



# HDR REVISITED

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# High Dynamic Range

- What is dynamic range?
- The difference between the brightest and darkest points in an image.
- Usually measured as a straight ratio (Contrast Ratio) or in Stops (Exposure Value) where  $1 \text{ stop} = 2 * \text{contrast ratio}$



# Why does Dynamic Range Matter?

- The dynamic range of typical everyday scenes often exceeds the dynamic range capabilities of the image recording system

Component	Dynamic Range	Stops
Typical scene (Interior with window)	100,000:1	16.5
Human eye	1,000,000:1 (or more)	22.6
Best DSLR Sensor (Nikon D810)	28,500:1	14.8



# Steps to Produce an HDR Image

- 1. Make multiple exposures of the same scene using different exposure levels
  - Use a tripod if possible
  - Three exposures (-2, 0, +2 EV) usually produces good results
  - Keep ISO and aperture constant and vary shutter speed
  - Use Auto-Exposure Bracketing if your camera supports this



# Steps to Produce an HDR Image

- *Remaining steps are done using post-processing software, in camera or out*
- 2. Auto Image Alignment
  - Not necessary if all images were shot on a tripod
  - Relies on well defined vertical/horizontal edges in the image
- 3. De-ghosting
  - Required where something has moved during the time that the multiple exposures were taken
  - Uses one of the exposures as a static reference source for the moving elements



# Steps to Produce an HDR Image

- 4. Exposure Blending
  - Merges the source images pixel by pixel to select the best detail at each location.
  - The resulting image has a dynamic range equivalent to the combined dynamic ranges of all the source images eg  $14 + 4 = 18$  stops.



# Steps to Produce an HDR Image

- 5. Tone Mapping
  - Compresses the dynamic range down to a level that can be handled by an output device while still preserving the full range of detail from the HDR image.
  - Most HDR software applies two levels of tone mapping:
    - Global tone mapping reduces all pixels according to their intensity. Tends to result in very “flat” looking images
    - Local tone mapping will convert pixels of the same intensity to different values depending on their relationship to surrounding pixels. This adds “pop” to the image.
    - Most HDR software provides the user with control over the local tone mapping logic. Sometimes grossly misused!



# In This Session

- 1. HDR and Adobe Photoshop Elements
  - Can you do HDR processing in Elements?
    - No and Yes
- 2. In Camera HDR
  - Which cameras support this?
  - What to look out for.
  - Examples of the same scene in HDR using different methods.
  - Including the same scene processed in Elements, Photoshop CC HDR and NIK HDR





# HDR in Photoshop Elements

- Prior to v12
  - Enhance
    - Photomerge
      - Photomerge Exposure
- Elements v12 and later
  - Switch to Guided mode
  - Select Photomerge
    - Photomerge Exposure
- Demo



# In Camera HDR – What to Look For

- 1. How easy is it to use?
  - How do you find it?
- 2. Does it impose any restrictions?
  - Image type/size
  - Processing delays
- 3. How much control?
  - Source images (number/exposure)
  - Save source images?
  - HDR processing
  - Tone mapping



# List of Cameras with Built-in HDR

- Too many to list
- Canon/Nikon/Panasonic not big fans of HDR
  - EOS 5D mkIII / 650D and up
  - Nikon 5100 / D600 and up
  - LUMIX G6, GH4, GH3, GX7 and GM1 and others
- Sony/Olympus/Pentax lots of models
- Becoming popular on mobile phones
  - Apple iPhone 4 and iOS 4.1 and up
  - Android 4.2 and up (depends on hardware/apps)



# Olympus TG-4

- Tough – Waterproof, freezeproof, crushproof and shockproof
- 16 MP sensor 1/ 2.3 (6.2 x 4.6mm)
- f/2 4x 25-100mm lens
- GPS + WiFi
- RAW + JPEG
- Full 1080p HD



# Olympus TG-4 HDR

- Turn mode dial to SCN (Scene)
- Select sub-mode Backlight HDR
- Or, turn mode dial to Underwater
- Select sub-mode HDR





# Olympus TG-4 HDR

- Restrictions
  - Only JPEG image files up to 16Mp (Not RAW)
  - Cannot save source images
- Controls
  - None
- Demo



# Kodak Easyshare Z990 Max

- “Swan Song” camera model 2011
- 12 Mp BSI sensor 1/ 2.33 (6.1 x 4.6mm)
- 30x zoom f2.8-5.6 28-840mm Schneider-Kreuznach lens
- Optical Image Stabilisation
- RAW or JPEG
- Full 1080p HD video



# Kodak Easyshare Z990 Max HDR

- Turn mode dial to HDR







# Kodak Easyshare Z990 Max HDR

- Restrictions
  - Only JPEG image files exactly 12Mp (Not RAW)
  - Cannot save source images
- Controls
  - None
- Demo



# Nokia Lumia 1020

- “Best Ever” camera in a mobile phone
- 41 Mp BSI sensor 2/3 (8.8 x 6.6mm) Pureview
- f2.2 26mm Carl Zeiss lens
- Optical Image Stabilisation
- Xenon flash
- 41 Mp RAW + 5 Mp JPEG
- Full 1080p HD video





## Nokia Lumia 1020 HDR

- Functionality depends on which App is used
- HDR Photo Camera app (Intellsys, Romania)
- Also available on Apple iPhone



# Nokia Lumia 1020 HDR Photo Camera

- Restrictions
  - Only 5 Mp JPEG image files (varies by device)
  - Can save source files
- Controls
  - Capture parameters
  - Fuse parameters
  - General settings
- Demo



# HDR Comparisons of Same Scene Different Cameras

- Scene 1. Windsor
  - Queen Victoria Statue
- Scene 2. Uxbridge
  - Grand Union Canal



# Examples

- [https://1drv.ms/f/s!AtF4WLMVbuoKi8dr7DIcmpdSZnR-\\_g](https://1drv.ms/f/s!AtF4WLMVbuoKi8dr7DIcmpdSZnR-_g)



**THE END**

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