Our community delivers simple answers to complex problems in the field of wide-angle optics, sensor fusion and image processing. Together, we create exponential value and strive to build the most innovative devices in the world.
WELCOME TO THE IMMERVISION INNOVATION LAB

We accelerate the emergence of new innovative solutions and help you build the next generation of intelligent vision systems for your device.

Immersion’s Innovation Lab creates invaluable intellectual property for you by putting our community of multidisciplinary and highly experienced scientists, optical designers and image processing engineers to work with the innovative approach of design thinking.

DEEP SEEING
[dep-seiNG]

Deep Seeing enables smart devices with augmented vision. By capturing high quality visual and contextual data in new ways, it unlocks the potential of Artificial Intelligence. Like superhuman eyes for your smart device.
OUTSOURCING VISION SYSTEM R&D TO THE INNOVATION LAB

Whether you’re looking to **complement an existing R&D team, hire experts to take on a complex challenge** or **develop a new innovative solution** in the field of wide-angle optics, sensor fusion or image processing, there are compelling reasons to outsource R&D to the Innovation Lab.

**Accelerate product development**
In a highly competitive market, time is of the essence. Outsourcing helps accelerate product development by resolving complex issues, helping out with the integration of existing technologies or simply by adding people with unique skills.

**Fuel creativity and innovation**
The Innovation Lab is involved on a wide range of optic, camera, image processing, computer vision and AI projects across multiple industry verticals, therefore creating cross-pollination and promoting creative thinking.

**Optimize your cost**
The Innovation Lab offers various opportunities for R&D cost reduction. For example, avoid capital investment in expensive hi-tech equipment or lower human resources overhead cost.

**Own invaluable intellectual property**
Intellectual property stemming from a project developed by the Innovation Lab is automatically transferred to the principal (our client).

**Benefit from the experience of our community**
20 years in the making, the Innovation Lab community is comprised of highly experienced developers, wide-angle optical designers, image processing engineers, as well as corporate and institutional collaborators.

**Concentrate on your core**
A collaboration with the Innovation Lab is an opportunity for your team to concentrate on what they do best, but also gain insights, stimulate creativity and challenge internal team paradigms.
WE GIVE MACHINES 20/20 EYESIGHT AND ARE PERFECTING THE UNDERLYING VISION SYSTEM FOR YOUR DEVICE TO NOT ONLY SEE THE WORLD, BUT UNDERSTAND IT.
DESIGN THINKING TO EQUIP YOUR DEVICE WITH INTELLIGENT VISION

We use Design Thinking to brainstorm, develop and deliver innovative solutions related to wide-angle optics, sensor fusion and image processing technology. This process puts our scientists, optical designers, image processing engineers, partners and clients to work with a clear understanding of users’ needs. The approach includes 6 steps going from a clear understanding of the problem to the delivery of the proof of concept or market-ready solution.

Design Thinking help us challenge assumptions, redefine problems and identify alternative strategies and solutions. Today, this iterative and non-sequential approach is used by highly innovative companies, such as Apple, Google, IBM and GE. The methodology is also taught at universities around the world, including Stanford, Harvard and Massachusetts Institute of Technology (MIT).
DESIGN THINKING PROCESS

We use Design Thinking to collaborate with our client and with other stakeholders at every stage of the research and development process.

UNDERSTAND

1. Empathize
   It starts with people. Understanding users’ needs and the problems they face is paramount to what we do. Usually, our client provides us with enough information to inspire our work.

2. Define
   We use this information to frame the right questions and to define the problem in a way that will inspire others to search for creative solutions.

EXPLORE

3. Ideate
   We brainstorm on potential solutions. Generate innovative ideas. Gather inspirations. Move past the obvious toward breakthroughs.

4. Prototype
   We build a minimum viable solution, a rough prototype to validate our assumption and learn how to make the idea even better.

MATERIALIZE

5. Test
   We conduct the necessary testing to learn from experimentation, refine ideas and iterate from feedback.

6. Deliver
   We craft the story and deliver a documented solution, ready for implementation. The blueprint for putting the vision into action.
INNOVATIONLAB
IMMERVISION

OUR MISSION IS TO IMAGINE THE FUTURE OF COMPUTER VISION AND THEN, TO BRING IT TO LIFE
APPLYING DESIGN THINKING: THE CASE OF PI SOLO
Quanta Computer's Pi SOLO lifestyle camera for smartphones
APPLYING DESIGN THINKING: THE CASE OF PI SOLO
Quanta Computer’s Pi SOLO lifestyle camera for smartphones

UNDERSTAND

1. Empathize
From their own observation, our client asked us to build a very unique high quality 187" wide-angle camera to connect to a smartphone.

