High Speed Triggering and No Light Photography

Bob Stevens and Jim Kay
Different than Landscape or Portrait Photography

• The problem is that you can not reliably trigger your camera on the subject
  • Too fast
  • Noncooperative
  • Too dark

• Fast moving nature objects like small birds in flight
• Nature objects at night - owls
• High speed controlled objects – milk drops
• Very high speed controlled objects - bullets
Bob’s Focus is Small Birds and Saw Whet Owls in flight plus a few fun things

• First requirement is a device to process sensor outputs/inputs and trigger a camera and/or flash
• Second requirement is sensors – they depend on what you want to do
  • Laser source and sensor
  • Infrared motion sensor
A Typical Outdoor setup

- Camera and sturdy tripod
- Sensor on tripod
- Laser on tripod
- Trigger Processor
Sequence of Events

- Sensor provides output signal
  - Laser beam broken
  - IR sensor detects change
- Sensor output sent to trigger processor
- Sensor Processor
  - Detects change in sensor output
  - Initiates firing of camera and/or flash
    - Adds delay if required
Trigger Processor I use is Camera Axe

- Many sensor processors available
  - Price range from $20 to $500
- I use Camera Axe from Dreaming Robots
  http://www.dreamingrobots.com/store/index.php?main_page=index&cPath=1&zenid=pj3f6qk21ebasg6thjfnj7vp3
  - Assembled $195 – Kit $95 (can be assembled by someone who knows how to solder)
  - Sensors are $20-$25 each
Settings for Typical shot

- Camera in Manual Mode or Shutter Priority (Tv)
  - ISO 800 or higher
  - Shutter Speed – 1/2000 second
  - F 10
- Flash
  - Make sure you have high speed sync enabled
- Note – background will come out dark unless there is a lot of light
Some things to know

• Camera shutter lag (time from electronic trigger to shutter release)
  • DSLR lag is 50 to 100 msec

• For remote photography, the camera and flash must be on continuously
  • Camera manual and flash manual will tell you how to keep camera and flash from going to sleep
  • Bring extra batteries
  • Cold weather is death on batteries – bring even more

• Sensors and processor have hair trigger
  • Small motions will trigger IR motion sensor
  • I had to shield back of IR sensor to keep from triggering on me
  • I had to shield laser sensor to keep from saturating on sunlight

• Turn off auto focus and image stabilization – they add to shutter lag time
• Estimate distance to where subject will be and hope
Things to remember

• There is a significant learning curve
  • Each sensor is different
  • Each camera is different
  • Each box of electronics is different
  • Each subject is different
• These photographs require changing the “standard” settings of your camera – remember to change them back
Ball thrown through laser sensor

Note effects of 50 msec shutter delay on 50 mph thrown ball
Balls in air
Final note before Jim talks about high speed photography

- You will have a lot of failures but when you get a good shot, it will be spectacular
Freezing Liquid Splashes

- How do you get a sharp “splash” image?
- The “Need for Speed” – Why use Speedlights?
  - Freezing a drop requires *very* fast speeds!
  - Alien Bee B400 @ Full Power t.1 = 1/2000
  - Nikon SB800 at full power = 1/1,000
  - Nikon SB800 at 1/32 power = 1/18,000

“Studio” flash technology is different than “Speedlites”

Equipment and Lighting Technique

- Can be accomplished with just a speedlight if your timing is good...but keeper rate tends to be low
- Increasing “Keeper” rate (can be done cheaply if you’re handy)
  - Triggering Device (Schmitt Trigger/Delay)
  - Motion sensor and variable delay – tune with your eye first
  - This trigger used to trigger flash, not camera! (need PC port)
  - Use bulb mode and a dark room, can ignore shutter speed.
- Lighting technique for a Transparent (water) drop
  - Not lighting the water, but what it reflects
  - Reflectors from behind work well to add dimension/depth
  - Use a colored reflector for variety, be creative!
- Lighting technique for an opaque drop
  - Standard techniques, lights like a normal object
Lens Selection, DOF and Light Power/Speed

- **Lenses**
  - Typically a 100mm macro lens is a good choice since the drops are quite small and working distance is good (keeps equip dry)
  - Use manual focus and pre-focus on the “drop spot”

- **Tradeoffs DOF vs. Flash Power**
  - Expose only for the flash (DOF and power tradeoffs)
    - Depth-of-Field (small aperture) requires more light
    - Don’t increase flash power as it will become slower
    - Move the flash closer
    - Increase ISO
    - Use more flashes (Used Vivitar 283 = $40, beware of trigger volt.)
Creating Variety

- Different types of drops
  - Medium used
    - Viscosity affects drop look (oil/milk/water/alcohol)
  - Transparent/Opaque
    - Try food coloring, be creative!
  - Splashing into a bowl of liquid vs. hard surface
  - Change splash surface (mirror, colored plastic)
  - Timing (changing trigger delay)
Some Related Links

Martin Waugh
• http://www.liquidsculpture.com/fine_art/index.htm
• http://www.liquidsculpture.com/the_process.htm

Hi Viz
• http://hiviz.com/

Edgerton Center
• http://web.mit.edu/edgerton/main.html

You Tube Video (PhotoGavin)
• http://www.youtube.com/watch?v=fwExpFDUC9Y
Jim Demonstration
Bob Demonstration

- Laser triggering using “soft” baseball
  - Throwing baseball through laser beam
- Low light triggering using “soft” baseball