



POLARIZED  
**VLM640**  
LWIR CAMERA

JENCOLOR SpectroNet Collaboration Conference 2019

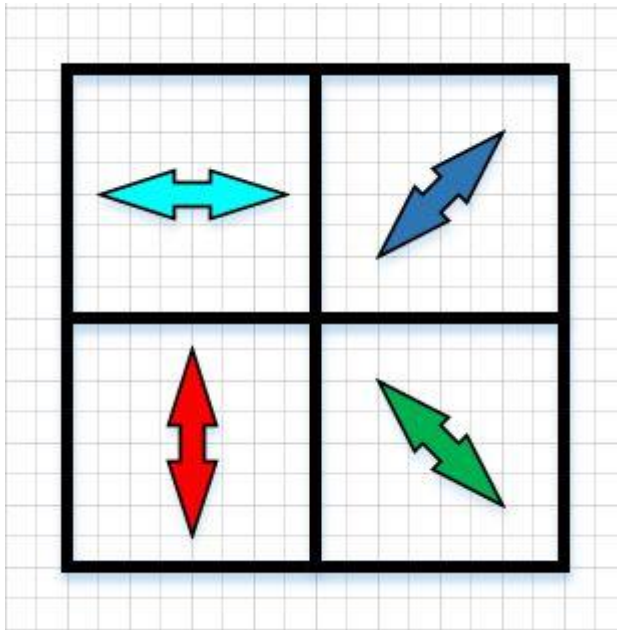
Maksim Bulatov, 28.08.2019



## 80 mK NETD LWIR CAMERA based on POLARIZED DETECTOR

### SPECIAL ONPIXEL FILTERS APPLIED

THE POLARIZATION OF EACH FILTER DIFFERS BY  $45^\circ$ . AS A RESULT, THE POLARIZATION ANGLES ARE  $0^\circ$ ,  $45^\circ$ ,  $90^\circ$ ,  $135^\circ$ .





**LEFT TO RIGHT: IR THERMAL IMAGE, POLARIZED IMAGE AND COMBINED IMAGE**



## ORDINARY GLASS BULB

A GLASS BULB IS AN EXCELLENT OBJECT FOR DEMONSTRATING ITS OWN POLARIZATION. THE GLASS IS OPAQUE IN THE RANGE OF 8 — 12  $\mu\text{m}$  AND PERFECTLY RADIATES THE HEAT, WHICH TURNS OUT TO BE POLARIZED DUE TO STRESSES IN THE GLASS.



**LEFT TO RIGHT: IR THERMAL IMAGE, POLARIZED IMAGE AND COMBINED IMAGE**

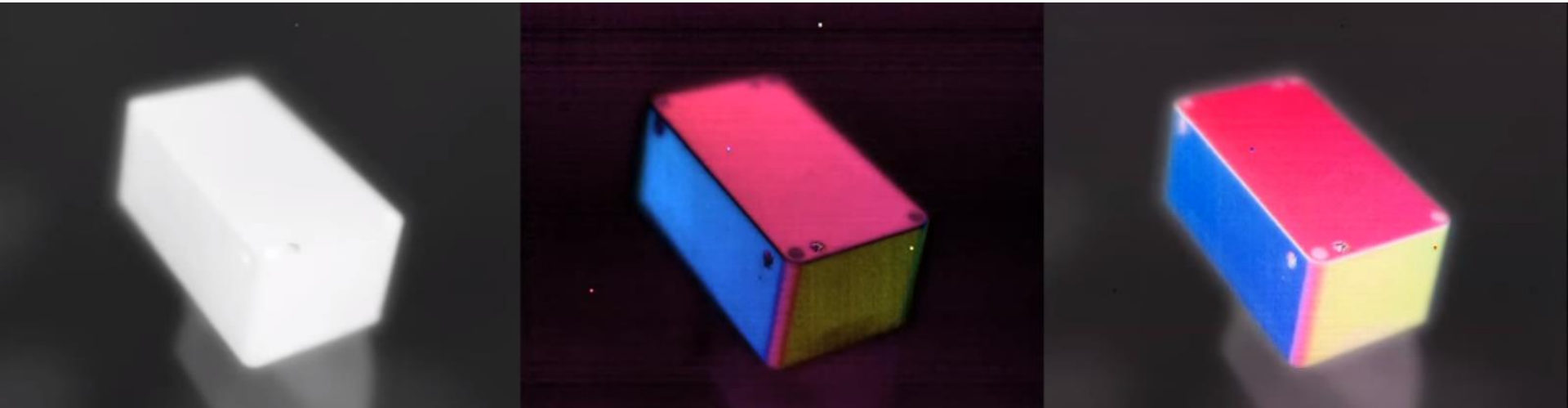


**PLASTIC DOME LAMP**

THE PICTURE SHOWS HOW THE POLARIZATION ALLOWS YOU TO DISPLAY THE SURFACE STRUCTURE OF THE OBJECT. IF THERE WERE DEFECTS ON THE SURFACE OF A SMOOTH OBJECT, THEY COULD BE DETECTED DUE TO A POLARIZATION EFFECT.



