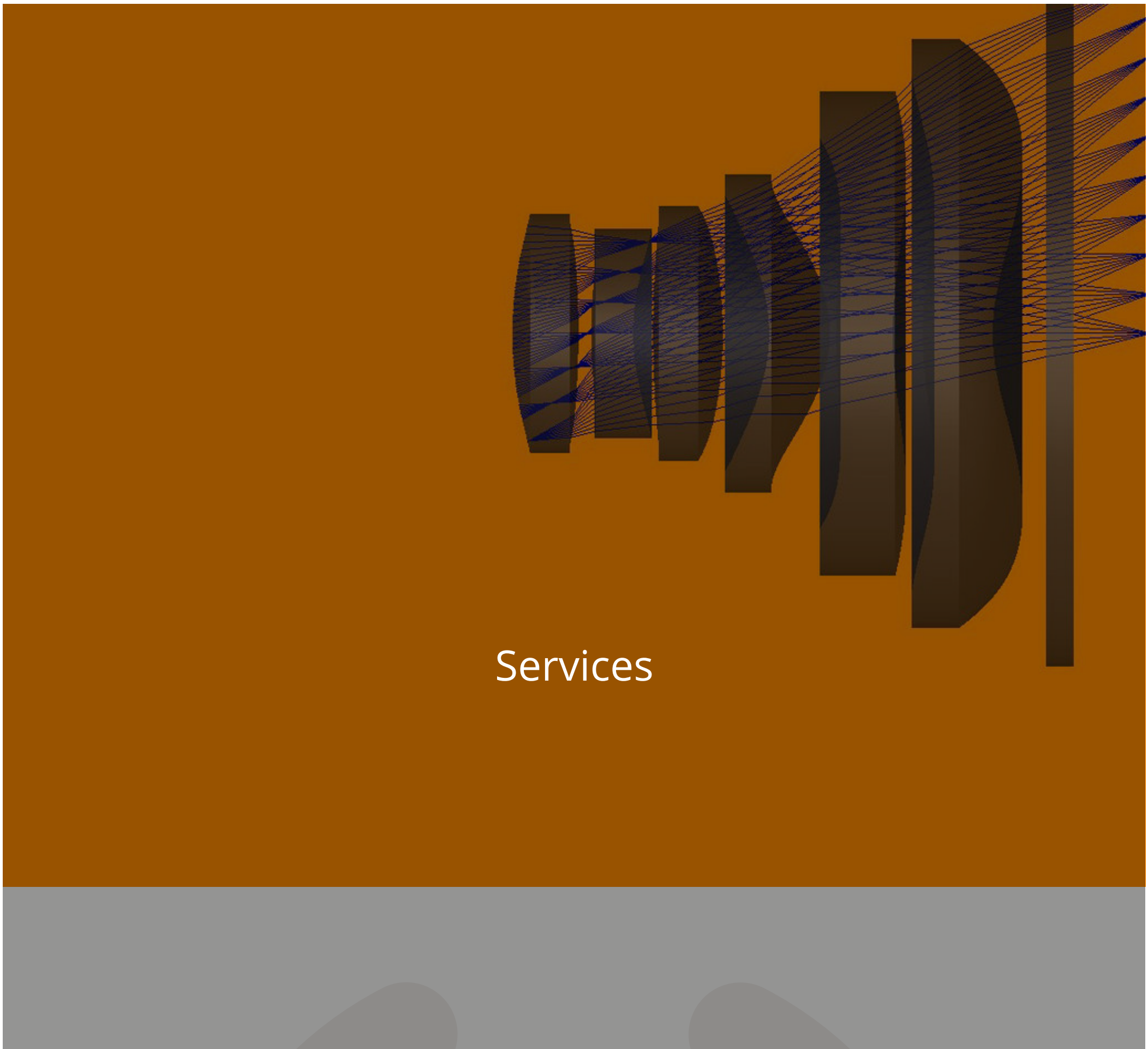
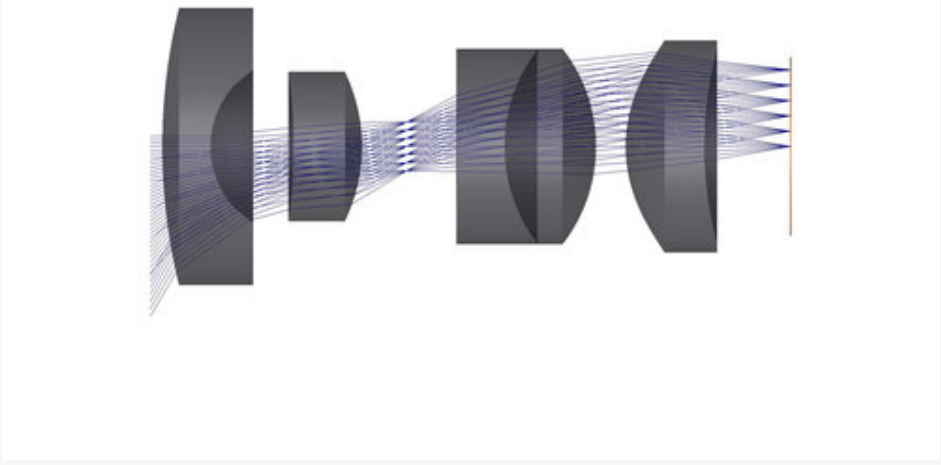