2. Define
The team from the Innovation Lab prepared the technology specifications and used cases aligned with the necessary connectivity, performance and design expectations.

EXPLORE

3. Ideate
A collaboration with our client led to potential solutions to manufacture the product, including: components, design and technology. At this stage, we also identified potential technical, financial and operational roadblocks for the delivery of the project.

4. Prototype
We worked on the development of a prototype with stakeholders, including: ODM (Quanta), chipset vendor (confidential), camera module vendor (Truly), lens vendor (Kolen) and the software provider (Quanta). Together, we defined and benchmarked the platform, worked on the UX, mitigated hardware, firmware and software risks.

MATERIALIZE

5. Test
From the proof of concept to mass production, a wide-range of tests (EVT, DVT, PVT) were performed at every stage to minimize risks of errors and identify problems early on. Options were constantly corrected, adjusted and optimized to match expected results.

6. Deliver
At this stage, a production-ready technology was released, including: SDK, documentation and engineering support. We also introduced the product across social media and opened the discussion for potential improvement.
FROM THE INNOVATION LAB

- Use case study and design ID review
- Study and project definition
- Optical system simulation
- Custom case study
- Optical system performance analysis
- Support for manufacturing and mass production
- Lens testing
- Camera modules testing
- Complete device testing
- Performances and comparison report
- Imaging pipeline definition and design
- Imaging HD/SW benchmarks
- Coordination of different 3rd parties to implement image processing pipeline
- IQ and analysis of image processing pipeline
- Immersion Imaging IPs integration and support
- Immersion Imaging IPs tuning and customization

Crosscall’s Trekker-X4
FROM THE INNOVATION LAB

- Use case study and design ID review
- Study and project definition
- Optical system simulation
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- Immervision Imaging IPs porting on embedded platform (Intel Movidius)
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INTELLIGENT VISION SYSTEM TECHNOLOGY INTEGRATION

The Innovation Lab also integrates and adapts Immervision’s cutting-edge wide-angle optics, sensor fusion and image processing technology providing OEM and ODM with readily available intelligent vision systems.
LATEST DESIGN WINS

**Lenovo:** First 3D camera with a human-like vision

**Orbi:** The first 360 Video Recording Eyewear

**Insta360 GO:** Smallest wearable camera with 180 FoV

**Crosscall Trekker-X4:** First action camera smartphone

**Quanta Computer:** First pocket-size 180 FoV live streaming camera
LATEST DESIGN WINS

Vantrix PRO25-AQUA: underwater horizontal

Vantrix PRO25: ultimate 180

Vantrix PRO100-360: 10K full sphere

eBee visteon: Automotive Ultra Wide back camera reference design

Acer Holo360: First Android LTE connected 360 camera

Latécoère LATvision™ Landscape Camera System: Connected to In-Flight Entertainment and Cabin Management systems for aircraft

Samsung Electro-Mechanics: Ultra Wide Anamorphic Free-Form automotive camera module
# RESEARCH, DEVELOPMENT AND INTEGRATION SERVICES

The Innovation Lab provides a wide range of services to its clients and has already delivered many optics project from concept to mass production. Our design techniques leverage the latest technology such as anamorphic lens, free from diffractive element and meta-lens from super miniature lens for smartphone to very large optical system for cinema and space exploration.

## OPTICAL SERVICES

<table>
<thead>
<tr>
<th>Study and Simulation</th>
<th>Optical Design</th>
<th>Prototyping and Manufacturing Support</th>
<th>Testing and Metrology</th>
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<tbody>
<tr>
<td>Study and project definition</td>
<td>Parameters evaluation and recommendation</td>
<td>Collaboration with manufacturers for production</td>
<td>Measurement protocol creation</td>
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<tr>
<td>Optical system simulation</td>
<td>Optical solution space exploration</td>
<td>Lens prototyping</td>
<td>Lens testing</td>
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<tr>
<td>Custom case study</td>
<td>Preliminary optical design</td>
<td>Lens mechanical assembly</td>
<td>Camera modules testing</td>
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<tr>
<td>Optical design</td>
<td>Final optical design for production</td>
<td>Lens certification</td>
<td>Complete device testing</td>
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<tr>
<td>Optical system performance analysis</td>
<td>Tolerance and sensitivity analysis</td>
<td>Prototyping</td>
<td>Performances and comparison report</td>
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<tr>
<td>Cost estimation</td>
<td>Performance analysis</td>
<td>Support for manufacturing and mass production</td>
<td></td>
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<tr>
<td></td>
<td>Stray light and ghost analysis</td>
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INNOVATION LAB | BENEFITS | METHODOLOGY | INNOVATION | SERVICES | COMMUNITY | INDUSTRIES | CONTACT
RESEARCH, DEVELOPMENT AND INTEGRATION SERVICES

