

MICHAEL LARSON
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PORTFOLIO **of Design, Engineering, and Development**

Michael has gained breadth and depth of experience through solving a wide variety of problems across many disciplines. He loves working with others to create things that make people's lives better, most recently in the realm of sleep. This portfolio contains some examples of Michael's expertise across every aspect of the product design and development process: developing novel concepts, researching relevant basic science, formulating mathematical and computer models, creating computer aided designs, preparing manufacturing documentation, testing, marketing, etc. His years of teaching have given him a mastery of the fields of mechanical engineering, materials science, and design, and an ability to convey complex information to others. His years of leading teams of professionals have given him skills in motivating others to work together to achieve a shared vision.

Inventor and Developer of
CONSUMER PRODUCTS



The First Sleep Tracker That Helps You Sleep

Larson's roles: inventor, principal research investigator, designer, engineer, company founder, and president

The patented Sleep Shepherd Blue was born out of love and desperation. Michael invented the patented headband to help his then teenage daughter Jessica. The drugs that were prescribed to help her sleep landed her in the emergency room for a two-week hospital stay. Michael assembled a small but talented team of four designers and engineers to help him bring his solution to life. Jessica was able to go off the drugs that put her in the hospital and take back control of her sleep - and her life. The headband has helped thousands of others get better sleep too.

The Sleep Shepherd is unique, and does more than just report about last night's sleep. It measures brainwave rates to give a more accurate picture of sleep via a companion app. It also goes the extra step to actively aid with sleep by playing binaural tones through thin built-in speakers. The frequency of the tones is controlled in a biofeedback loop by the EEG sensor to lead the brain to deeper sleep states. The efficacy of the headband is supported by clinical studies, basic science, and many customer testimonials.

The product was launched with crowd funding. 20k units have been sold to date.



Sleep Shepherd Blue Companion App

Larson's roles: UX designer, project manager, company founder and president

The Sleep Shepherd Companion App communicates with the Sleep Shepherd Blue via a Bluetooth connection. In the morning, data from the unit is transmitted to the user's phone and is then processed securely in the cloud. The data is then sent back to the Companion App and displayed on various pages of the application. Data displayed includes an overview of the previous night's sleep, detailed sleep graphs for the night, and trends to show how the user's sleep has improved while using the Sleep Shepherd Blue.





The Laser Game: KHET

Larson's roles: inventor, designer, engineer, company founder, CEO, and manager of a protracted (but ultimately successful) patent infringement case

Khet is a patented, two-player strategy game that won numerous awards, including MENSEA Select and Toy of the Year Finalist. It combines the complexity of chess with the high-tech appeal of laser beams. Players alternate turns moving their Egyptian-themed mirrored pieces around the board and firing a real laser beam. The beam bounces from mirror to mirror. If the beam strikes a non-mirrored surface of any piece it is immediately removed from play. The game ends when one player's Pharaoh is illuminated. Michael and his two partners (former graduate students) found success manufacturing and distributing on their own, selling over 500k units. Unfortunately they had to protect their patent in a thirteen year legal battle with a very aggressive infringer. They ultimately prevailed in a case that went all the way to the U.S. Supreme Court.



Super Affordable. Crazy Comfortable.

Larson's roles: inventor, designer, engineer

The relaxing yet fun Vi-Band was created to make the world a more comfortable place. This massaging headband includes integrated vibration motors that pulsate for a satisfying head massage. You can select between multiple vibration patterns for a custom soothing or invigorating experience, all for less than the cost of a half-hour massage. The Vi-Band sold thousands of units, primarily through Amazon and Sharper Image.