Services

Expert Lens Design.

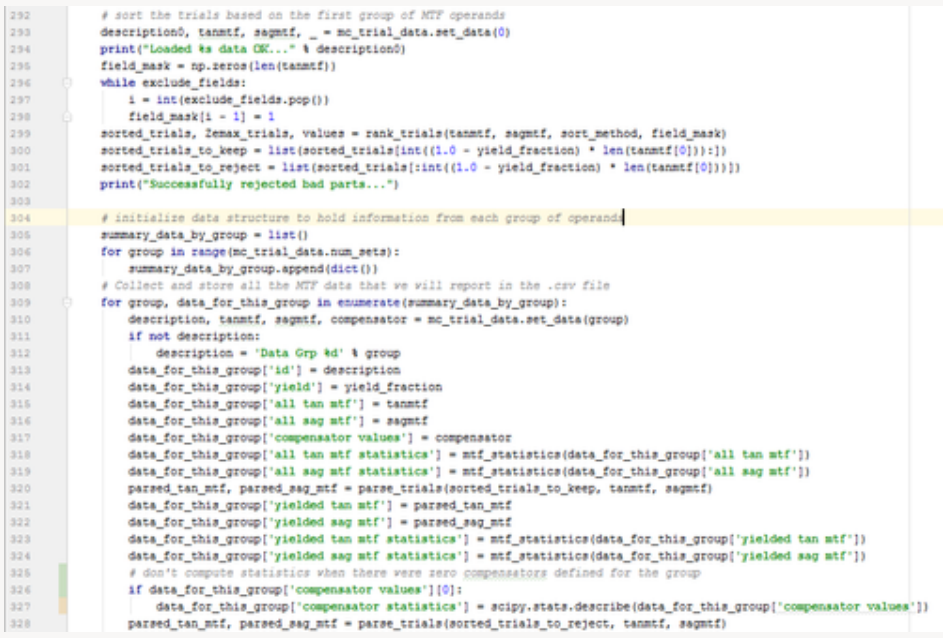
From feasibility studies to full production designs, our team can help you through the entire process of an optical design project. With backgrounds in mobile devices, 3d

sensing, cinematic projection, microscopy, and endoscopy, the diversity of our backgrounds is one of our greatest assets and helps us approach each new challenge from a variety of perspectives.



Optical Design

We are power users of Zemax OpticStudio, specializing in designing imaging systems for capture and display. Our team has highly specialized expertise in plastic optics for high volume applications as well as glass optics for high quality and environmentally demanding applications.

