



# Take Mobile Imaging to the Next Level

Solutions for mobile camera performance  
and features that compete with DSC/DSLR

# Who we are



- Leader in mobile imaging and computational photography.
- Developer of cutting-edge image processing technologies.
- Maker of top super resolution software for DSLR, top mobile camera applications for Android.
- Mobile imaging solutions vendor to Top mobile OEMs in Japan, Korea, China and Taiwan.

# What we do



## Computational photography

a set of SW techniques to improve imaging without changing camera HW

Effective resolution increase: **two times**

Software equivalent for **1.5x-2x optical** zoom

**10 dB** noise reduction without losing the details

Dynamic range increase: **8 Ev** and more multi-frame,  
**2 Ev** single frame real time

Imaging features: **100 Mpix** panoramas, **moving objects** removal/cloning and more.



## **SW imaging solutions**

- + no HW change
- + easy, fast, cost effective integration
- + fast adjustments and improvements
- requires computational resources

## **Improved Hardware**

- + no computational resources needed
- expensive, requires investments
- longer time-to-market
- physical limits (size, weight)



Computational photography can be used as an **addition** to HW improvements, not as an alternative

BSI -6dB SNR + Almalence Blurless -10 dB =  
**-16 dB SNR**

Lumia 2x zoom + Almalence SuperZoom 2x =  
equivalent to **4x** optical zoom

HDR (dual exposure) sensor + Almalence HDR =  
more details and better colors

# Computational Photo Adoption



Camera module and  
sensor makers

Today?

ISP makers  
(Qualcomm, Tensilica, CEVA)

2012

Mobile OEMs  
(iPhone 4 HDR)

2010

Software developers  
(PhotoAcute Mobile, HDR for mobiles)

2005

Units (users)

Hundreds of  
millions

Tens of  
millions

Millions

Thousands

# Our solutions: common



- Provide noticeable boost in image quality (wow effect)
- Ready for deployment
- Do not require the change of sensor or lens
- Licensed to top mobile OEMs
- Provide best performance among competitors
- Can be adjusted to customers' needs
- Suitable for any platform, application layer or HAL
- ANSI-C reference code
- Optimized for ARM, GPU and DSPs
- Versions for specialized image processors (Tensilica IVP32)
- Patented