The Innovation Lab provides a wide range of services to its clients. The team is using the latest techniques in imaging, computer vision and AI to constantly innovate.

SOFTWARE SERVICES

<table>
<thead>
<tr>
<th>Platforms</th>
<th>Imaging Pipeline Consulting</th>
<th>Imaging Algorithm Customisation</th>
<th>Production and Testing Tools</th>
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<tbody>
<tr>
<td>HISILICON</td>
<td>• Imaging pipeline definition and design&lt;br&gt;• Imaging HD/SW benchmarks&lt;br&gt;• Coordination of different 3rd parties to implement image processing pipeline&lt;br&gt;• IQ and analysis of image processing pipeline&lt;br&gt;• Immervision Imaging IPs integration and support&lt;br&gt;• Immervision Imaging IPs tuning and customization&lt;br&gt;• Immervision Imaging IPs porting on embedded platform</td>
<td>• Distortion Correction&lt;br&gt;• Adaptive Dewarping&lt;br&gt;• Adaptive Image Fusion&lt;br&gt;• Adaptive Stitching&lt;br&gt;• Adaptive Distortion Conversion&lt;br&gt;• Data-In-Picture&lt;br&gt;• Lens Shading Correction&lt;br&gt;• Color Correction&lt;br&gt;• Fusion Masking&lt;br&gt;• Electronics Image Stabilization</td>
<td>• Wide angle lenses testing software&lt;br&gt;• Camera calibration software&lt;br&gt;• Creation of custom bench for camera metrology&lt;br&gt;• Custom metrology algorithms</td>
</tr>
</tbody>
</table>

INNOVATION LAB | BENEFITS | METHODOLOGY | INNOVATION | SERVICES | COMMUNITY | INDUSTRIES | CONTACT
**HI-TECH OPTICAL EQUIPMENT IN A SPECIALIZED SETTING**

To help reduce your capital investment, the Innovation Lab has access to a wide range of cutting-edge optical technology equipment as well as specially customized settings to conduct tests and experiments.

<table>
<thead>
<tr>
<th>Description</th>
<th>Manufacturer</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical test bench</td>
<td>Optikos</td>
<td>LensCheck VIS</td>
</tr>
<tr>
<td>Optical test bench</td>
<td>Trioptics</td>
<td>OptiSpheric</td>
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<td></td>
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<td>OptiSurf</td>
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<tr>
<td></td>
<td></td>
<td>OptiCentric</td>
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<tr>
<td>Point source microscope</td>
<td>Optical Perspectives Group</td>
<td></td>
</tr>
<tr>
<td>Interferometer</td>
<td>Zygo</td>
<td>Mark GPI-XPS</td>
</tr>
<tr>
<td>Interferometer</td>
<td>Zygo</td>
<td>Verifire HD</td>
</tr>
<tr>
<td>Interferometer</td>
<td>ESDI</td>
<td>Intellium H2000</td>
</tr>
<tr>
<td>Stylus contact profilometer</td>
<td>Veeco</td>
<td>Dektak 150</td>
</tr>
<tr>
<td>Inspection microscope</td>
<td>Olympus</td>
<td>STM6</td>
</tr>
<tr>
<td>SEM/FBI microscope</td>
<td>FEI</td>
<td>Quanta 3D FEG</td>
</tr>
<tr>
<td>Scanning probe microscope</td>
<td>Veeco</td>
<td>Dimensions V</td>
</tr>
<tr>
<td>Thin coating system</td>
<td>Leybold</td>
<td>SYRUS-PRO-710</td>
</tr>
<tr>
<td>Thin coating system</td>
<td>Intlvac</td>
<td>Nanochrome</td>
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<tr>
<td>Prism coupler</td>
<td>Metricon</td>
<td>2010/M</td>
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<tr>
<td>Spectrometer</td>
<td>Agilent Technologies</td>
<td>Cary 5000 Vis-Nir</td>
</tr>
<tr>
<td>Spectrometer</td>
<td>Stellarnet</td>
<td>GW-VIS</td>
</tr>
<tr>
<td>Spectrometer</td>
<td>Ocean Optics</td>
<td>Flame-S-XR1-ES</td>
</tr>
<tr>
<td>Ultra precision machining system</td>
<td>Precitech</td>
<td>Nanoform 250</td>
</tr>
<tr>
<td>Surface profiler</td>
<td>Taylor Hobson</td>
<td>TalySurf PGI Freeform</td>
</tr>
<tr>
<td>Ultra precision polishing system</td>
<td>Zeeko</td>
<td>iRP200</td>
</tr>
</tbody>
</table>
HI-TECH OPTICAL EQUIPMENT IN A SPECIALIZED SETTING

