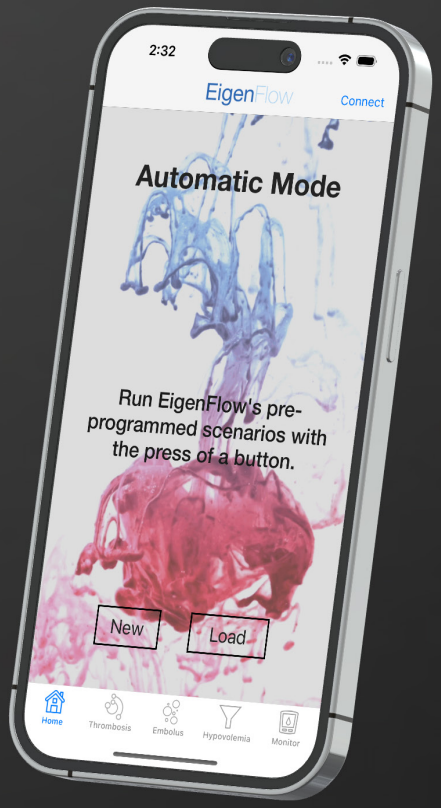
CLR

EigenFlow 3

ECMO SIMULATOR



TRAIN SMARTER
SAVE LIVES

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INTRODUCTION

At the forefront of new medical simulators, EigenFlow addresses the need for high quality ECMO simulation. Training nurses and respiratory therapists can be very challenging. ECMO Specialists must be attentive to even the slightest changes in the oxygenator circuit, be able to quickly evaluate problems, and take corrective actions.

As institutions began to develop their own ECMO simulations many realized that higher-fidelity simulation would not be possible without the development of a remote controlled simulator connected to an ECMO circuit

With the growing use of ECMO in adults and the sporadic admission of ECMO candidates, training is ready to adapt for an on-demand learning expereince. One that is immersive, repeatable, and precise enough to create mechanical troubleshooting scenarios.

The importance of ECMO simulation is underscored by recent findings highlighting the devastating impact of resource shortages during the COVID-19 pandemic, where nearly 90% of young ECMO-eligible patients died due to limited access[1]. Proper training through high-fidelity simulators like EigenFlow ensures healthcare providers are prepared for future respiratory illnesses or pandemics, where quick and precise responses are crucial. By enhancing the skills of the healthcare team, ECMO simulation addresses challenges of equipment and personnel shortages, ultimately saving lives in critical times[1].

[1]Vanderbuilt University (2022): https://www.cidrap.umn.edu/study-90-young-ecmo-eligible-covid-patients-us-hospital-died-amid-rationing

INTUITIVE. PROGRAMABLE. TRANSFORMING

EIGENFLOW 3

Elevate your in situ training with EigenFlow 3, a state-of-the-art wireless ECMO simulator designed for perfusionists and ECMO specialists. Seamlessly integrate EigenFlow 3 into any adult or pediatric ECMO circuit to remotely simulate critical scenarios such as thrombi, line obstructions, air emboli, hypovolemia, and variations in pulmonary and cardiac function.

EigenFlow 3 comes preloaded with 12 expertly crafted scenarios, and also allows you to create and share custom scenarios, enhancing collaborative training and preparedness. At the core of EigenFlow 3 is our user-friendly iOS app, available for free on the App Store. We've revolutionized ECMO simulation by shifting control from desktop computers to a convenient iPhone app. Connecting via Bluetooth, EigenFlow 3 offers seamless control from up to 100 feet away, providing you with the flexibility to create realistic training environments without being tethered to a desktop.

EigenFlow 3 also introduces advanced programmability, making it easier than ever to create custom scenarios. With the intuitive app interface, you can design decision trees and nodes tailored to your specific physiological needs. This feature empowers you to build and adapt scenarios that enhance your training and ensure preparedness for any situation.

Discover the freedom, efficiency, and advanced capabilities of EigenFlow 3 – your essential tool for mastering ECMO procedures.