# Solutions List



## Super Resolution Zoom

Super resolution digital zoom comparable to optical

## HDR

Professional-level HDR on camera phones

## Dynamic Range Optimizer

More details in shadows and highlights, real-time and always-on

## Super Low Light and Noise Reduction

Sharp and noise-free images in low light

## HD Panorama

High resolution, high dynamic range panorama

## Best Shot

More chances of taking a good photo

...continued on the next page



# Solutions



## Object Removal

Remove moving objects from the photo

## Sequence Photo

Capture dynamic moment evolution in a single image

## Group Shot

Select faces from multiple frames, make everyone smile

## Advanced single-frame noise filtering and sharpening

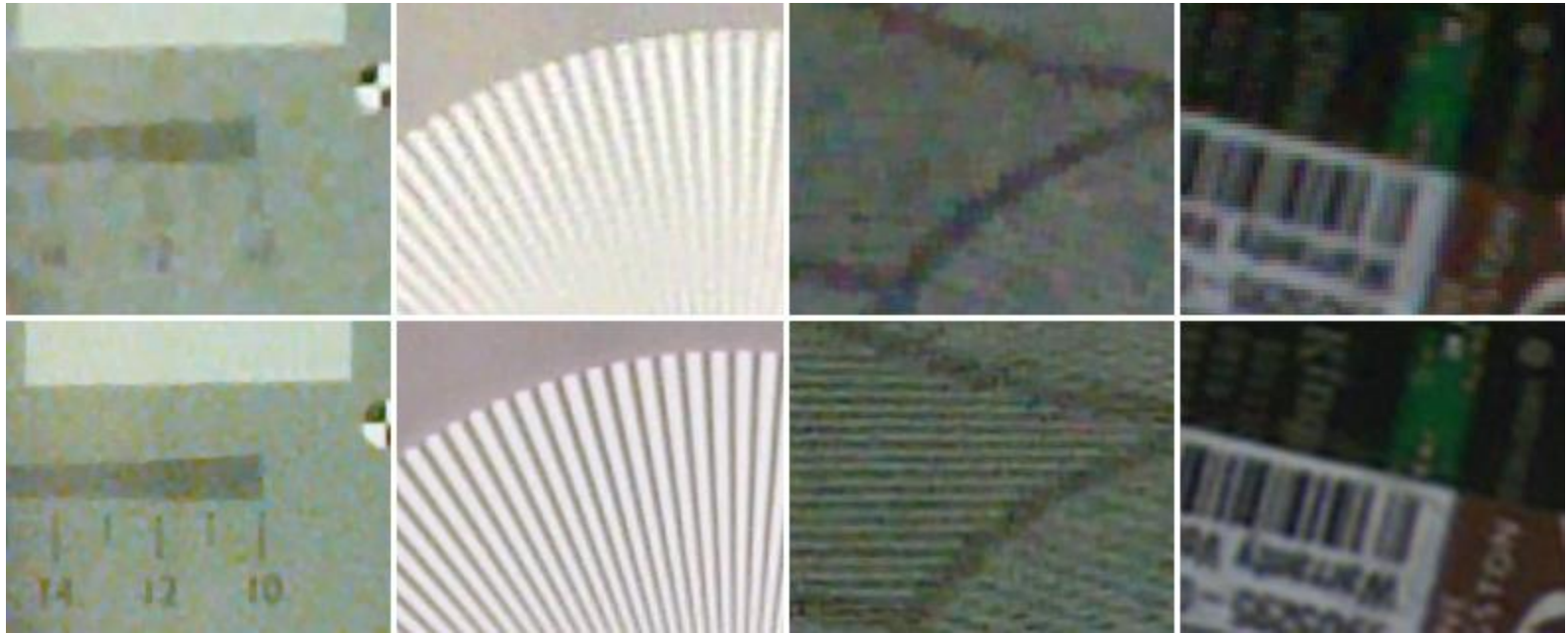
Replace ISP filters with higher quality SW filters

## Auto scene detection

for better shooting and processing parameters

**...new solutions coming in 2014**

# Super Resolution Zoom



Based on super resolution technology, Super Zoom provides high definition zoomed images.

Images taken with Super Zoom have more details, as if they were taken with an optical zoom lens.

# Features



## Super Zoom

Resolution increase: **more than 2 times**

Supported zoom levels: **x1.1-x32**

PSNR increase: **5-10 dB**

Robust to real life conditions such as noise, moving objects, changing illumination, handshaking

The only commercially available solution with such characteristics

HDR

Almalence  
Innovative Imaging Technologies



HDR on mobile device with the quality of professional desktop HDR software.

# Features



On-device processing within fraction of second

Processing and de-ghosting of moving objects

Handshaking compensation, precise alignment

Full resolution

Tone mapping parameters adjustable real time

Stunning images looking like taken with a good camera and processed with professional HDR software