Larson's roles: inventor, designer, engineer

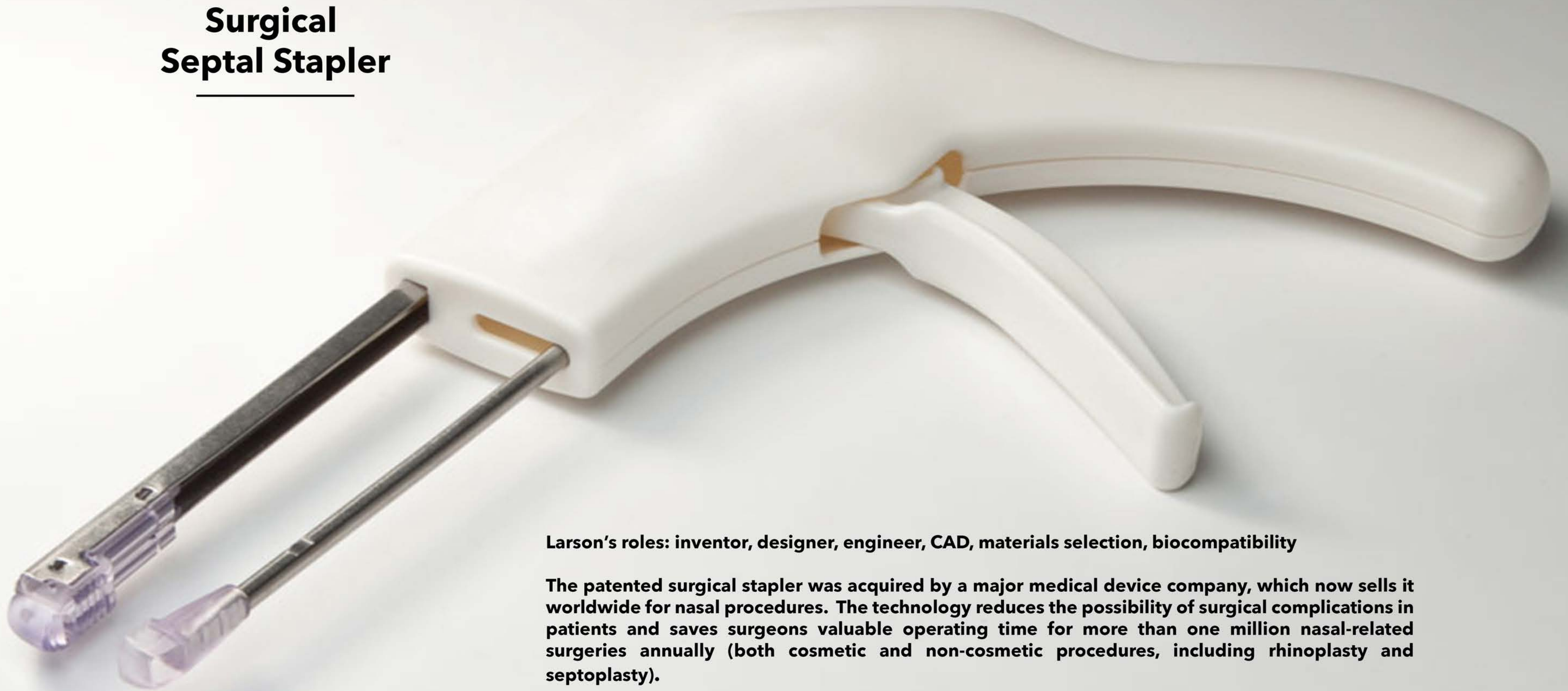
SomniCloud is the first all-in-one smart sleep device that combines scientifically proven light, sound, and temperature cues to help create the perfect sleep environment. The SomniCloud allows users to effortlessly track their sleep throughout the night and features a Smart Alarm to help gradually wake them each morning. The project is in the prototype test stage using working units made to mass-manufacturing specifications.



SomniCloud

Inventor and Developer of
MEDICAL DEVICES

Surgical Septal Stapler



Larson's roles: inventor, designer, engineer, CAD, materials selection, biocompatibility

The patented surgical stapler was acquired by a major medical device company, which now sells it worldwide for nasal procedures. The technology reduces the possibility of surgical complications in patients and saves surgeons valuable operating time for more than one million nasal-related surgeries annually (both cosmetic and non-cosmetic procedures, including rhinoplasty and septoplasty).

TISSUE FUSION



Laser Tissue Fusion Device

Larson's roles: inventor, designer, engineer, biocompatibility assessment, principal research investigator for laser-tissue interaction modeling and analysis, manager of two successful live animal trials

The patented Laser Tissue Fusion device has been shown in animal trials to successfully close wounds using laser energy as an alternative to staples and sutures. The first embodiment of the technology is for use in rhinoplasty and septoplasty surgeries. The device permits surgeons to fuse tissue together using an 808nm laser. The device directs the laser through a disposable tweezer-like attachment (shown below) that holds the tissue together. Once the tissue reaches an optimal temperature, the tissue is fused together by protein denaturation, resulting in a waterproof seal. Recovery time and patient discomfort are significantly reduced.

