PARAGON INNOVATIONS

Summary

Client	ADViSYS
Project Name	Electroporation Enducer
Industry	Medical
Location	The Woodlands, Texas
Class of	2003
Customer Type	New

ADViSYS knew there was a better way.

The previous technology used to introduce DNA into muscle fibers could cause cell damage through loss of square-wave function. A prior design firm had very little success trying to implement ADViSYS's concepts for an electroporator based on constant current.

They found a better way. Paragon Innovations.

OVERVIEW

ADViSYS's enducer is a device designed to introduce small molecules, plasmid DNA, or dyes into muscle fibers through electroporation. Existing electroporation technology had the potential for cell destruction through loss of square-wave function and overheating. ADViSYS wished to avoid this by introducing a new technology: pulsed constant-current control. A previous firm had attempted to design this technology for ADViSYS, with limited success.

Paragon designed a configurable solution that not only met ADViSYS's initial requirements, but allowed ADViSYS to monitor more accurately the electroporation process.

RESULTS

- Exceeded customer design requirements for pulsed constant current control
- Performed redesign from a heavy, unreliable product with four PCBs to a single PCB microprocessor-based design
- Provided extensive waveform logging to measure electroporation effectiveness and reliability
- Improved handle assembly process to improve the poor connectors of the original electrode array

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where hardware and software become one

972-265-6000

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“ ADViSYS wanted to create something totally new, something that hasn’t ever been done in our field. Paragon helped us to break new ground and create a truly unique piece of equipment. The level of technical support we received after development was quite useful. ”

Amir Khan, Ph.D.
Lead Research Scientist
ADViSYS

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Prior Outsourcing Experience

- Some experience, with poor results.

Services Provided

- Designed high-voltage pulse current control
- Redesigned product from an unreliable, old technology to microprocessor-based design
- Reduced PCBs from four to one by utilizing the latest microprocessor technology
- Provided means to log and save electroporation waveform data to dramatically improve control and measurement of electroporation process
- Streamlined design and reduced bulk and weight

Innovations by Paragon

- High-voltage pulse current control
- A highly configurable current control that allowed for pulses to fire in any sequence across the electrode array
- Recording of current pulse data to measure the effectiveness of the electroporation

Features

- Waveform logger records data from continuous pulse sampling at 2000 samples per second
- Four-line, 20-character LCD displays system status information
- Programmable buzzer provides configurable, audible status updates in an industrial or office environment
- 3-inch by 4-inch numeric keypad to program system parameters including buzzer volumes, electroporation current and firing delay, and impedance testing parameters
- IR port can upload waveform data to PC for viewing
- Designed to preserve data while conserving memory

Design Technologies

- Reduced four boards to one-board microprocessor design
- Orcad schematic capture
- Four-layer board

Primary Vendors

- Texas Instruments

Long-Term Results

- ADViSYS succeeded with the design of a high-voltage pulse current in their Electroporation Enducer with the added benefit of greater ability to control and measure the electroporation process.