Powers HDR Camera – the top camera app for Android, several million of users

# Dynamic Range Optimizer

Almalence  
Innovative Imaging Technologies

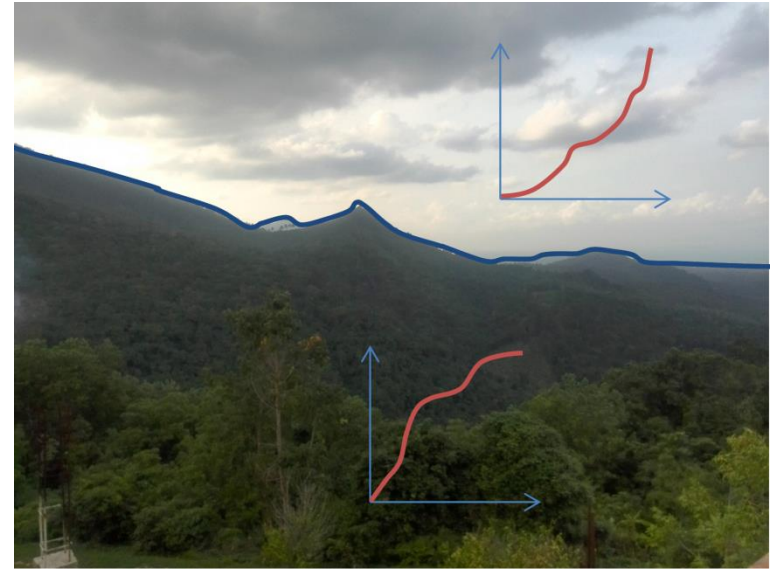
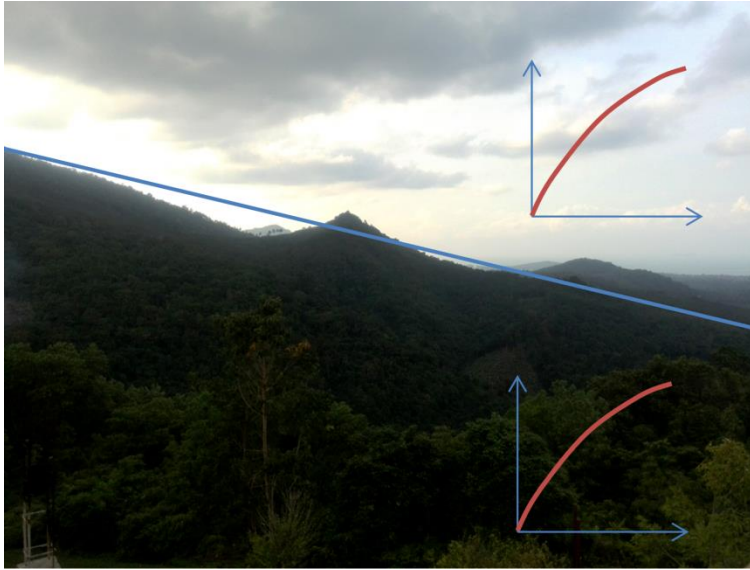


DRO makes more details visible in highlights, midtones and shadows, without amplifying the noise. It's a real time, single-image based solution to be used "always on" in any camera.

# Features



DRO



Standard ISP:

- Fixed  $\gamma$ -correction, regardless of scene content
- The same tonal curve for the whole scene, thus **non-optimal** for some of or most of areas

DRO:

- Intelligent adjustment of dynamic range and tonal curve
- Variable tonal curve in different areas (technique similar to local tone mapping)

# Features



- Provides image improvement in 100% situations
- Can be used “always on” for any camera, for each scene, every time a picture is taken
- Can be integrated in:
  - ✓ ISP
  - ✓ Operating System (HAL level)
  - ✓ Applications
- Can be used for both still images and video
- Can be used in Viewfinder
- Can replace HDR for lots of scenes



# Low Light, Noise Reduction and Image Stabilization



Almalence's BlurLess solution combines multiple frames into a single "long exposure" image, eliminating noise without losing image details and preventing blur.



## Features

Lighting required for acceptable image quality:

Normal camera phone: **100 Lux** (indoor / hallway or very dark overcast day)

Phone with BlurLess: **10 Lux** (twilight)

Correct handling of handshaking and moving objects

Drastic noise reduction with no loss of image details

Extended dynamic range

Number of input frames: from 4 to 12

# HD Panorama

Almalence  
Innovative Imaging Technologies



10 megapixel panorama taken with Samsung Galaxy Nexus running Almalence HD Panorama application. The picture is seamlessly stitched with no ghosting on moving objects (people). High dynamic range of the scene captured with no clipping.

Almalence's HD Panorama solution smoothly stitches up to **100 MPix**, up to **360°** panoramic images, preserving high dynamic range and handling moving objects to avoid ghosting.

# Features



Resolution: up to 100 MPix (limited by RAM)