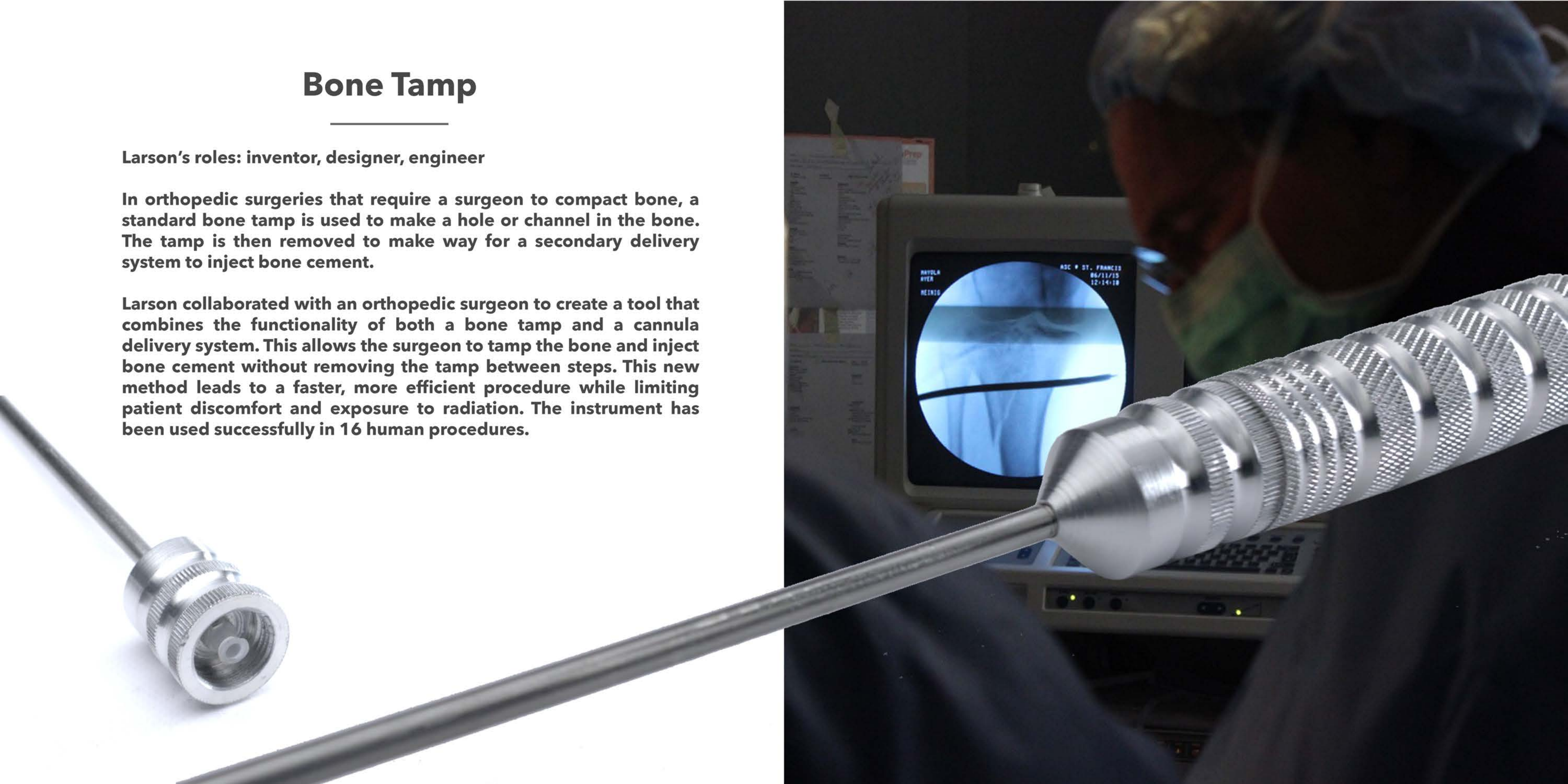


Bone Tamp

Larson's roles: inventor, designer, engineer

In orthopedic surgeries that require a surgeon to compact bone, a standard bone tamp is used to make a hole or channel in the bone. The tamp is then removed to make way for a secondary delivery system to inject bone cement.

Larson collaborated with an orthopedic surgeon to create a tool that combines the functionality of both a bone tamp and a cannula delivery system. This allows the surgeon to tamp the bone and inject bone cement without removing the tamp between steps. This new method leads to a faster, more efficient procedure while limiting patient discomfort and exposure to radiation. The instrument has been used successfully in 16 human procedures.

