

Automatic 3D reconstruction of electrophysiology catheters from two-view monoplane C-arm image sequences

Christoph Baur · Fausto Milletari ·
Vasileios Belagiannis · Nassir Navab ·
Pascal Fallavollita

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Abstract *Purpose:* Catheter guidance is a vital issue for the success of electrophysiology interventions. It is usually provided through fluoroscopic images that are taken intra-operatively. The cardiologists, who are typically equipped with C-arm systems, scan the patient from multiple views rotating the fluoroscope around one of its axes. The resulting sequences allow the cardiologists to build a mental model of the 3D position of the catheters and interest points from both views.

Methods: We describe and compare different 3D catheters reconstruction strategies and ultimately propose a novel and robust method for automatic reconstruction of 3D catheters in non-synchronized fluoroscopic sequences. This approach does not purely rely on triangulation but incorporates prior knowledge about the catheters. In conjunction with an automatic detection method, we demonstrate the performance of our method by evaluating on the complete surgical workflow.

Results: In our experiments that include 20 biplane datasets, we achieve an average re-projection error of 0.43mm and an average reconstruction error of 0.67mm compared to gold standard annotation.

Conclusions: In clinical practice, catheters suffer from complex motion due to the combined effect of heart beat and respiratory motion. As a result, any 3D reconstruction algorithm via triangulation is imprecise. We have proposed a new method that is fully automatic and highly accurate to reconstruct catheters in three dimensions.

Keywords fluoroscopy · catheter 3D reconstruction · electrophysiology · probabilistic graphical model · arrhythmia

Christoph Baur
Technische Universität München
Bohrmannstr. 3, 85748 Garching, Germany
Tel.: +49 (0)89 289 17979
E-mail: baurc@in.tum.de

Fausto Milletari, Vasileios Belagiannis, Nassir Navab, Pascal Fallavollita
Computer Aided Medical Procedures, Technische Universität München, Germany

Electrophysiology Lab Procedure Manual

Leo M.L. Nollet, Leen S. P. De Gelder



Electrophysiology Lab Procedure Manual:

Handbook of Cardiac Electrophysiology Andrea Natale, Oussama M. Wazni, Kalyanam Shivkumar, Francis E. Marchlinski, 2020-03-23 The second edition of this bestseller provides a practical user friendly manual guiding the theory and practice of cardiac electrophysiology The handbook provides the specialist in training with a thorough grounding procedures and clinical findings for clinicians It provides a review of the main kinds of arrhythmia with illustrations of typical ECG findings supported where appropriate by correlative imaging It also details the principal diagnostic and therapeutic procedures include implantation of pacemakers resynchronization therapy and ablation techniques Key Features Provides concise user friendly guide to the equipment procedures and clinical findings with which EPs need to be familiar Delivers alternatives resource to the flagship titles available in this field idea for those beginning training or seeking an update Presents extensively updated material to enhance comprehension Includes new treatments and devices for electrophysiologists trained to perform interventional cardiac electrophysiology studies EPS as well as surgical device implantations *2012 Comprehensive Accreditation Manual for Laboratory and Point-Of-Care Testing (Camlab)* Jcr, 2012

A Manual of Laboratory and Diagnostic Tests Frances Talaska Fischbach, Marshall Barnett Dunning, 2009 Now in its Eighth Edition this leading comprehensive manual helps nurses deliver safe effective and informed care for patients undergoing diagnostic tests and procedures The book covers a broad range of laboratory and diagnostic tests and studies that are delivered to varied patient populations in varied settings Tests are grouped according to specimen and function test type e g blood urine stool cerebrospinal fluid etc Each test is described in detail with step by step guidance on correct procedure tips for accurate interpretation and instructions for patient preparation and aftercare Clinical Alerts highlight critical safety information *Invasive Cardiology: A Manual for Cath Lab Personnel with Navigate Advantage Access* Sandy Watson, Kenneth A . Gorski, 2022-03-10 This book is written primarily for technical and nursing professionals training to work in catheterization laboratories It also serves as a reference manual for these professionals during their first few years in the lab *Developing and Managing Engineering Procedures* Phillip A. Cloud, 2001-01-16 This book provides hands on techniques for writing engineering procedures to achieve ISO 9000 compliance It is designed for individuals responsible for writing these procedures in any industry Readers will find actual examples of clearly written compliant engineering procedures ready to adapt to your own industry and your own particular needs and use immediately It answers virtually all your procedure writing questions Procedure writers will gain a general understanding of engineering documentation principles and how to apply them to their own situations Simple diagrams and other graphics illustrate key ideas giving a bird's eye view of what is coming next The intent of the book is to familiarize the reader with the essential elements and concepts of engineering procedure development and management and show how to apply these concepts to their own specific applications The author emphasizes engineering principles and tools that are common to all engineering disciplines