SCENARIO CREATOR

The latest update for EigenFlow 3 introduces the powerful Scenario Creator feature, giving you full control over your ECMO training simulations. With this update, you can now:

- **Design Custom Scenarios:** Build your own decision trees to mimic complex ECMO procedures
- **Personalize Every Node**: Name each node to align with key decision points.
- **Set Transition Times and Colors**: Fine-tune your scenario flow by selecting transition times between steps and assigning custom colors for easy identi fication and smooth visual navigation.
- **Save, Play, and Share**: Save your custom scenarios, play them back for consistent training sessions, and easily share them with colleagues or training groups to collaborate and enhance learning.

EigenFlow™ connected
to a Fresenius Novalung®

DESIGN

We've taken the complexities of ECMO training and boiled them down to only the bare essentials: thrombosis, air entrainment, cannulation, and hypovolemia. Next, we asked ourselves, how can we make ECMO training as simple as launching an app on your phone?

Simplicity was one of the foundations to the creation of EigenFlow. From the CPC quick connect adapters, to using one port for both air entrainment and hypovolemia scenarios.EigenFlow can quickly get you to the next scenario and still leave your trainee wondering what could go wrong next.

Elegant design comes only from inspiration. Here's how EigenFlow went from a prototype to a finished product.

COMPACT **DESIGN**

Stitting at just 6cm wide and 14cm tall. Most people are pleasantly surprised to see just how small EigenFlow is. From the 850mL reservoir, two CPUs, 5 sensors, and two industrial strength valves found inside EigenFlow. There is little space left to waste in this precisely engineered compact design.

3D-PRINTED **PARTS**

Each EigenFlow 3 comes with four internal 3D-printed parts that are used to store everything from air, fluid, and mounts for the components inside EigenFlow.

BARE **MINIMALISM**

Everything you need to run an ECMO simulation, right when you need it. EigenFlow was designed for in-situ based simulations making it easier for ECMO coordinators to plan their simulations around the number of reserve pumps they have in one session.

INTUITIVE **INTERFACE**

The EigenFlow iOS App is simple and easy to use. Each EigenFlow function is divided into 4 tabs at the bottom of the app. Controls and interfaces are plainly written and easy to find. You'll never have an issue creating a scenarios with EigenFlow's easy access to critical blood parameters.

CONNECTIVITY

EigenFlow can easily connect to any ECMO circuit (pediatric or adult, centrifugal or roller pump). Select two locations on your ECMO practice circuit that you would like to manipulate pressures (usually pre and post oxygenator), splice the circuit, and interpose EigenFlow with our CPC quick connect adapters.

Hypovolemia and air entrainment are connected via a small hose to any port on your circuit.

Once your hoses are connected from the ECMO circuit to EigenFlow, launch the EigenFlow app and you will have complete wireless control of your ECMO circuit up to 150 feet with Bluetooth.

BLUETOOTH

EigenFlow is paired wirelessly through a Bluetooth LE connection to any iOS device. Bluetooth was chosen based on performance with security in mind. Bluetooth allows for multiple connections, so if there are mulitple EigenFlow in use, each one can be operated independently.

IOS APP STORE

The EigenFlow app is a free download on the Apple iOS Store. Updates to the app are will be made throughout the lifetime of the product to ensure EigenFlow can run on the newest versions of the iOS operating system.

Available on the App Store

SIMULATION TYPES

EigenFlow offers four distinct simulation types—Thrombosis (Resistance), Air Entrainment, Hypovolemia, and Blood Monitoring—each designed to address critical scenarios that ECMO specialists frequently encounter. By focusing on these key areas, the simulations help trainees develop specific skills needed to manage complex and varied clinical situations, ensuring that they are well-prepared to recognize and respond to complications.

RESISTANCE

Generate variable flows and pressures with two variable controlled valves for inlet or outlet obstruction, thrombi, kinking, pump chatter, catheter malposition, and variable pre and post oxygenator pressures.

HYPOVOLEMIA

Drain up to 750 mL of fluid into EigenFlow's internal reservoir this will automatically refill the ECMO circuit when the simulation is complete.