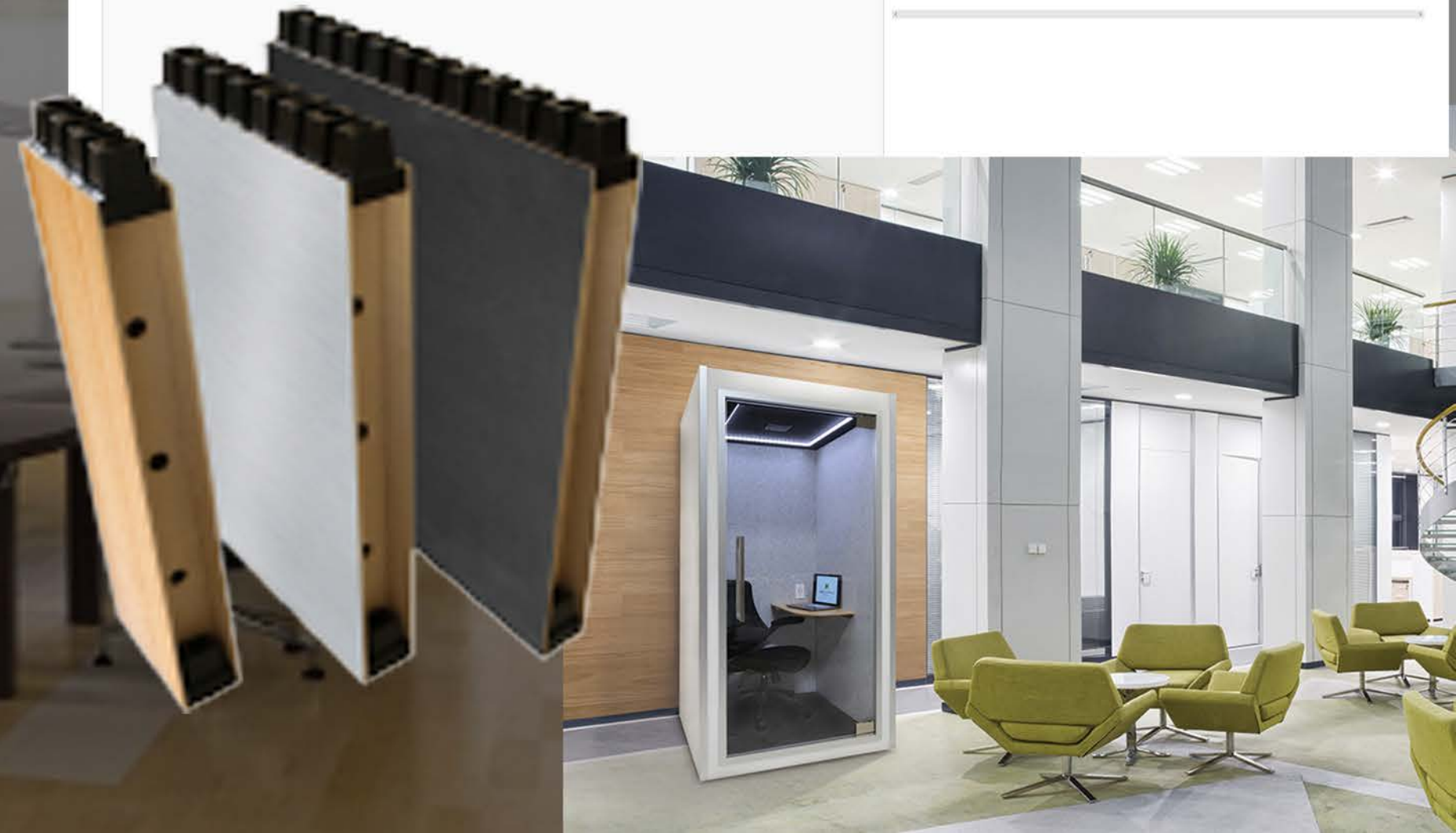