Angle: up to 360 MPix

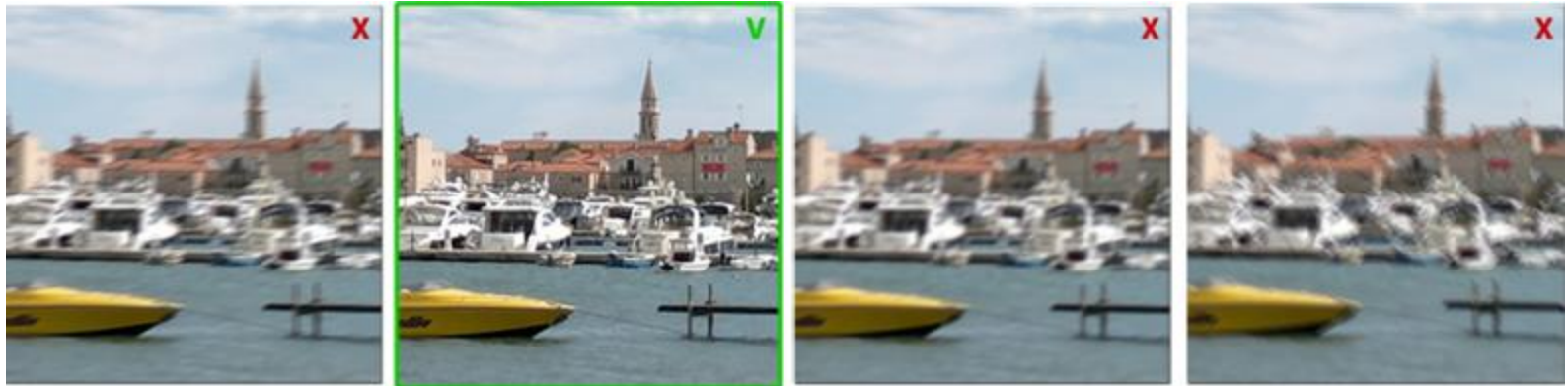
High dynamic range, the exposure is automatically adjusted frame by frame.

Swipe and frame-by-frame modes available

Augmented reality visualization – taken frames displayed over the viewfinder

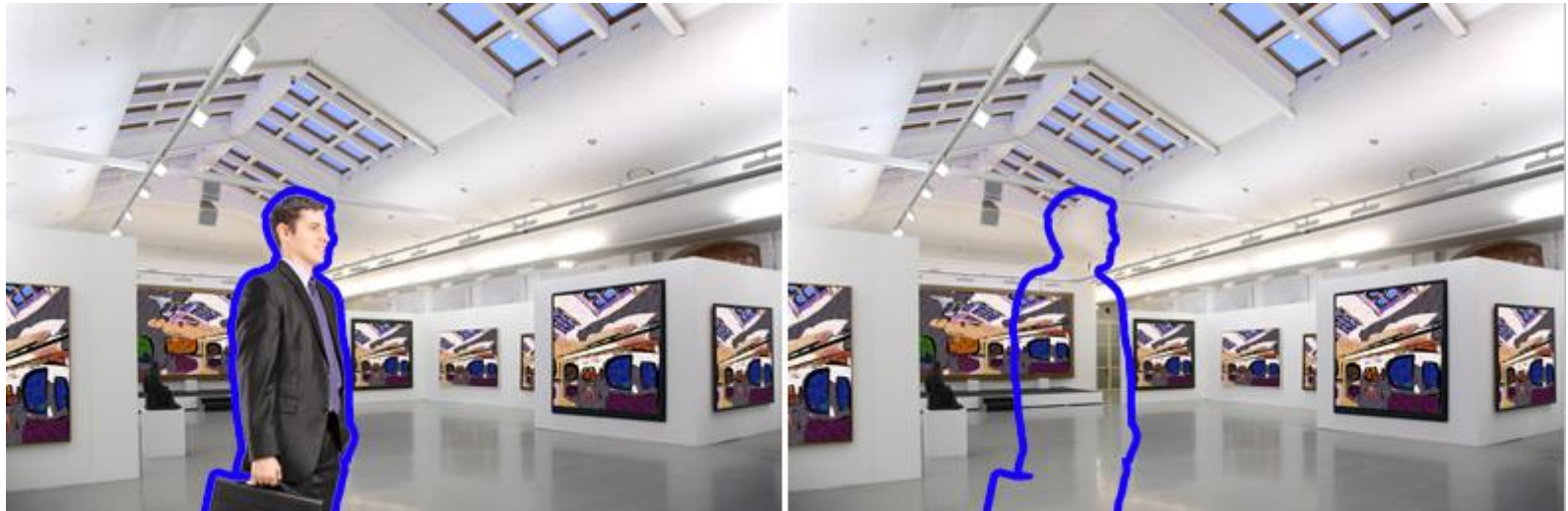
Both gyroscope and image data used for orientation

# Best Shot



Instantly analyzing series of shots, Best Shot chooses the best one, increasing the chances of taking blur free image **10 times**.

