$114	Thorlabs HW-KIT2
Black aluminum foil	\$31	1	\$31	Thorlabs BKF12
Black masking tape	\$10	1	\$10	Thorlabs T137-1.0

<b>Software</b>	<b>Subtotal</b>	<b>\$720</b>		
LabView 2017+	\$400/yr	1		National Instruments
Vision Acquisition Software	\$0	1		National In VAS 2017
Matlab	\$860/yr	1		Mathworks
Arduino IDE	\$0	1		Arduino
Python	\$0	1		Python For Python 2
	<b>Grand Total</b>		<b>\$4,714</b>	

**Notes**

[Redacted]

Similar LED available from LEDsupply.com for \$4

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[Redacted]

Also available directly from FLIR

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[Redacted]

30cm cable, no PEM module

[Redacted]

[Redacted]

[Redacted]

When circuit works

For testing circuit

Two colors for + and - connections

For mounting DMD to Delrin Block  
For mounting LEDs to Heatsinks

Will only need 5/8", 1.25", and 1" lengths



## Link

[https://www.thorlabs.com/newgrouppage9.cfm?objectgroup\\_id=6071&pn=M660D2#6072](https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=6071&pn=M660D2#6072)

[https://www.thorlabs.com/newgrouppage9.cfm?objectgroup\\_id=6071&pn=M730D2](https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=6071&pn=M730D2)

[https://www.thorlabs.com/newgrouppage9.cfm?objectgroup\\_id=6071&pn=M850D2#6072](https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=6071&pn=M850D2#6072)

<https://www.edmundoptics.com/p/BFS-U3-13Y3M-C-USB3-Blackfly-S-Monochrome-Camera/37235/>

<https://www.edmundoptics.com/p/Blackflyreg-frac14-20-Tripod-Adapter/30486/>

<https://www.edmundoptics.com/p/35mm-c-series-fixed-focal-length-lens/16529/>

<https://www.thorlabs.com/thorproduct.cfm?partnumber=ACL25416U-B>

<https://www.thorlabs.com/thorproduct.cfm?partnumber=AC254-050-B>

<https://www.thorlabs.com/thorproduct.cfm?partnumber=PF20-03-P01>

<https://www.edmundoptics.com/p/700nm-25mm-diameter-dichroic-shortpass-filter/23547/>

<https://www.edmundoptics.com/p/800nm-25mm-diameter-dichroic-shortpass-filter/23549/>

<https://www.thorlabs.com/thorproduct.cfm?partnumber=LPNIRE100-B>

<https://keynotephotonics.com/product/lc4500-nir-controller/>

<https://www.thorlabs.com/thorproduct.cfm?partnumber=LMR1>

<https://www.thorlabs.com/thorproduct.cfm?partnumber=FMP1#ad-image-0>

<https://www.thorlabs.com/thorproduct.cfm?partnumber=RSP1#ad-image-0>

<https://www.thorlabs.com/thorproduct.cfm?partnumber=KM200#ad-image-0>

<https://www.thorlabs.com/thorproduct.cfm?partnumber=PFM1>

<https://www.thorlabs.com/thorproduct.cfm?partnumber=LH1>

<https://www.thorlabs.com/thorproduct.cfm?partnumber=KM100C>

<https://www.thorlabs.com/thorproduct.cfm?partnumber=ER1.5>

<https://www.thorlabs.com/thorproduct.cfm?partnumber=MB1218>

<https://www.mcmaster.com/catalog/124/3717>

<https://www.digikey.com/product-detail/en/arduino/A000066/1050-1024-ND/2784006>

<https://www.digikey.com/product-detail/en/leddynamics-inc/3021-D-E-1000/788-1107-ND/3114438>

<https://www.digikey.com/product-detail/en/cui-inc/SDM36-12-UC-P6R/102-4668-ND/8544415>

<https://www.digikey.com/products/en?keywords=102-3432-ND>

<https://www.digikey.com/product-detail/en/tensility-international-corp/10-02958/839-1459-ND/8660981>

<https://www.digikey.com/products/en?keywords=1175-1675-ND>

<https://www.digikey.com/product-detail/en/assmann-wsw-components/AK672M-2-1/AE1450-ND/930235>

<https://www.digikey.com/product-detail/en/qualtek/3023017-02M/Q549-ND/2356455>

<https://www.digikey.com/product-detail/en/mg-chemicals/8329TCM-6ML/473-1220-ND/6035511>

<https://www.digikey.com/product-detail/en/sparkfun-electronics/PRT-12070/1568-1082-ND/5230951>

<https://www.digikey.com/product-detail/en/adafruit-industries-llc/239/1528-2143-ND/7244929>

<https://www.digikey.com/product-detail/en/wakefield-vette/882-100AB/345-1105-ND/2640528>

<https://www.digikey.com/product-detail/en/aven-tools/17555LF/243-1363-ND/5252789>

<https://www.digikey.com/product-detail/en/cnc-tech/1430-20-1-0500-004-1-TS/CN502R-25-ND/7063400>

<https://www.digikey.com/product-detail/en/general-cable-carol-brand/C2003A.12.05/C2003Y-5-ND/48401>

<https://www.digikey.com/product-detail/en/qualtek/Q2-F-1-16-01-QB48IN-25/Q2F116B-ND/1210313>

<https://www.mcmaster.com/92196a081>  
<https://www.mcmaster.com/92196a942>  
<https://www.mcmaster.com/91841a115>  
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<https://www.thorlabs.com/thorproduct.cfm?partnumber=TR1>  
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<https://www.thorlabs.com/thorproduct.cfm?partnumber=TR6>  
<https://www.thorlabs.com/thorproduct.cfm?partnumber=TR8>  
<https://www.thorlabs.com/thorproduct.cfm?partnumber=PH4>  
<https://www.thorlabs.com/thorproduct.cfm?partnumber=BA1S>  
<https://www.thorlabs.com/thorproduct.cfm?partnumber=RA90>  
<https://www.thorlabs.com/thorproduct.cfm?partnumber=HW-KIT2>  
<https://www.thorlabs.com/thorproduct.cfm?partnumber=BKF12>  
<https://www.thorlabs.com/thorproduct.cfm?partnumber=T137-1.0>

<http://www.ni.com/en-us/shop/select/labview?edition=base>  
<http://www.ni.com/download/ni-vision-acquisition-software-january-2017/6606/en/>  
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<https://www.python.org/downloads/>