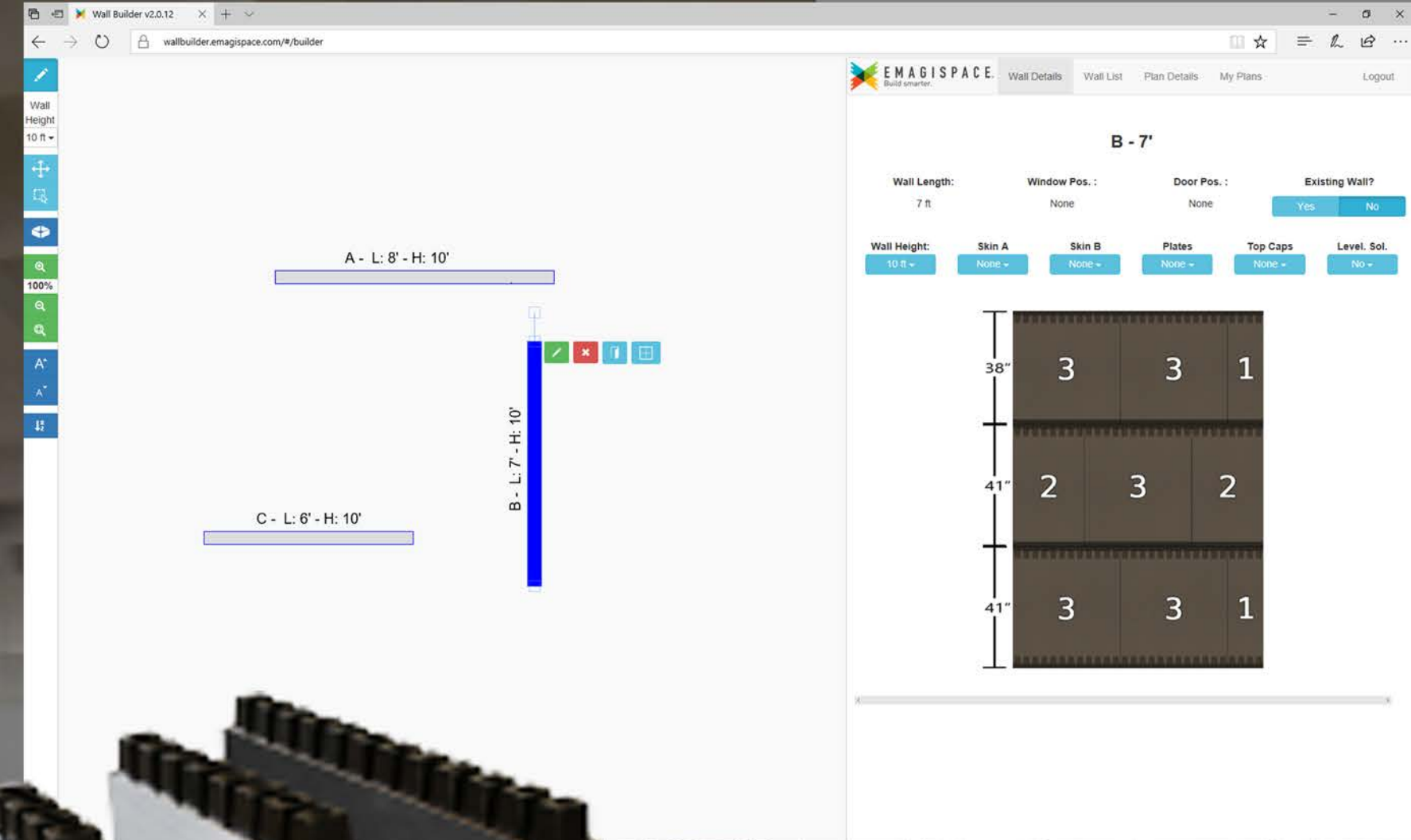


