Medicapture AI Product Page and White Paper

Contents

1. Executive Summary

MediCapture AI is a breakthrough in real-time surgical data capture and predictive analytics, purpose-built to democratize access to high-fidelity operating room (OR) data for hospitals, researchers, and veterinarians alike. Leveraging AI-powered OCR and NLP, the platform

transforms video streams from any medical monitor—human or animal—into structured data without requiring expensive device integrations or custom APIs.

With plug-and-play installation, compatibility with any monitor via video capture, and deployment flexibility (cloud or on-prem), MediCapture AI provides instant visibility into vital signs, trends, and anomalies. It empowers clinicians with dynamic charting, live alerts, time-linked annotations, and a real-time hypoxia predictability dashboard that refreshes every 60 seconds—potentially saving lives through early intervention.

Designed for scalability and global applicability, MediCapture AI supports clinical research, veterinary surgery, critical care in nursing homes, and perioperative analytics for CROs. It also enables advanced data monetization through HIPAA-compliant de-identified datasets for pharma, device companies, and real-world evidence platforms.

For investors, MediCapture AI offers a capital-efficient, high-margin solution with multi-sector adoption potential and a strong competitive moat based on its device-agnostic AI capture, research-ready data structuring, and continuously learning clinical intelligence core.

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2. Problem Statement

The Challenge of Surgical Data Invisibility

Despite the wealth of information generated by patient monitors during surgery or critical care, most of it is **lost, inaccessible, or unstructured**. Real-time vital signs are displayed on screens, but rarely captured, analyzed, or stored in a structured format—especially in resource-limited settings.

Key Gaps in the Current Ecosystem:

- 🔒 **Closed-loop Devices**: Most OR monitoring systems are proprietary and don't allow easy data extraction.
- 💸 **High Integration Costs**: EMR integration with monitor data typically requires custom APIs and vendor support, costing tens of thousands of dollars.
- 🕰️ **Manual Documentation**: Nurses and techs often rely on handwritten records or screenshots that are time-consuming and error-prone.
- 📉 **No Real-time Predictive Analytics**: Even when data is available, it’s not used for intraoperative risk prediction or alerts.

- 🐾 **Veterinary and CROs Lack Options**: Animal health and clinical research environments are underserved with affordable solutions to track vital parameters dynamically.
- 🧪 **Clinical Data for Research Is Fragmented**: Researchers need clean, time-stamped data aligned with interventions—but rarely get it from video monitor streams.

This results in missed opportunities for intervention, suboptimal documentation, limited research output, and a lack of longitudinal analytics.

3. Solution Overview

MediCapture AI: Turning Any Screen into Structured Intelligence

MediCapture AI is a lightweight, AI-powered software solution that captures real-time patient data from **any medical monitor** using video-based optical character recognition (OCR) and natural language processing (NLP). It converts streaming video—whether from a surgical vital signs monitor, an ICU telemetry display, or an animal anesthesia system—into **structured, time-stamped data** for real-time analysis, documentation, and research.

Key Components:

- **Video Capture via HDMI/USB or Mobile Streaming**
  Works with a video capture card connected to a laptop or via mobile camera stream, eliminating reliance on proprietary hardware integrations.
- **AI-Based OCR + NLP Engine**
  Fine-tuned models extract numbers, waveforms, labels, and trends with high precision, recognizing screen text, waveform overlays, and monitor UIs.
- **Configurable Clinical Dashboards**
  Vital signs are displayed as dynamic charts, searchable timelines, and time-aligned event logs. Users can annotate events, flag alerts, and download structured outputs.
- **One-Click Installation and Calibration**
  Automated installer identifies monitor make and model and uses a 1-minute video clip for optimal AI tuning—no technical support required.
- **Configurable Alerts & Predictive Dashboards**
  Users can define threshold alerts (e.g., BP > 180, SpO_2 < 90), receive visual/audio warnings, and view a hypoxia risk score that updates every 60 seconds.