# Object Removal



Object Removal provides auto detection of moving objects and allows user to choose what to remove.

The final image is smoothly cleaned of selected objects and has no artifacts.

# Features



Highest detection rate and lowest false detection rate among competing solutions  
(Based on evaluation performed by several OEMs)

Smooth stitching

Correct handling of reflections and changing illumination

Number of input frames: 5 to 8

# Sequence Photo



Sequence Photo captures dynamic moment evolution in a single image.

Useful to capture sport events and any action with fast movement.



# Features



User-selection of the input frames to be included in final scene

Smooth stitching

Number of input frames: 2 to 10

# Group Shot



Group Shot allows to select the faces for each person from different frames.

The final image is smoothly stitched with no breaches or artifacts, as it was a single photo.

## Features



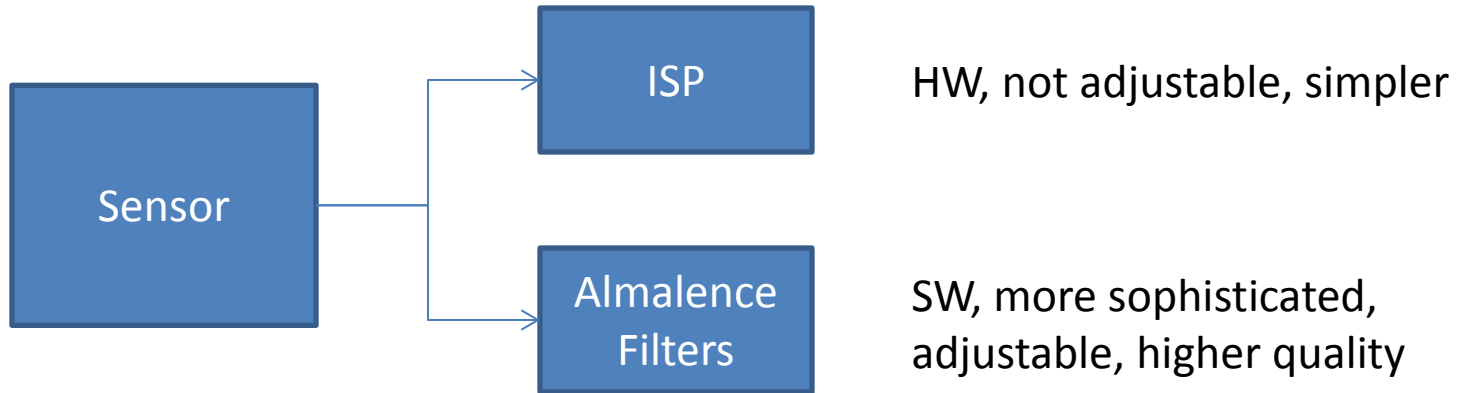
Smooth stitching

Compatible with 3<sup>rd</sup>-party face detection solutions, including Android built-in face detection

Quick-processing mode for responsive UI

Number of input frames: 2 to 8

# Noise Reduction and Sharpening



High-performance noise reduction and sharpening filters are used instead of ISP filters, providing much better image quality.

## Features



Single-frame noise reduction and sharpening

Adjustable parameters easily accessible from application

Best level of detail preservation with complete removal of noise

Takes lens shading in account (unlike HW filters)

# Auto Scene Detection



Auto Scene Detection allows auto selection of better shooting and post-processing parameters for producing the best possible images.

Almalence's ASD consumes less than 1% of CPU time at 30 frames per second

## Features



### Scene types:

- ✓ Night
- ✓ Low light
- ✓ Backlight
- ✓ Document
- ✓ Barcode
- ✓ Macro
- ✓ Beach
- ✓ Sports
- ✓ Street
- ✓ Snow
- ✓ Night Club
- ✓ Nature
- ✓ Portrait
- ✓ any scene + Portrait\*

\*Portrait is detected together with any other scene, like Night + Portrait, Backlight + Portrait, et cetera.



Almalence provides full range of support and integration services.

With our qualified engineers and the partners network in Korea, China, Taiwan and Japan we are able to serve our customers in quickest manner.



# Contact

Almalence  
Innovative Imaging Technologies



For any inquiries please send a message to:  
[info@almalence.com](mailto:info@almalence.com)

Thank you for your time.