**LEFT TO RIGHT ARE IR THERMAL IMAGE, POLARIZED IMAGE AND COMBINED IMAGE**

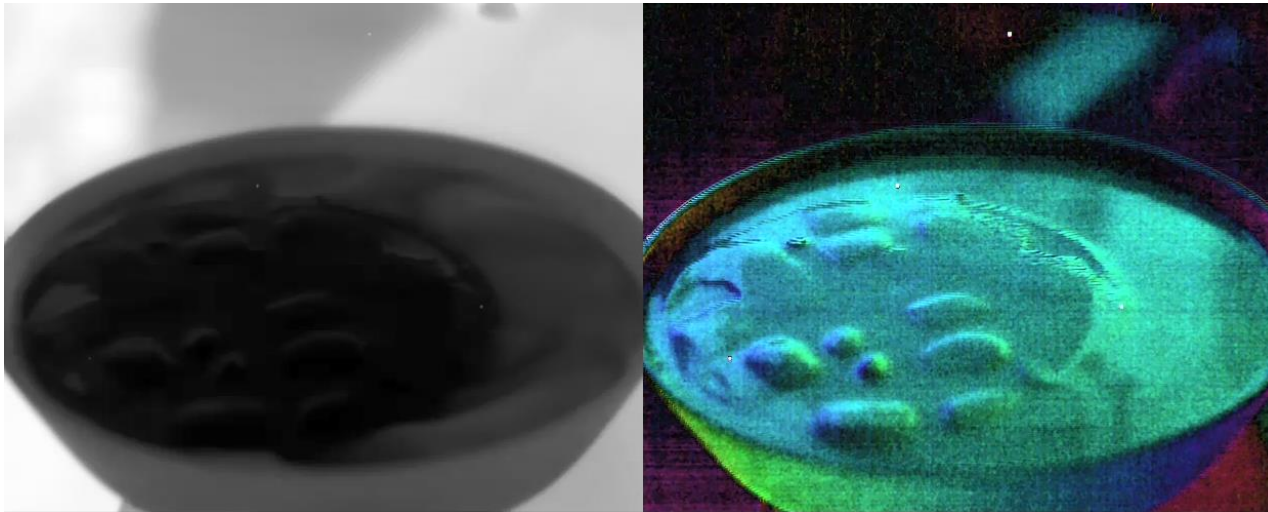


**PAINTED METAL BOX**

FLAT OBJECTS RADIATE QUITE SIMPLY, BUT EACH FACET UNDER DIFFERENT POLARIZATION ANGLE. IN THE THERMAL IMAGING, IT COULD NOT BE UNDERSTOOD WHAT THE ANGLE OF A FACET IS. TAKING INTO ACCOUNT THE POLARIZATION OF THE RADIATION, THIS BECOMES POSSIBLE.



**LEFT TO RIGHT: IR THERMAL IMAGE, POLARIZED IMAGE**



**ICE IN THE WATER**

ICE STRUCTURE ON THE WATER CAN BE CLEARLY SEEN ONCE WE HAVE USED POLARIZATION EFFECT



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<b>DETECTORS TYPE</b>	VO <sub>x</sub>
<b>RESOLUTION</b>	640 × 512 (320x256 polarization)
<b>PIXEL SIZE</b>	17 μm
<b>SPECTRAL RANGE</b>	8 — 14 μm
<b>THERMOSTABILIZATION</b>	TEC-1
<b>FRAME RATE (PROGRESSIVE)</b>	25/50 fps
<b>RESOLUTION PAL</b>	768 × 576
<b>ANALOG VIDEO OUTPUT</b>	PAL
<b>DIGITAL OUTPUT (OPTIONAL)</b>	Camera link (14-bit/8-bit, bt.656, Ethernet)
<b>MANUAL BRIGHTNESS/GAIN</b>	
<b>AUTO BRIGHTNESS/GAIN/CONTRAST</b>	
<b>DIGITAL ZOOM</b>	X2/X3/X4
<b>CALIBRATION</b>	MANUAL/AUTO
<b>IMAGE PROCESSING</b>	
<b>ALGORITHMS</b>	AVERAGING, BACKGROUND SUBTRACTION, DDE
<b>LOCAL CONTRASTING MODE</b>	
<b>VOLTAGE</b>	DC 3 — 13 V
<b>POWER CONSUMPTION</b>	≤2 W
<b>CONTROL CONNECTOR</b>	RS485
<b>OPERATING TEMPERATURE</b>	
<b>RANGE</b>	-55° ~ +55°
<b>DIMENSIONS</b>	∅ 50 mm × 45 mm
<b>WEIGHT</b>	≤100 g (including shutter)



## Possible areas of application:

- Detection of different liquids on the water (oil for example)
- Detection of object defects
- “3D” imaging
- Surveillance





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[www.optolabcam.de](http://www.optolabcam.de)

[www.optolabltd.com](http://www.optolabltd.com)

# THANK YOU!

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