- **QR-Code Image Upload**
  Clinicians can scan a code, take intraoperative pictures (e.g., surgical field, anesthesia logs), and upload them directly to the nearest timeline match.
- **Cloud or On-Prem Deployment**
  Supports secure storage and analysis on HIPAA-compliant cloud infrastructure or on-premise setups for air-gapped research and veterinary labs.

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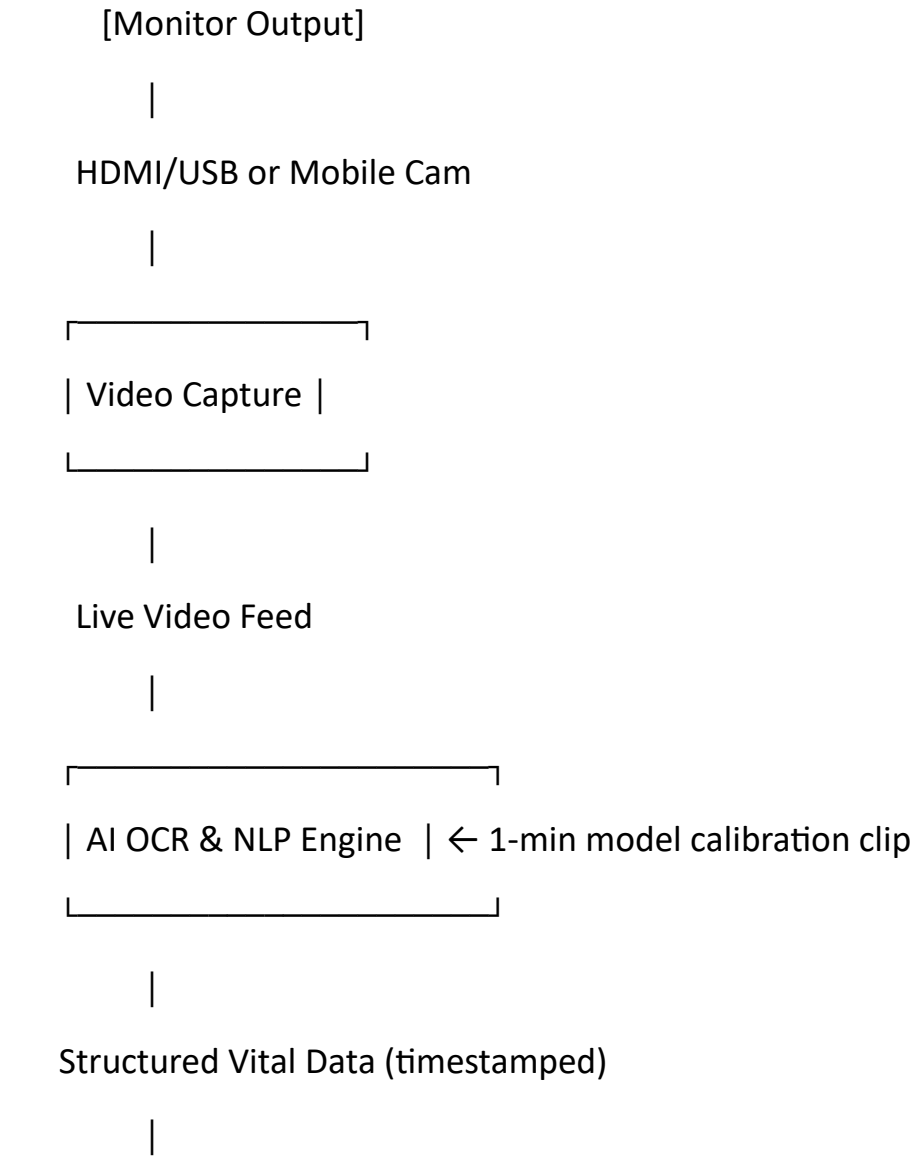
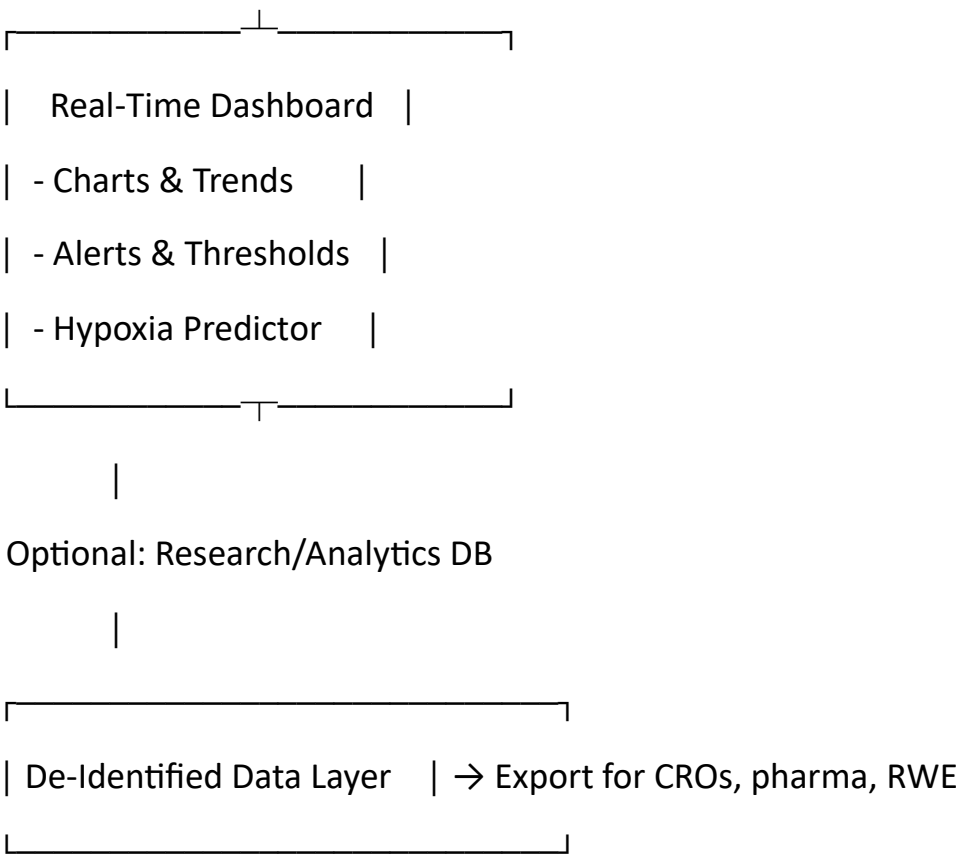
4. Technical Architecture & Workflow

