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3D reconstruction and extended depth-of-field based on only one snapshot and a single monocular camera

Single-lens 3D Light Field Camera

R5 High Speed Camera System

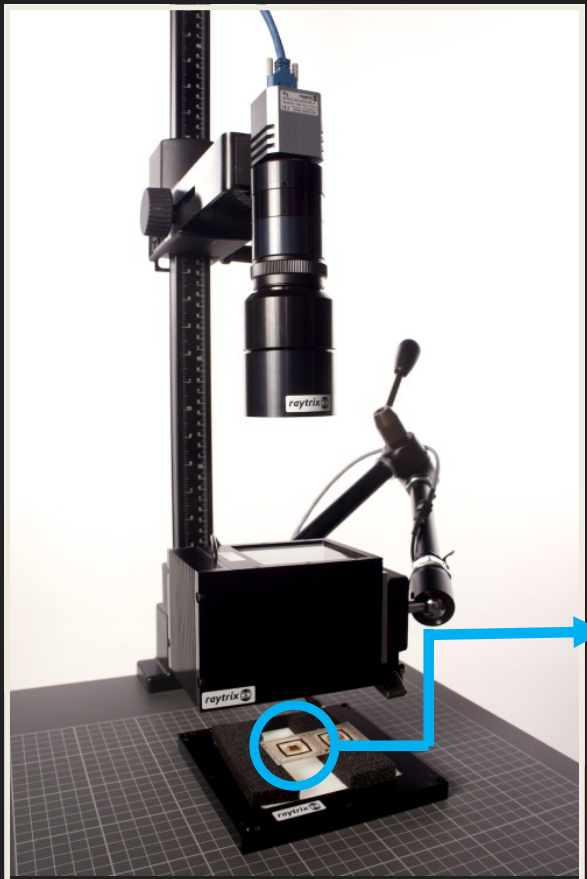
R5 3D Bonding Wire & Spot Weld Inspection

Light Field Camera Technology* raytrix

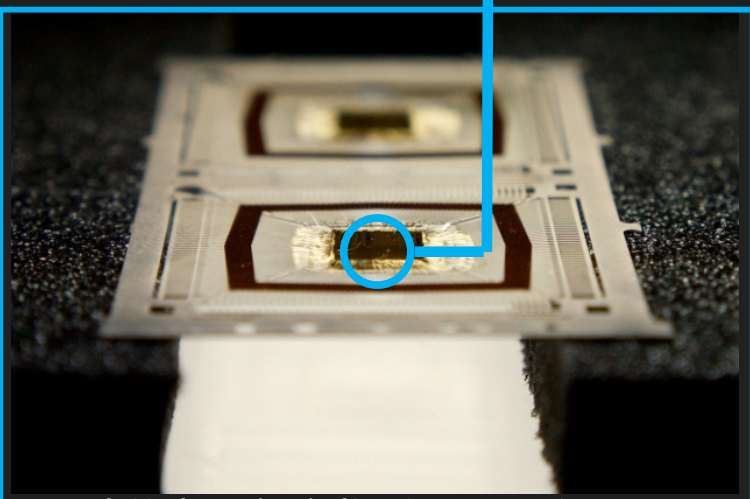
3D reconstruction and extended depth-of-field based on only one snapshot and a single monocular camera

Single-lens 3D Light Field Camera

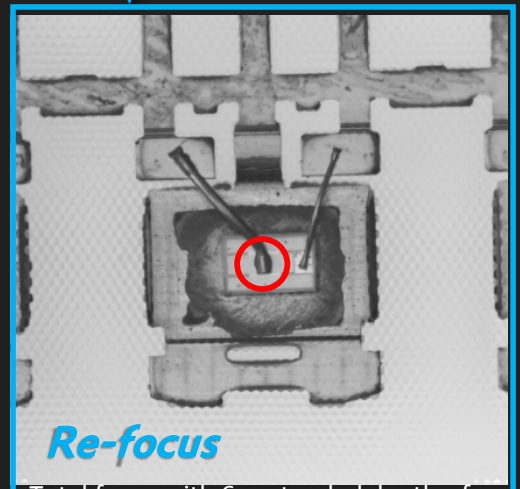
- calibration-free monocular camera
- robust & space-saving setup
- down to micron resolution
- extended depth-of-field by software re-focus
- captures fast moving objects by a single shot
- no special structured illumination required
- mono, color and NIR cameras available



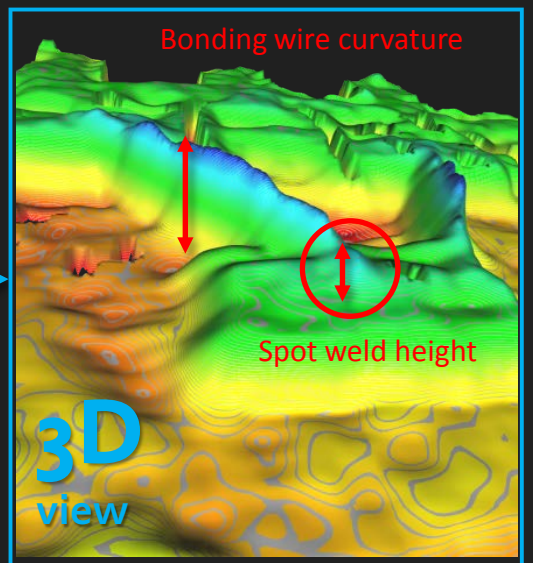
Telecentric lens by R5 camera with f/5.66

