

# Peter Flowers

ENGINEERING WITH LIGHT

I apply engineering and physics knowledge to technical product design and industrial problems

## HOLOGRAPHIC CAMERA

This instrument produced full sized holograms of 3D medical scans. Its foot print was 2.5 ft by 9 ft. I designed the optics path, and was responsible for the engineering of the first prototype.

## MICRO CAMERA

This device is the size of a white-board marker. It reads 2D bar codes that direct a browser to a specific web site. I designed and built a prototype lens and an LED-based illumination system.

## DNA ARRAY READER

This product is a scanning confocal microscope, with laser excitation and fluorescence detection. I devised the scanning method, and worked with the team that put it into production. I have extensive experience with narrow band filters, commercial lasers, photo-multiplier tubes, and opto-mechanical debugging.

## DNA ARRAYER

For this product I invented a novel pin and ring method for obtaining DNA samples from 96 well plates and depositing spots of DNA onto a microscope slide. I also was the project manager during the company start up phase.

## LENS DESIGN

I use Zemax for imaging lens design, laser beam telescope design, scanner mirror design, and analysis of existing systems.

## FILM RECORDER

This black box produces 4k X 5k images on 14 X 17 inch dry silver film. The light source is a near IR diode laser, the image was scanned mechanically with a resonant scanner and a precision galvanometer. I designed the optical path, and 2 generations of the resonant scanner. I supervised the effort of an outside lens designer.

## PATENTS

2 issued, 1 pending

## MICRO IR SPECTROMETER

The dispersive element of this device is a 1 mm thick silicon waveguide fabricated with a combination of classical optic shop practice and modern vacuum processing techniques such as electron beam lithography. The completed device will fit inside the 1 inch bore of a drill used for Mars geology surveys.

I started working on the project to assist the PI in through ray trace studies using the non-sequential capabilities of Zemax. During this phase I brought the Zemax macro

capability in house to partially automate the analysis and reporting process. I designed the illumination system, and bench tested it, verifying the predictions of the modeling phase. Presently, while working under the direction of the company's CTO, I am working with the outside people involved in fabrication, breadboard testing elements of the waveguide, and designing the tooling for the assembly of terrestrial test devices.

#### ELECTRONIC NOSE

This clever device is based upon the animal studies of 2 Tufts professors. Optical filter testing, air flow measurement, optimizing light collection. Improved light collection by x2 using light collection cones – and the results nearly matched the optical simulation.

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