



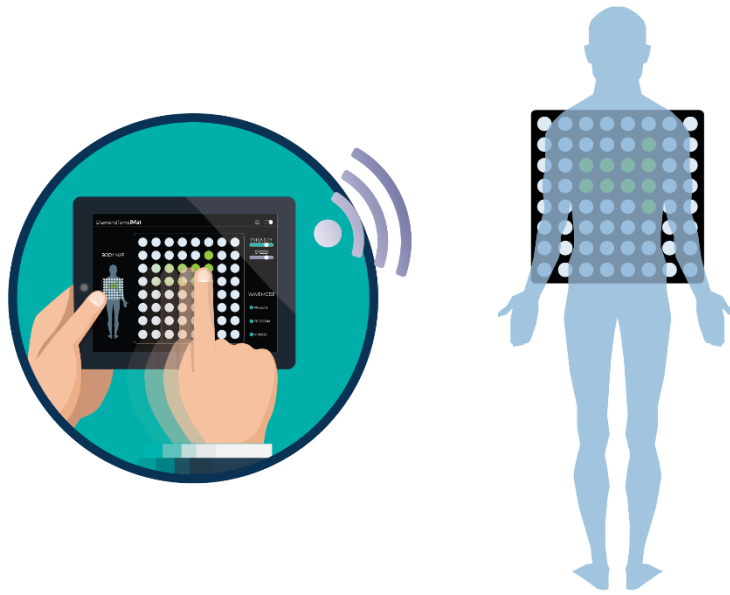
UCSB EE Capstone Project

iMat Massage Pad

Altair Instruments Inc. is a leading developer and manufacturer of skin resurfacing and microdermabrasion products for the medical aesthetics market, using groundbreaking technology to develop the most advanced non-surgical platforms for skincare and beauty. The products are very popular in the spa, beauty and medical industry where they are used by dermatologists and trained medical personnel. Altair is a US FDA registered facility, as well as an ISO and CSA certified, and is located in Ventura, California. The company is the originator of Crystal Free Microdermabrasion where the diamond crystals that are used to exfoliate the skin are embedded into the hand wand. This was a significant improvement over previous crystal particles which are less clean and a potential bio-hazard. The company sells globally and holds numerous patents, and trademarks. Altair was formed in 1980 and has internationally recognized product brands such as DiamondTome®, HydroWand®, HydroSerums™ and Newapeel™, as well as our new, free DTX Experience App (Android and iOS). The company now wishes to expand our healthcare product line and introduce a unique new personal massage pad (The iMat) for use in spas, salons and other healthcare and medical facilities.

Douglas Walker is CEO and Technical innovator of Altair Instruments Inc. He graduated from Tulane University with a degree in Biomedical Engineering and a MBA from Pepperdine University. Doug founded StrenuMed Inc, Altair's sister company, which focuses on orthopedic and neurosurgical powered surgical instruments. Doug has 12 U.S. Patents and will oversee the engineering development of the massage pad.

Brenda Acosta is President of Altair and oversees its marketing and sales. Brenda graduated from UCSD in economics and has held a variety of positions in the medical and healthcare corporate market place. She also co-founded StrenuMed and originated its tagline "Creative Designs in Cordless Technology". This year she was named Female Entrepreneur of the year by the L.A. Business Journal, which covers all of southern California.



Project Description

Our design team has developed a completely innovative individual user controlled massage pad, The iMat. The portable, cordless massage pad will be controlled via a tablet app, in real time, to allow a completely user friendly self adjustable massage experience.

The iMat massage pad user will choose from a programmed library of massage patterns, set to the users intensity level, time and speed to enjoy a personally specific relaxation environment. Individually controlled coin vibration motors embedded within a soft, pliable massage mat will allow users to create custom massage patterns to achieve a personal user defined experience specific to the individual. Vibration massages have proven to alleviate medical ailments. The massage pad will have pre-set patterns that cater to specific medical conditions. A library of pre-set patterns will come included in the app and can also be used for relaxation purposes.

The iMat system encompasses the Android and iOS App; cordless, flexible matt with motor array, Blue tooth communication module; embedded motor array and rechargeable battery. Altair has completed a breadboard model of an initial design utilizing an 8 x 8 array of motors, Microchip AVR microcontrollers and basic library of Arduino coded massage patterns. The prototype massage pad interface is hardwired to a main computer controller. These development components will be provided to the Capstone team.

Project Scope

The initial breadboarded prototype will provide a guide to the performance and understanding of the final unit. The next step is to reduce this initial prototype to a first article production product that is app controlled, cordless and portable, and ready for manufacturing production. A further task is to gather clinical/end customer evaluation data on the end user experience and performance. Statistical analysis of a significant sample size will be performed, with the objective of ascertaining marketplace acceptance of this new product. The Capstone team will be responsible for developing, building, documenting, and testing the iMat system to this level.

Key design elements required on this project include:

- › Functional tablet App coding and real time blue tooth interface to electronic hardware
- › Motor array control to both pre-programed modules and real time App interface
- › Defining the optimum motor control system: Cost effective μ Controller, PCB design and electronic component designed to obtain software interface, performance and market objectives
- › Power management and battery selection given product end use specifications (weight, safety, cost)
- › Clinical data analysis to evaluate market potential

Project Deliverables

The project team will deliver:

- One fully functioning prototype to first article production level
- One lighted (LED) demonstration prototype
- Documentation of system design history, experimental and clinical data, data analysis, final bill of materials, final schematics, and any other relevant documentation necessary to demonstrate system design and function such that an outside party may reproduce the system

Ideal Student Qualifications

- App coding and implementation
- *u*C software coding with interface to hardware
- PCB design and layout experience
- Motor control and matrix array experience
- Passion for innovative functional design and consumer products

Student Requirements

Team participants must sign a nondisclosure agreement and an invention assignment agreement.

Company Assets available to students

- Production electronic assembly (pcb stuffing) and testing instrumentation
- Machine Shop and cutting laser, raw materials
- Marketing and Graphic design capabilities

Company Website

diamondtome.com

Contact

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