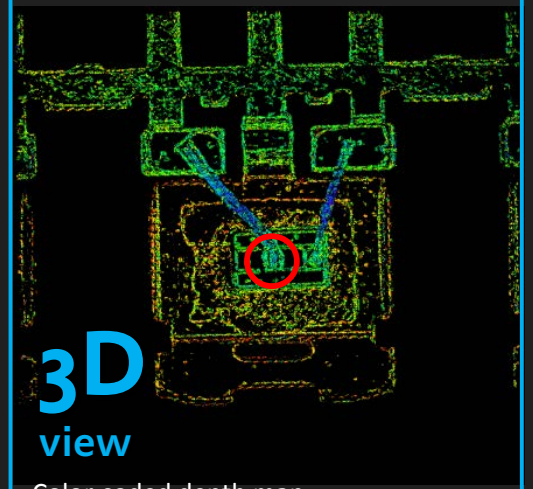


11mm field-of-view (FoV) of bonding wires with 0.5cm depth of field (DoF)



Total focus with 6x extended depth-of-field and 1 Megapixel lateral resolution





Color coded depth map

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* US-Pat.-No.: 2012/0050562 A1 , European patent No. 2244484, CHIP-Award 2012: „Innovation of the year“

R5 High-Speed 3D Light Field Camera

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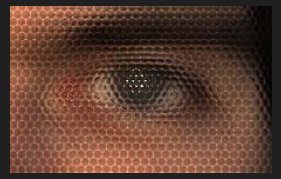
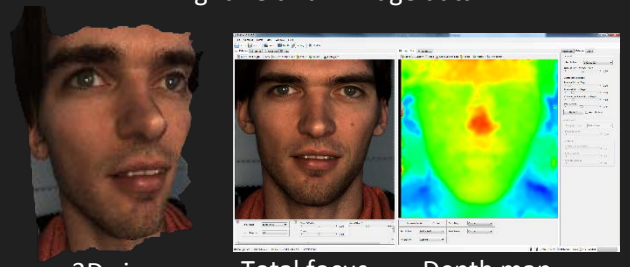
3D
Light Field Camera

illustration may differ


4D light field raw image data


3D view Total focus Depth map

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R5 Specifications	
Lateral resolution	max 1 MP (25% of original image sensor resolution)
Extended depth-of-field	max 6x of standard cameras
Frame rate	25 FPS (GigE), 56 FPS (Dual-GigE), 30-90 FPS (USB 3.0), 180 FPS (Camera-Link)
Light field image sensor	4.2 Megarays, 2048 x 2048 pixel, 5.5µm pixel pitch, CMOSIS, CMV4000, CMOS
3D depth resolution	max 100 discrete depth layers
Fixed aperture	f/2.4, f/5.66, f/26 (microscopy), … (***we offer full customized micro lens array optics meeting your needs)***
Interface	Single/Dual Gigabit Ethernet, Camera-Link, USB 3.0 superspeed
Lens mount	C-mount
Software support	MVTec Halcon plugin interface, SDK/API programming interface for Microsoft Windows
Hardware requirements	NVIDIA GeForce GTX-Titan with 6 GB GPU memory (or higher)
Software requirements	Microsoft Windows 7, CUDA with OpenGL 4.0 and Compute Capability 2.0
Applications	Fluid flow (3D Particle tracking, PIV), Light Field R&D, machine vision, endoscopy, microscopy, visual quality inspection, life science, face recognition, …

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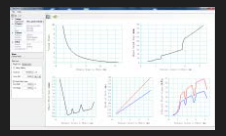

R5 3D Light Field Camera

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3D reconstruction and extended depth-of-field based on only one snapshot and a single-lens camera

3D light field camera	R5 f/5,6	R5 f/2,4	R5 f/2.4	R5 f/2,4
Application example	Surface inspection	Life science (motion tracking)	Inspection of mechanical parts	Gesture recognition
X field of view	10mm	35mm	50mm	500mm
Y field of view	10mm	35mm	50mm	500mm
Z field of view (depth of field)	4mm	20mm	40mm	1,2m
Working distance	0,40m	0,3m	0,33m	0,4m
Z depth resolution	30µm	120µm	250µm	7mm
Illumination example	low angle	ring light	low angle	ambient light
Main lens optics	100mm macro	50mm	50mm macro	33mm
Sample object examples	Steel, small screws,…	Insects, seedlings,..	Screws, valves, threads …	Gesture/face recognition

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* US-Pat.-No.: 2012/0050562 A1 , CHIP-Award 2012: „Innovation of the year“

3D Light Field Camera Technology

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* US-Pat.-No.: 2012/0050562 A1 , CHIP-Award 2012: „Innovation of the year“