- Inspection microscope – Olympus STM6
- Zeeko IRP200 Ultra - Precision Polishing Machine
- Point source microscope – Optical Perspectives Group
- Optical test bench – Trioptics
- Interferometer Zygo Verifire HD
- Optical test bench – Optikos LensCheck VIS
DEVELOPING YOUR OWN PATENT PORTFOLIO

Our approach led to the development of unique innovative concepts in the field of wide-angle optics, sensor fusion and image processing. Over the years, we have developed a robust and comprehensive patent portfolio. This is a strong statement of our commitment to advance the science of Computer Vision. Now, the Innovation Lab can act as an extension of your team to help evolve your own intellectual property.

2001 Method for capturing and displaying a variable resolution digital panoramic image
2001 Camera support device
2001 Method and device for orienting a digital panoramic image
2001 Method and device for obtaining a constant-hue digital panoramic image
2001 Method for capturing a panoramic image by means of a rectangular image sensor
2005 Method and device for identification and calibration of panoramic optic systems
2008 Method and device for projecting a panoramic image with a variable resolution
2014 Splitting of elliptical images
2014 Panoramic camera
2014 Direct environmental mapping method and system
2014 Panoramic image viewer
2014 Automated definition of system behavior or user experience by recording, sharing, and processing info associated with wide-angle images
2015 Designing an optimization apparatus for a camera having a lens with non-uniform parameters to be imaged as a lens with uniform parameters
2015 Miniature wide-angle imaging lens
2016 Image distortion transformation method and apparatus
2016 Method to capture, store, distribute, share, stream, and display panoramic image or video
2017 Wide-angle stereoscopic vision with cameras having different parameters
2018 Constant resolution continuous hybrid zoom system
2019-2020 To be published (confidential)
INNOVATION LAB COMMUNITY

20 years in the making, the Innovation Lab Community helps us stay at the cutting edge of computer vision. Our experienced team draws its knowledge, creativity and inspiration from a strong ecosystem of corporate and institutional partners.

INTERNAL

R&D Team
Our signature results-oriented approach is rooted in a tight collaboration between scientists, optical designers and image processing engineers.

CORPORATE PARTNERS

Components and Suppliers
Close collaboration for the manufacturing of Panomorph lenses, camera modules, sensors, processors and semi-conductors.

Software
Close collaboration for the integration of image processing technologies.

Hardware
Close collaboration for the integration of wide-angle optic technologies.

INSTITUTIONAL PARTNERS

Center for Optics, Photonics and Lasers
COPL is the Quebec cluster of recognized experts in optics and photonics. Its research excellence, state-of-the-art facilities and comprehensive scientific program position them among the best centers in the world for optics and photonics training and research.

The Computer Vision and Systems Laboratory (CVSL)
CVSL regroup professors, graduate students, post-doctoral fellows working together on computer vision and its industrial and biomedical applications. Belonging to the REPARTI strategic network, it hosts two research chairs at Laval University Quebec. Immervision collaborates with CVSL on research thematic at the convergence of machine learning, deep learning, computational photography and computer vision.
WE ARE NOT ONLY BUILDING VISION SYSTEMS FOR SMART DEVICES BUT ALSO A NATION OF INNOVATORS

Montreal, Canada
INDUSTRY EXPERIENCE

The mandate of the Innovation Lab is to advance wide-angle optics, sensor fusion and image processing technology across 12 industry verticals where it leads with key innovations.
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