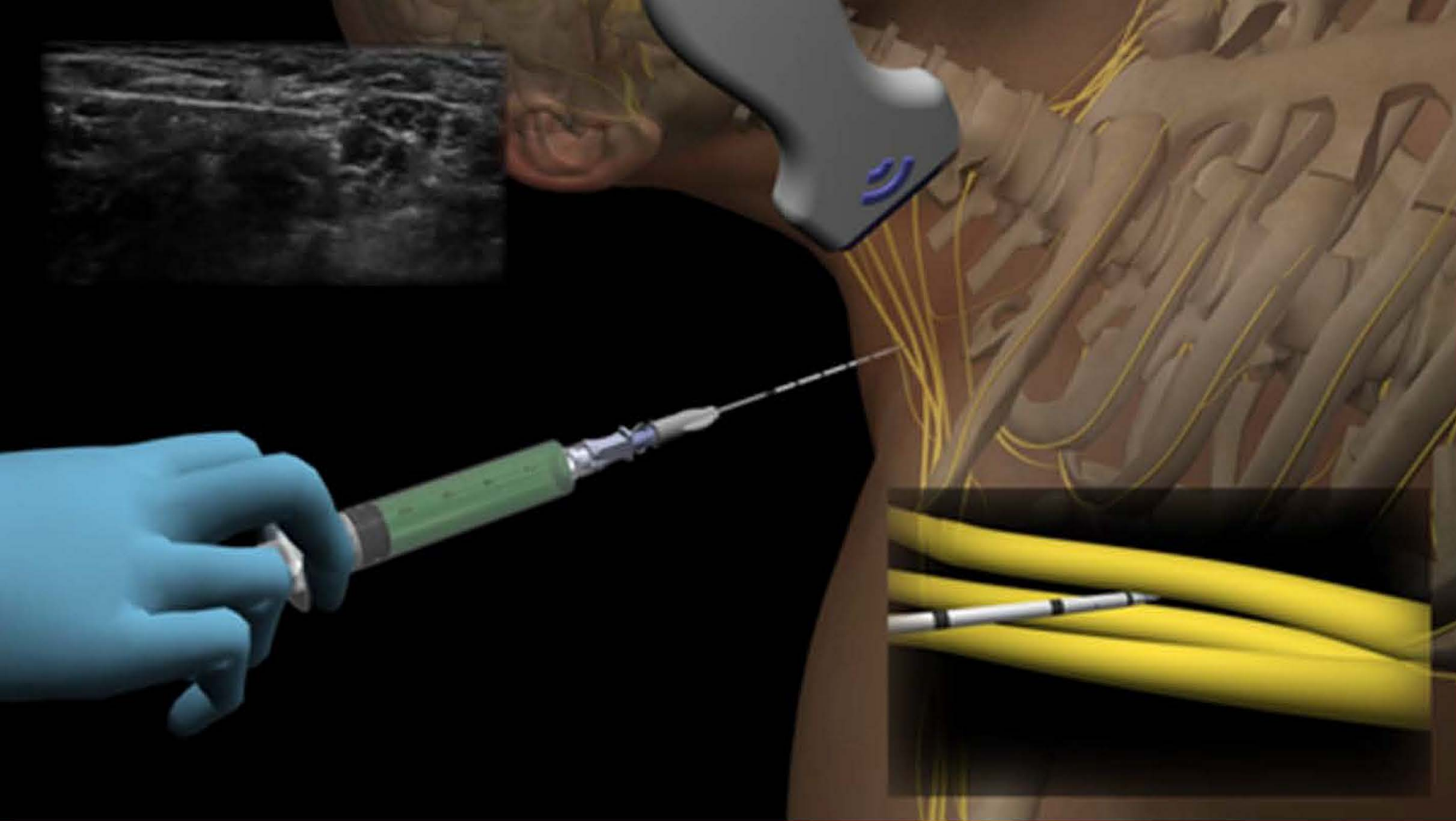
Products
Created for Clients

Modular Wall System with a companion Web Application

Larson's roles: project manager, structural design, finite element analysis, CAD, compliance with building codes, injection molding design, software development

Emagispace is a modular wall system comprised of lightweight ABS interlocking blocks and environmentally sourced MDF. With these modular blocks, users can create internal walls, vanity walls, and cubicles knowing that they have the flexibility to configure these structures easily. In addition to designing structures which are cost-effective and safe, Larson supervised the creation of a web application that employees use to quote projects, create build instructions, and display decorative skins virtually. This application was created using an AngularJS front end paired with a Django back end database.