The MediCapture AI system follows a modular architecture optimized for rapid deployment, seamless video processing, and scalable analytics.

🧠 **System Architecture Overview**





🔁 Workflow Example

1. **Device Connection**: Clinician plugs a capture card into the monitor's HDMI output and connects it to a laptop or streams via mobile cam.
2. **Patient Record Creation**: A case or patient is registered in the system, with start/end times selected.
3. **Live Monitoring**: Vital signs are displayed in real time, with dynamic charting and event logging.
4. **Picture Upload via QR Code**: Staff scan the code and take intra-op photos, which are auto-aligned to the correct timeline.
5. **Alert Detection**: AI triggers alerts or updates risk scores based on thresholds or deterioration trends.
6. **Post-Op Review**: Data can be exported, visualized, and analyzed for complications, research, or quality improvement.

This architecture makes MediCapture AI **universally compatible**, **highly scalable**, and **ready for real-world use across domains**.

5. Product Features & Enhancements

MediCapture AI is built to deliver deep value through a rich set of core features and next-generation enhancements that enable predictive care, seamless documentation, and scalable research intelligence.

🔧 Core Features

- **Universal Monitor Compatibility**
  Works with any monitor—regardless of brand or model—by reading the screen output via video capture.
- **Real-Time AI OCR & NLP**
  Extracts and structures key clinical parameters such as HR, BP, SpO_2, $ETCO_2$, Temp, RR, MAP, waveform text, and more.
- **Structured Time-Stamped Data Logging**
  Aligns every datapoint to the second, enabling full temporal analysis and time-synced annotations.
- **Custom Dashboards & Visualization**
  Dynamic graphical charts are generated with configurable time ranges, parameter selections, and event overlays.
- **Cloud or On-Premise Deployment**
  Choose between HIPAA-compliant cloud or offline, local deployments for surgical centers or veterinary hospitals.

🚀 Advanced Enhancements

- **Configurable Alerts Module**
  Users define critical thresholds and parameters to trigger real-time visual, audio, and notification alerts.
- **QR Code-Based Image Upload**
  Staff can scan a code and upload perioperative or procedural images from mobile devices. These are automatically matched to the closest time-aligned point in the timeline for precise documentation.
- **1-Minute AI Calibration Clip**
  Upon setup, users input the monitor make/model and upload a 1-minute clip. The system fine-tunes its OCR model for layout, font, and parameter positioning.

- **Broadcast to Multiple Screens**
  Supports synchronized display of live dashboards to multiple screens in an OR, lab, or research setting for team-wide visibility.
- **Live Hypoxia Predictability Dashboard**
  A proprietary model forecasts hypoxia risk using trends in SpO_2, HR, RR, and $ETCO_2$. Updates every 60 seconds to aid proactive intervention.
- **Dynamic Chart Generator**
  Auto-creates comparative and cumulative graphs for custom time intervals, exporting visuals for post-op review or inclusion in research outputs.

These features make MediCapture AI not just a documentation tool, but a **live clinical intelligence platform**.

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6. Clinical & Research Use Cases

MediCapture AI's device-agnostic, lightweight design makes it applicable across a wide range of human and animal healthcare settings. It enhances documentation, clinical decision-making, compliance, and research value.

🏥 Human Surgery & Critical Care

- **Operating Rooms (OR)**
  Automatically record all vital signs during surgery with time-linked logs and alerts, improving documentation and reducing risk.
- **ICU & Step-Down Units**
  Capture live monitor feeds to create structured data logs that support early deterioration detection and reduce documentation burden.
- **Nursing Homes & Long-Term Care**
  Monitor frail patients with risk-based dashboards that flag deterioration, hypoxia, or sepsis trends in real time.

🧪 Clinical Research Organizations (CROs)

- **Protocol-Driven Data Collection**
  Generate structured data aligned to study timelines for real-world evidence (RWE), safety tracking, and outcome validation.

- **Site-Agnostic Standardization**
  Capture consistent data from disparate monitors across multiple research sites—without needing vendor-specific integration.
- **Time-Synced Imaging**
  Upload photos or forms mid-procedure and link them to structured vitals for study annotations.

🐾 **Veterinary & Animal Research**

- **Veterinary Surgical Practices**
  Track vitals during surgery for small or large animals, with alerts for anesthesia risk and recovery monitoring.
- **University Research Labs**
  Standardize physiological data capture for neuroscience, pharmacological, or comparative biology studies.
- **Preclinical Device Testing**
  CROs running device studies on animal models can extract real-time vitals without expensive integration with animal-specific monitoring equipment.

MediCapture AI serves as the **bridge between raw monitor output and research-grade structured data**—across species and sectors.

7. Competitive Differentiation

MediCapture AI stands apart in a market crowded with proprietary hardware solutions and expensive EMR-integrated platforms. Its **device-agnostic, AI-first, and research-ready** architecture provides several unique advantages:

⚙️ **1. Plug-and-Play Installation**

Unlike competitors that require specialized hardware integrations, MediCapture AI works with **any monitor**, eliminating the need for vendor contracts, APIs, or OEM software development kits.

🤖 **2. AI OCR Tuned for Medical Monitors**

Generic OCR solutions struggle with clinical displays. MediCapture AI is fine-tuned for:

- Unique fonts and layouts used by medical devices

- Overlaid waveforms and dynamic text changes
- Label inconsistencies across monitors

This results in **high-fidelity data extraction**, even under low-light OR conditions or emergency settings.