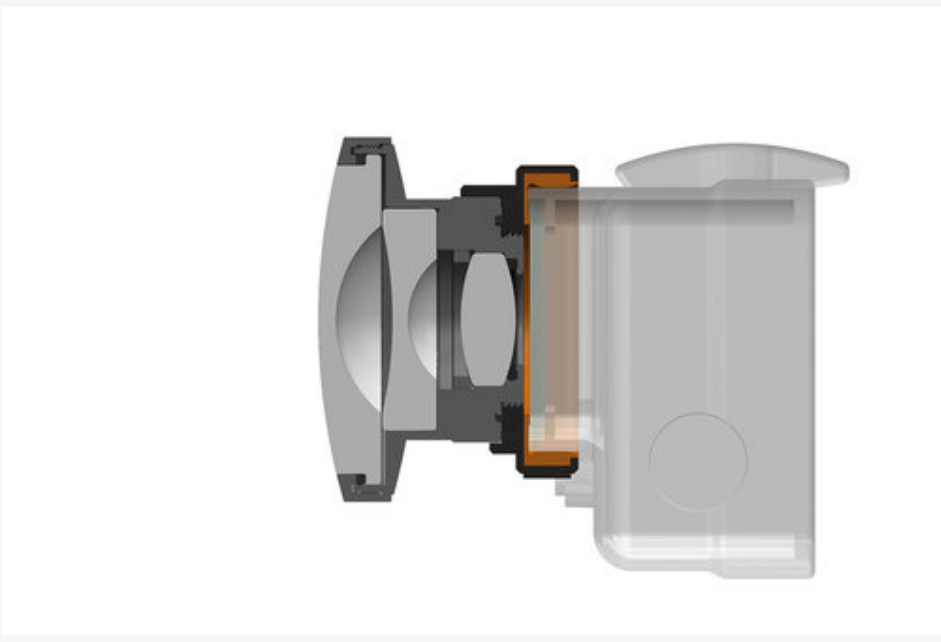


```
# sort the trials based on the first group of MTF operands
description0, tanmtf, sagmtf, _ = mc_trial_data.set_data(0)
print("Loaded %s data OK..." % description0)
field_mask = np.zeros(len(tanmtf))
while exclude_fields:
    i = int(exclude_fields.pop())
    field_mask[i - 1] = 1
sorted_trials, zemax_trials, values = rank_trials(tanmtf, sagmtf, sort_method, field_mask)
sorted_trials_to_keep = list(sorted_trials[int((1.0 - yield_fraction) * len(tanmtf[0])):])
sorted_trials_to_reject = list(sorted_trials[:int((1.0 - yield_fraction) * len(tanmtf[0]))])
print("Successfully rejected bad parts...")

# initialize data structure to hold information from each group of operands
summary_data_by_group = list()
for group in range(mc_trial_data.num_sets):
    summary_data_by_group.append(dict())
# Collect and store all the MTF data that we will report in the .csv file
for group, data_for_this_group in enumerate(summary_data_by_group):
    description, tanmtf, sagmtf, compensator = mc_trial_data.set_data(group)
    if not description:
        description = 'Data Grp %d' % group
    data_for_this_group['id'] = description
    data_for_this_group['yield'] = yield_fraction
    data_for_this_group['all tan mtf'] = tanmtf
    data_for_this_group['all sag mtf'] = sagmtf
    data_for_this_group['compensator values'] = compensator
    data_for_this_group['all tan mtf statistics'] = mtf_statistics(data_for_this_group['all tan mtf'])
    data_for_this_group['all sag mtf statistics'] = mtf_statistics(data_for_this_group['all sag mtf'])
    parsed_tan_mtf, parsed_sag_mtf = parse_trials(sorted_trials_to_keep, tanmtf, sagmtf)
    data_for_this_group['yielded tan mtf'] = parsed_tan_mtf
    data_for_this_group['yielded sag mtf'] = parsed_sag_mtf
    data_for_this_group['yielded tan mtf statistics'] = mtf_statistics(data_for_this_group['yielded tan mtf'])
    data_for_this_group['yielded sag mtf statistics'] = mtf_statistics(data_for_this_group['yielded sag mtf'])
    # don't compute statistics when there were zero compensators defined for the group
    if data_for_this_group['compensator values'][0]:
        data_for_this_group['compensator statistics'] = scipy.stats.describe(data_for_this_group['compensator values'])
    parsed_tan_mtf, parsed_sag_mtf = parse_trials(sorted_trials_to_reject, tanmtf, sagmtf)
```