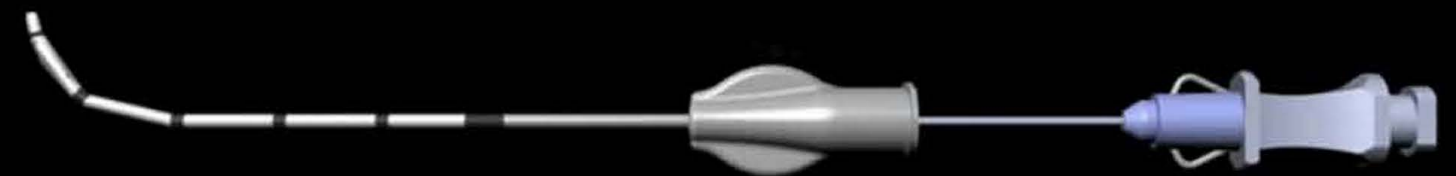
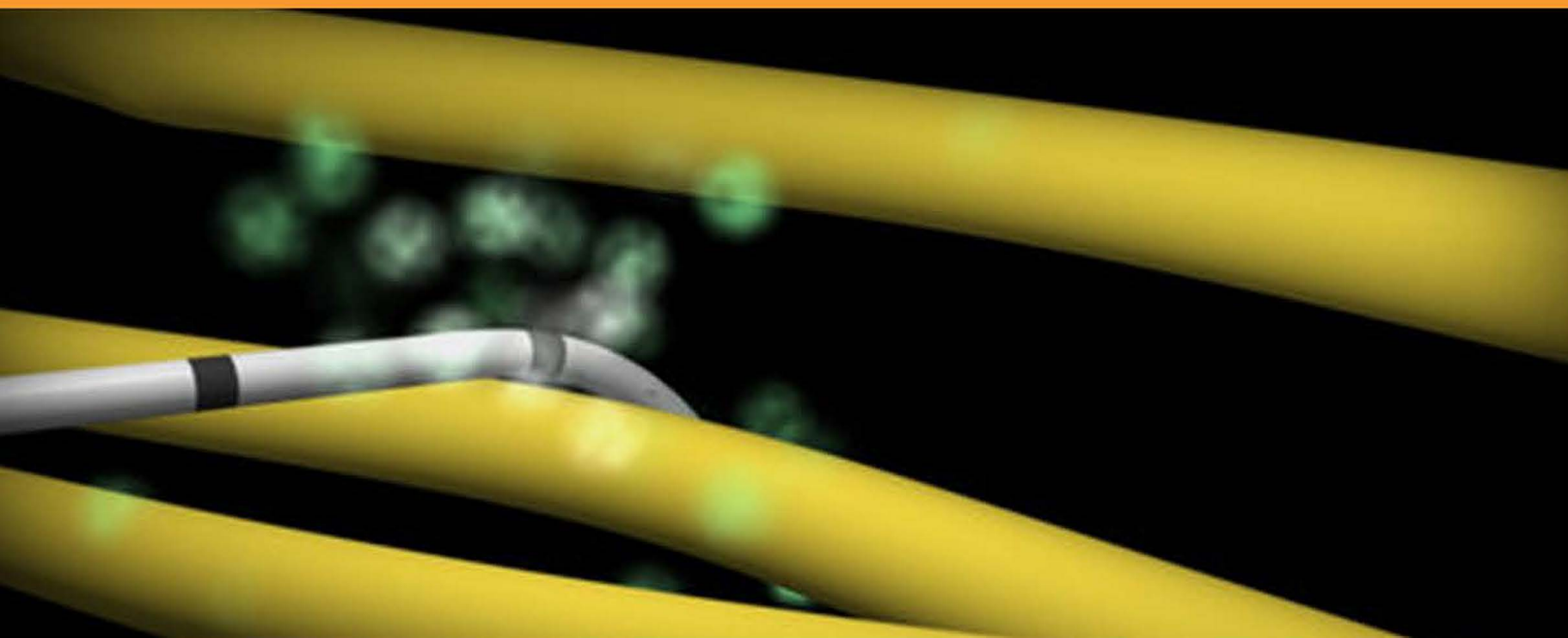




Localized Nerve Block System for Surgical and Post-Surgical Pain Management

Larson's roles: designer, engineer, CAD, ergonomics for ease of use

The Nerve Block System is another successful collaboration with practicing physicians where we created a superior solution to a commonly encountered problem. With this patented kit, anesthesiologists are able to quickly apply local anesthetic directly to nerve clusters to numb targeted regions of the body and avoid the whole-body effects of narcotics. This procedure leads to fewer complications, quicker recovery times, and less risk of post-op painkiller dependence and abuse.