AIR ENTRAINMENT

Inject small (5cc), medium (25cc), or large (50cc) emboli of free air into an ECMO circuit. Customize the amount you would like to inject and do it quietly with EigenFlow 3. Train students when to spot and eliminate an air embolus before it becomes fatal.

BLOOD MONITORING

Display simulated vital blood parameters PaO2, PaCO2, SvO2, Hb, Hct, arterial and venous temperatures, simulated flow rate, activated clotting time (ACT), TEG Ratio, aPTT, ABP, PAP, CVP, Anti-Xa, Sweep Gas, FiO_2, P1, P2, ΔP, ph, PWP, and Lactate directly to the ECMO trainee.

CONTENTS

EigenFlow contains everything you'll need to run your own in situ ECMO Simulations:

EigenFlow 3 ECMO Simulator
10" LCD monitor
6' HDMI Cable
15 pediatric/adult circuit acetal connectors
Apple iPod Touch preloaded with the EigenFlow app
Rolling Pelican 1610 Case
EigenFlow Manual
1 year limited warranty

Acccessories

- CLR CannulaMan Adult ECMO Cannuation Task Trainer
- 3-Dmed® Pediatric ECMO Cannulation Kit plus 3 replacement neck pads

The 3-Dmed® Pediatric ECMO Cannulation Kit plus 3 replacement neck pads takes your training to a new level. Using the 3-Dmed® ECMO neck pad provides a realistic experience when training for ECMO cannulation. Now the surgeon is an active participant in the simulation experience.

Each ECMO neck pad allows for a surgical incision, cannulation of vessels and connection to the ECMO machine for artificial blood transference through the machine. Use in conjunction with the EigenFlow for a comprehensive simulation experience.

3-Dmed® developed the ECMO neck pad in collaboration with Cincinnati Children's Hospital Medical Center.

TECHNICAL SPECS

Finish	316 Stainless Steel
Capacity	16GB microSD Card
Weight and Dimensions	Height: 6 1/8” Width: 8 1/2” Depth: 10 1/8” Weight: 33 lbs
Display	Panel Size: 10.1” TFT LCD (16:9) Resolution: 1024×600, support up to 1920×1080 Brightness: 450cd Contrast: 500:1 Input Signal: HDMI, YPbPr, AV1/AV2
Processors	700 MHz single-core ARM1176JZF-S, 16MHz Atmel ATmega32U4
Wireless	Bluetooth 4.2 technology
Power & Output	EigenFlow is powered by 12VDC 6A Output: HDMI out
EigenFlow iOS App	iOS 18 or less iPhone 16 or less iPod Touch iPad: 2024 to iPad Air
Environmental Requirements	Operating ambient temperature: 32° to 95° F (0° to 35° C) Nonoperating temperature: -4° to 113° F (-20° to 45° C) Relative humidity: 5% to 95% noncondensing
Warranty	1 year limited liability warranty

CANNULAMAN

CLR CannulaMan™ is the ultimate training tool for health-care professionals mastering the art of ECMO cannulation.

Designed with precision and attention to detail, Cannula-Man™ is perfect for medical institutions, simulation centers, and professionals seeking to refine their skills in venous and arterial access.

CannulaMan™ delivers a lifelike training experience with accurate anatomy, realistic tissue transitions, authentic vessel resistance, and IJV / femoral vein + artery access

CannulaMan™ is ideal for team training, enabling nurses, physicians, and ECMO specialists to collaboratively practice placing cannulas, suturing, priming, initiating ECMO, weaning, and decannulation — ensuring seamless coordination in real-life scenarios.

Built to complement EigenFlow or be a standalone product, CannulaMan™ is great for practicing all of your mechanical troubleshooting needs.