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a number of comprehensive books in clinical microbiology there remains a need for a manual that can be used in the clinical laboratory to guide the daily performance of its work Most of the existing publications provide detailed and precise information for example by which a microorganism can be characterized and identified beyond any doubt however the number of tests involved in this process exceeds the capabilities and resources of most clinical laboratories and are irrelevant for patient care It is therefore necessary in any clinical laboratory to extract from reference manuals textbooks and journals those tests and procedures that are to be used to complete the daily workload as efficiently and accurately as possible It is also essential in the clinical laboratory to determine on the basis of the kind of specimen being examined which microorganisms are clinically relevant and require isolation and identification and which should either be excluded selectively or simply regarded as indigenous flora and therefore not specifically identified Cost and time limit a laboratory's resources and priorities must be established for handling the workload The procedures described in the second edition of this manual are those selected by our staff for use in the clinical laboratory on the basis of clinical relevance accuracy reproducibility and efficiency Alternative procedures when considered equivalent on the basis of personal or published experience have been included where appropriate

Title List of Documents Made Publicly Available U.S. Nuclear Regulatory Commission, 1981 **Monthly Catalogue, United States Public Documents**, 1989-03 *How-to Manual for Pacemaker and ICD Devices* Amin Al-Ahmad, Andrea Natale, Paul J. Wang, James P. Daubert, Luigi Padeletti, 2018-03-20 A complete how to do it guide to planning programming implementing and trouble shooting today's pacemakers and other implantable cardiac devices Edited by a team of leading clinician educators this is a practical go to reference for trainees and clinical staff who are new to or less experienced with the programming and management of implantable devices It distills device best practices into a single quick reference volume that focuses on essential tasks common pitfalls and likely complications Each chapter follows a hands on how to do it approach that helps readers quickly master even the most challenging device related tasks such as programming and how to respond confidently when complications arise Today's pacemakers and other implantable EP devices are to earlier versions what smart phones are to rotary phones They are not only smaller and more comfortable they offer complex programming options that allow clinicians to adapt a device to individual patient requirements As they continue to become smaller smarter and more adaptable these devices also become more challenging for clinicians to set up manage and monitor This unique quick reference guide dramatically reduces the learning curve for mastering this essential technology by giving doctors and technicians the how to information they need Focuses on tasks clinicians perform including pre implementation planning programming management troubleshooting and more Shows how expert clinicians achieve optimal outcomes in their own labs with real world examples Features more than 300 images including ECGs X ray and fluoroscopy images from device interrogation intracardiac electrograms and color electroanatomical maps Provides eight videos on an accompanying website demonstrating key tasks and techniques Also

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Kern's Cardiac Catheterization Handbook - E-BOOK Paul Sorajja,Michael J Lim,2025-05-23 Clearly written highly illustrated and designed for quick reference Kern s Cardiac Catheterization Handbook 8th Edition is the resource of choice for every member of the cardiac cath team Widely regarded as the bible of cardiac catheterization this portable accessible primer provides a straightforward practical explanation of the lab and its complex procedures for cardiac fellows residents nurses and all cath lab personnel Initial chapters assist the novice with descriptions of how procedures flow what steps to learn first and other essential information Later chapters are devoted to special techniques high risk procedures research techniques percutaneous coronary interventions and optimization of outcomes all with a focus on treatment protocols for every procedure Provides clear instructions on what to expect what to avoid and how to manage complications for every procedure you ll encounter including coverage of new techniques and technologies that affect virtually all aspects of familiar procedures Covers all the newest catheterization techniques for vascular closure and expansion of large bore access procedures including TAVR ECMO mitralclip and TMVR Discusses key topics such as intracardiac echocardiography and intraprocedural imaging management of complications with algorithms that expedite the approach to these patients adjunctive hemodynamic support and maintaining quality in the laboratory Emphasizes indications and contraindications for procedures in the context of a multidisciplinary heart team approach Includes numerous clear illustrations and a newly expanded video library to enhance your understanding of the material Any additional digital ancillary content may publish up to 6 weeks following the publication date Practical Guide to Catheter Ablation of Atrial Fibrillation Jonathan S.

Steinberg,Pierre Jais,Hugh Calkins,2015-11-23 Now in its second edition this practical guide offers clear headed guidance to the successful application of catheter ablation for atrial fibrillation This book concentrates on clinically relevant information that providers can put to immediate use caring for patients Takes a clear headed practical approach to ablation of atrial fibrillation long on actionable clinically relevant guidance succinct and to the point on the theory behind the procedure Edited by three leading internationally known electrophysiologists with extensive experience in ablation for atrial fibrillation Written by international team of experts reflecting global best practices from centers with considerable experience in the use of catheter ablation Format designed to serve the needs of electrophysiologists regardless of experience electrophysiology fellows electrophysiology nurses and lab technical staff Covers hot topics such as new noninvasive imaging techniques the treatment of challenging left atrial flutters options for persistent atrial fibrillation and when a redo ablation is needed and novel application of ablation targeting the autonomic nervous system **Handbook of Water Analysis** Leo M.L.

Nollet, Leen S. P. De Gelder, 2000-06-27 This work details water sampling and preservation methods by enumerating the different ways to measure physical chemical organoleptical and radiological characteristics It provides step by step descriptions of separation residue determination and cleanup techniques for a variety of fresh and salt waters It also discusses information regarding the analysis and detection of bacteria and algae

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