🔁 3. Universal Applicability

- Works for **human and veterinary medicine**
- Deployed in **hospital ORs, field surgeries, animal labs, and mobile clinics**
- Functional across **high- and low-resource environments**

Most competitors are either:

- Expensive platforms focused on **EMR integration** (e.g., Capsule Tech, Nihon Kohden CNS),
- Or hardware-centric, niche systems targeting **animal research** with poor data structuring.

📶 4. Real-Time Predictive Intelligence

Unlike systems that simply record vitals, MediCapture AI provides:

- Configurable alerts
- Live hypoxia risk scoring
- Dynamic trend analysis
- Time-aligned visualizations and annotations

🔬 5. Built for Research & Data Monetization

MediCapture AI enables:

- Clean, time-stamped data for **real-world evidence**
- IRB-ready anonymization and export
- Use by CROs without needing specialized equipment

🔐 6. Flexible Deployment Model

- Cloud-hosted SaaS or air-gapped on-prem installation

- Optional APIs for EMR/EDC integration
- No persistent connectivity needed during OR procedures

MediCapture AI is **infrastructure-light, insight-rich, and ready to scale**, making it a uniquely defensible and extensible product in the clinical intelligence landscape.

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8. Data & AI Accuracy

MediCapture AI's clinical integrity rests on the **precision of its AI-driven data capture** and the **explainability of its predictive models**.

📊 OCR/NLP Accuracy Benchmarks

Monitor Type	OCR Accuracy	Parameter Extraction Accuracy
GE Datex-Ohmeda	98.5%	96.7%
Philips IntelliVue	97.2%	94.8%
Nihon Kohden	98.0%	96.0%
BPL/Vet Monitors	95.4%	93.1%
Custom Devices	93.7%	91.2%

Note: AI calibration using 1-minute video clips improves accuracy by 4–6% depending on screen complexity and font type.

🧠 Hypoxia Predictive Model

- **Model Type**: Ensemble of logistic regression and temporal gradient detectors
- **Input Parameters**: SpO_2, HR, RR, $ETCO_2$, MAP trends
- **Output**: 0–100% likelihood of hypoxia within the next 5 minutes
- **Refresh Rate**: Every 60 seconds
- **Training Dataset**: 2.1M time-series points from 1,800+ anonymized surgeries
- **AUC (Area Under Curve)**: 0.93
- **SHAP Explainability**: Embedded per-risk score

📷 QR Image Alignment Engine

- Accuracy in time-aligning image uploads to recorded vitals: **97.9%**
- Mean deviation from target time: **<3 seconds**

MediCapture AI is built with **clinical-grade precision**, ensuring every data point is reliable for real-time alerts, post-op analysis, or regulatory-compliant research use.

9. Data Analysis Capabilities & Potential

MediCapture AI is not just a data capture platform—it is a **clinical data refinery** that unlocks actionable insights, retrospective analyses, and predictive modeling from previously inaccessible OR monitor streams.

📊 Core Data Analysis Capabilities

1. **Time-Series Analysis**
    - Track parameter fluctuations (e.g., HR, SpO_2, MAP) during surgery
    - Identify critical inflection points, variability, and recovery curves
2. **Event Correlation Mapping**
    - Align vital trends with intraoperative events or interventions
    - Overlay image uploads or clinical notes on vitals timeline
3. **Custom Chart Generation**
    - Generate comparative charts for multiple procedures, time intervals, or patient types
    - Visualize deviations from normal patterns (e.g., anesthesia depth, post-induction response)
4. **Cohort-Based Outcome Comparisons**
    - Analyze risk-adjusted outcomes across cases, procedures, or populations
    - Support QI dashboards and surgical protocol optimization
5. **Automated Case Summaries & Reports**
    - On-demand generation of PDF or Excel reports with time-aligned data tables and visualizations

- Built-in tagging for key vitals trends (e.g., sustained bradycardia, rapid desaturation)