Optical analysis

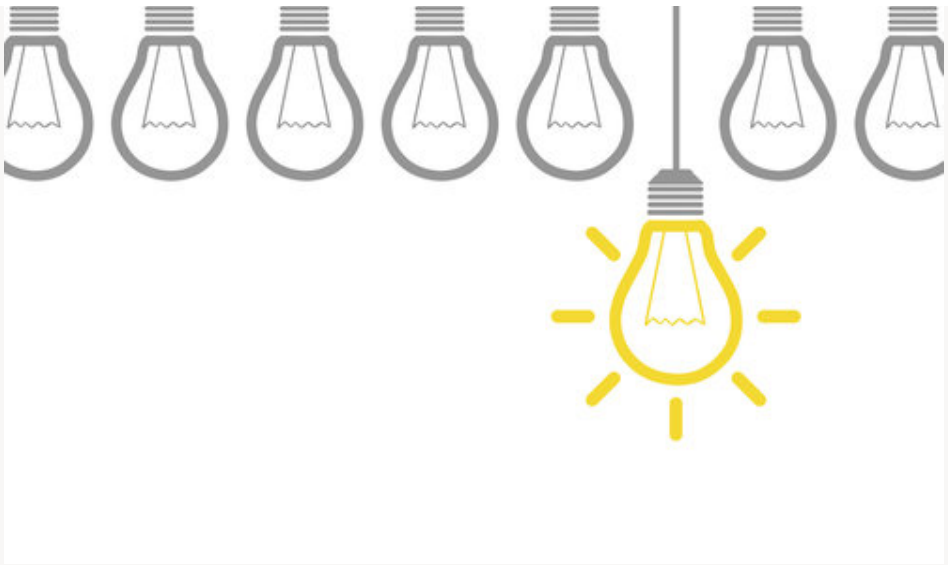
In addition to built-in Zemax tools, we've developed a great deal of proprietary Python code and macros for facilitating DfM (design for manufacturing) and for advanced analysis/visualization for tolerancing, yield prediction, stray light, and thermal simulation.



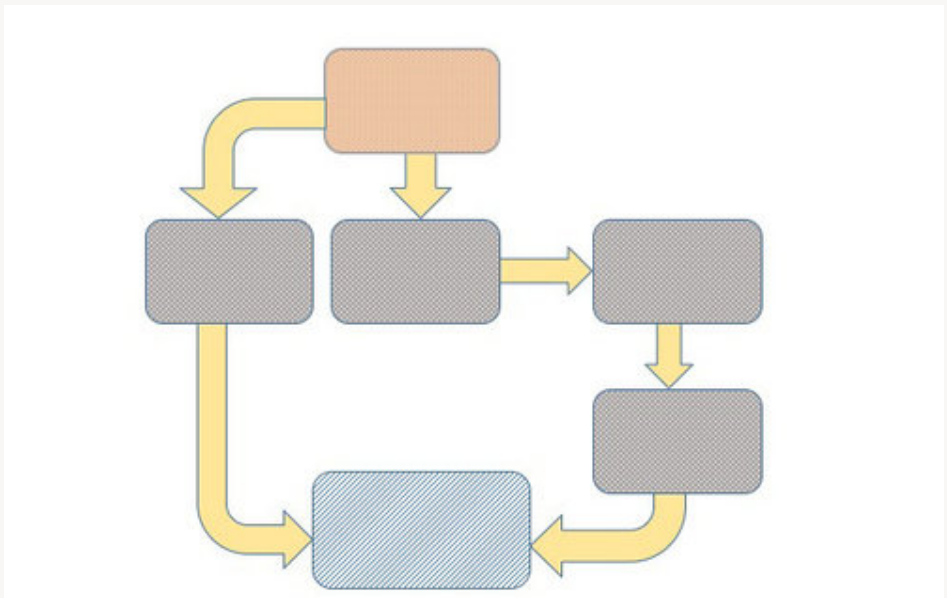
Opto-mechanical design

With SolidWorks as our go-to tool for mechanics, we have years of experience designing traditional lens mounts and focus assemblies, as well as complex systems, clever mechanisms, and full-blown industrial product designs.

Feasibility studies



We're often called upon to help brainstorm concepts or to investigate potential design forms at the beginning of a project. This can be incredibly helpful to understand the design space, gauge feasibility for a new product, or set specifications prior to making a big investment in a product direction.



Supply chain support

We have long-running ties with many suppliers for optics, mechanics, and full camera modules. As an independent design group, we offer unbiased guidance on design form and supplier choice. We routinely facilitate both prototyping and transition to volume production for products we design.

Testing

via the following in-house equipment

- Trioptics ImageMaster Pro4 MTF testing station
- Ocean Optics spectrometers (+integrating sphere, fibers, lamps, etc.)
- Custom-built stray light tester
- Dioptometer for visual system focus checking/setting
- Optical power meters, IR viewer, digital oscilloscope
- Inspection microscopes, drop gauge, radius gauge, calipers/micrometers, etc.

Prototyping

via the following in-house equipment

- Class 100 hood, vacuum tools, and programmable epoxy dispensing system
- FormLabs Form2 SLA 3D printer
- Programmable oven for epoxy curing
- Optical table and associated opto-mechanical mounting hardware
- General lab equipment such as UV epoxy curing station, digitally controlled Weller soldering iron, and a well-stocked supply of optics and electronics components