Baby Play Gym

Larson's roles: project manager, designer, engineer

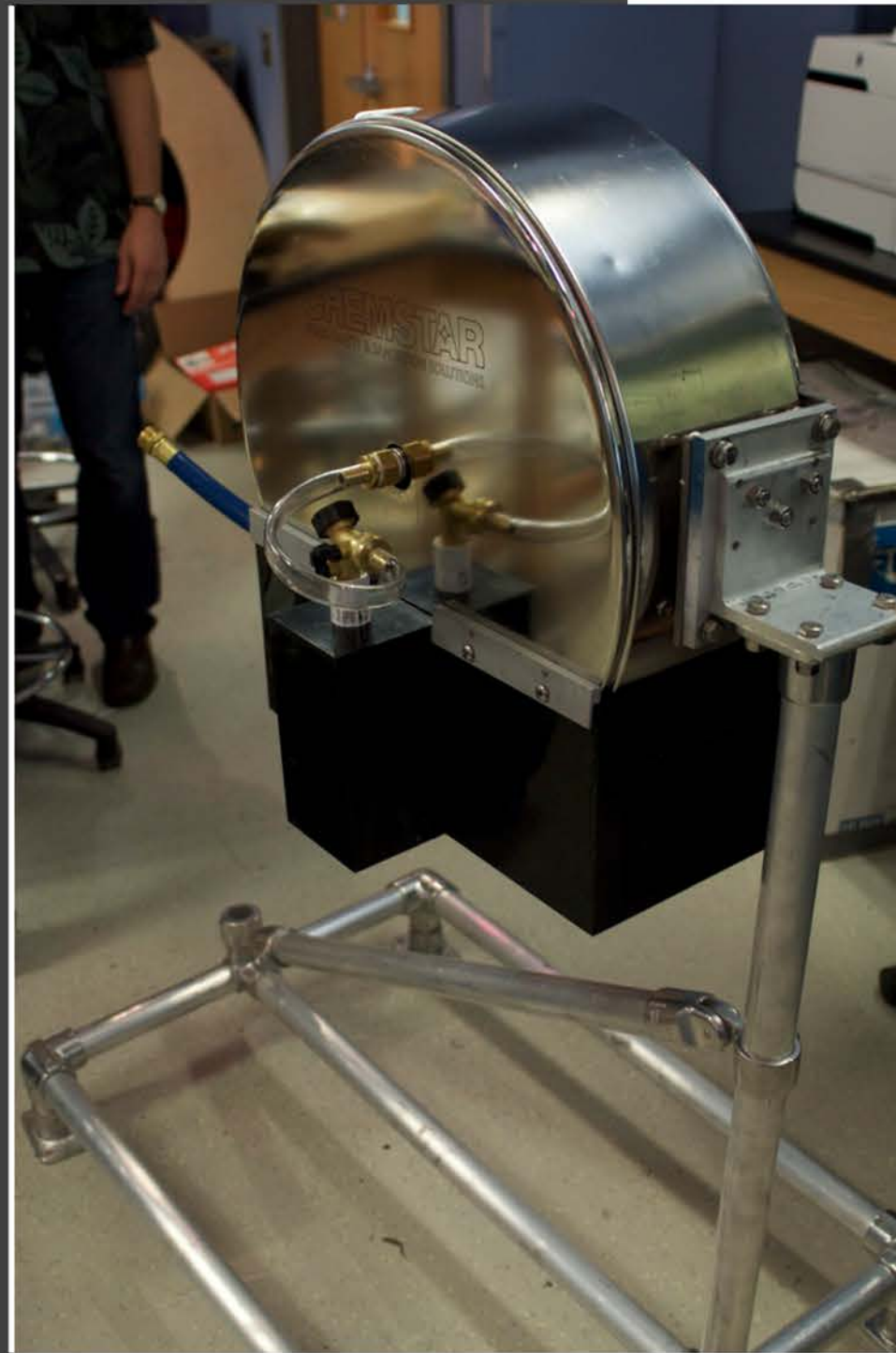
The Baby Play Gym was created with infant development as its primary focus. It was designed in collaboration with pediatricians and ophthalmologists. The play gym is unique in using visual, auditory, and kinesthetic stimuli to help infant brains develop.



Commercial Sanitizing Equipment

Larson's roles: inventor, project manager, designer, engineer, rapid prototyping

Michael orchestrated the construction of working prototypes of a wall-mounted and Bluetooth connected Detergent and Sanitizer Dispenser, a battery-powered Mobile Sanitizing Spray Foamer, and a Self-sanitizing Hose Reel for a major manufacturer of chemicals used in commercial kitchens and food processing facilities. That company is developing these products in hopes of bringing useful technologies to an industry that is starved for innovation.



Scooping Bowl

Larson's roles: project manager, prototyping, design for manufacture

A local inventor asked for help giving form and function to his idea of an innovative kitchen utensil. Michael's team worked closely with him to develop conceptual prototypes and design components for manufacturing. The inventor later went on to pitch his product on ABC's Shark Tank and Lori Greiner bought a one-third stake in the startup company.