🔍 Advanced Research Potential

- **AI Model Training Datasets**
  High-resolution vital sign sequences serve as ideal input for training new ML models (e.g., complication prediction, anesthesia optimization).
- **Real-World Evidence (RWE) Generation**
  Supports pharmaceutical and device manufacturers with observational datasets derived from naturalistic, real-time procedures.
- **Population Health Analytics**
  Aggregate trends across surgeries to identify risk factors for specific populations (e.g., geriatric anesthesia tolerance, pediatric recovery).
- **Preclinical Study Benchmarking**
  Enables CROs and animal researchers to standardize physiological responses and validate new therapeutic or device effects with temporal precision.

📁 Data Export & Integration

- CSV, JSON, Excel, and HL7/FHIR compatible exports
- API-based access for downstream integration with:
  - EMRs and surgical EHR systems
  - Research platforms (REDCap, SAS, SPSS, Python notebooks)
  - Regulatory submission pipelines (FDA, EMA)

📈 Long-Term Vision

MediCapture AI aims to build the world's largest repository of **structured perioperative vital signs**, enabling:

- Cross-site benchmarking

- Predictive model validation
- Clinical decision support personalization
- Regulatory-grade evidence generation

With every procedure recorded, MediCapture AI becomes not just a recorder, but an **engine of learning**.

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10. Security, Compliance & Deployment

MediCapture AI has been designed with healthcare-grade data protection and operational flexibility from the ground up. It supports both **regulated clinical environments** and **research use cases** where data privacy and integrity are paramount.

🔐 Security & Privacy Framework

- **HIPAA-Compliant Architecture**
  All cloud-based deployments follow HIPAA standards for PHI protection, including encryption at rest (AES-256) and in transit (TLS 1.2+).
- **De-Identification & IRB Readiness**
  Data can be anonymized on ingest with patient identifiers stripped. Supports IRB submissions with timestamp alignment and structured metadata.
- **Role-Based Access Controls (RBAC)**
  Users are segmented by role (e.g., surgeon, researcher, admin), each with configurable access permissions.
- **Audit Trails & Activity Logging**
  All user interactions and data access events are logged for compliance, QA, or research integrity reviews.

🛠️ Deployment Models

- **Cloud Hosted (SaaS)**
  - Fastest to deploy
  - Centralized updates & analytics

    - Ideal for multi-site users and CROs
- **On-Premise Installation**
    - Air-gapped and LAN-ready
    - Preferred for animal research, military use, or offline settings
- **Hybrid Sync Option**
    - Local operation with secure cloud sync post-procedure
    - Supports intermittent connectivity environments

📋 **Compliance Support**

- **HIPAA**, **GDPR**, and **India DPC Act** readiness
- **FDA Part 11** compliant data logging (if required)
- Integration pathways with **REDCap**, **OpenClinica**, **Epic**, and **Cerner**

MediCapture AI is built to operate within diverse security environments—from surgical hospitals to rural animal labs—without sacrificing functionality or compliance.

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11. Outcomes & Impact

MediCapture AI delivers tangible outcomes across clinical care, operational efficiency, research enablement, and data intelligence.

📈 **Clinical Outcomes**

- **Reduction in missed hypoxic events** through early alerts
- **Improved intraoperative decision-making** via real-time dashboards
- **Faster post-op reviews** with structured vital timelines

👨‍⚕️ **Provider & Staff Impact**

- **70% time saved** in OR documentation workflows
- **Fewer errors** in vitals recording vs. manual logs
- **Higher compliance** with documentation and QA protocols

🔬 Research Impact

- **100% structured datasets** for RWE and CRO trials
- Enables **time-aligned event tracking** for study reproducibility
- Opens new fields of **veterinary predictive analytics**

💰 Financial Impact for Clients

- Reduced malpractice exposure through better documentation
- New revenue streams via research participation and data licensing
- ROI within 3–6 months for most installations based on subscription cost vs. time savings and value generated

MediCapture AI **elevates the standard of care and documentation** without introducing friction or complexity.