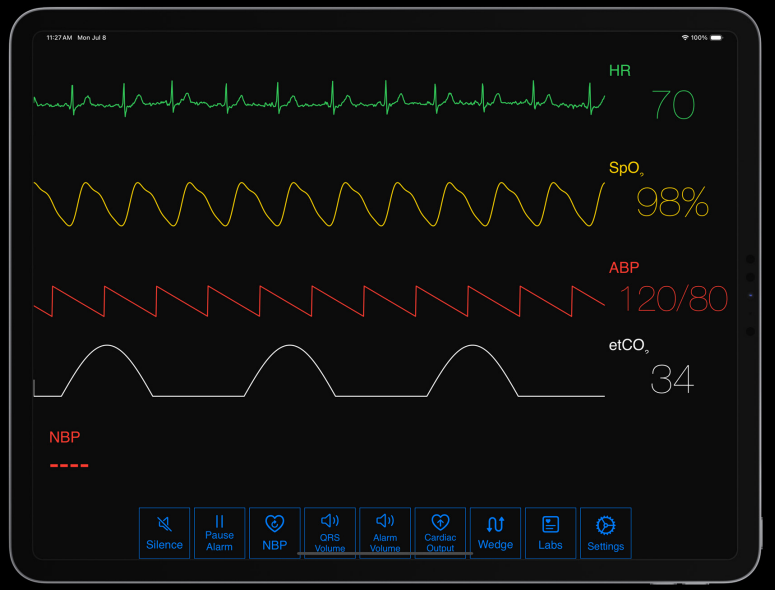
CannulaMan™ assembled on top of operating table. Pelican Air 1637 case also included.

EIGENFLOW 3 ADVANCED

EigenFlow 3 Advanced is the next evolution in ECMO training technology, designed to offer even greater flexibility and control. The Advanced model introduces a fully programmable patient monitor on an iPad, seamlessly integrated with the EigenFlow 3 iPhone app for remote control functionality.

This upcoming feature will eliminate the need for simulated monitors from other manufacturers, making your training scenarios more efficient and cohesive. With the ability to remotely adjust the patient monitor, you'll have full control over dynamic simulations, allowing for real-time adjustments that mirror the complexities of actual ECMO cases.

EigenFlow 3 Advanced is set to redefine what's possible in training environments, streamlining every aspect of scenario creation and execution.



Control the EigenFlow's Pateient Montitor values remotely with the upcoming EigenFlow 3 Advanced upgrade

Coming Q2 2025

Featuring a full simulated patient monitor display emulated on a 13” iPad.

SCENARIOS

EigenFlow comes with 12 pre-written adult and 7 pre-written pediatric scenarios that can be used by your ECMO team to formalize your training. Each scenario comes with a background history of each patient as well as a state diagram detailing a scenario progression. Here is a list of the following

Adult

1. Cardiac Tamponade
2. Cardiogenic Shock
3. Differential Hypoxia
4. High Post-Oxygenator Pressure
5. High Pre-Oxygenator Pressure
6. Hypovolemia
7. Kinked Tubing
8. Oxygenator Failure
9. Pump Chatter
10. Venous Air Entrainment
11. Arterial Air Entrainment
12. VV ECMO Preparation

Pediatric

1. High Post-Oxygenator Pressure
2. High Pre-Oxygenator Pressure
3. High Better Bladder Pressure
4. Hypovolemia
5. Venous Air Entrainment
6. Arterial Air Entrainment
7. Oxygenator Failure

OUR CLIENTS

The EigenFlow ECMO Simulator is trusted by a range of prestigious clients, including some of the top hospitals, training organizations, and ECMO machine manufacturers worldwide. We've partnered with institutions that are at the forefront of medical innovation, helping to enhance their ECMO

Rachel Wallace, RRT
University of Minnesota
Masonic Children's Hospital.
ECMO Coordinator

"I have used the CannulaMan and the EigenFlow for 2 years now for training, demonstrating, and educating fellows, attendings, and ECMO specialists. The customer support has been great as they always respond quickly and help with solutions for our very busy program. Recently, they attended our critical care cardiology education summit, where we had 16 CannMans available to run through cannulation training! The team at CLR worked diligently to ensure we had adequate vessels and volume to continue training. We look forward to what more this company can provide us in the future!"

CLR

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