**SERENA BONARETTI**

**Curriculum Vitae**

**PERSONAL INFORMATION**

Current Position Physical Science Research Scientist and Associate Director of the Zeego Laboratory

Department of Radiology, Stanford University School of Medicine

Research Biomedical Engineer

Veterans Affairs Palo Alto Health Care System

Work Address Lucas Center for Imaging, Stanford University

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Webpage <https://sbonaretti.github.io/>

**EDUCATION**

03.2012 – 12.2014 Postdoctoral Scholar, Department of Radiology and Biomedical Imaging, University of California, San Francisco, USA

Project: Standardization of acquisition procedure for bone imaging for multicenter clinical research

Advisors: Thomas Lang and Andrew Burghardt

12.2007 – 01.2012 PhD in Biomedical Engineering, Institute for Surgical Technology and Biomechanics, University of Bern, Switzerland

Thesis: Statistical Models of Shape and Density for Population-based Analysis of Bone Mechanics with Applications to Fracture Risk Assessment and Implant Design

Advisors: Mauricio Reyes and Philippe Büchler

10.2003 – 10.2005 MSc in Biomedical Engineering, Politecnico di Milano, Italy

Thesis: Methods for 2D and 3D segmentation and rendering of CT images: Validation and application in maxillofacial surgery (in Italian)

Advisors: Gabriella Tognola and Paolo Ravazzani

10.2000 – 10.2003 BSc in Biomedical Engineering, Politecnico di Milano, Italy

Advisor: Paolo Ravazzani

**EMPLOYMENT**

01.2016 – present Physical Science Research Specialist, Department of Radiology, Stanford University, USA

Research Biomedical Engineer, Department of Veterans Affairs, Palo Alto, USA

Projects: Weight-bearing imaging of the knee using C-arm CT, and Automatic segmentation of MR images of the knee

Advisors: Garry Gold and Gary Beaupre

01.2015 – 12.2015 Associate Specialist, Department of Radiology and Biomedical Imaging, University of California, San Francisco, USA

Project: Standardization of acquisition procedure for bone imaging for multicenter clinical research

Advisors: Thomas Lang and Andrew Burghardt

11.2005 – 11.2007 Clinical Engineer, Department of Audiology, Fondazione Audiologica Varese ONLUS, Ospedale di Circolo - Fondazione Macchi, Varese, Italy

Role: Responsible of the department instrumentation and support for scientific activities

Advisor: Sandro Burdo

04.2005 – 10.2005 Research Assistant, Institute of Biomedical Engineering - Italian National Research Council (ISIB-CNR), Politecnico di Milano, Italy

Project: Segmentation of mandibular nerve from CT images

Advisors: Gabriella Tognola and Paolo Ravazzani

05.2003 – 07.2003 Research Assistant, Institute of Biomedical Engineering - Italian National Research Council (ISIB-CNR), Politecnico di Milano, Italy

Project: Segmentation of brain image for electromagnetic field estimation

Advisors: Paolo Ravazzani and Marta Parazzini

**INSTITUTIONAL RESPONSIBILITIES**

The following institutional responsibilities are without remuneration

11.2016 - present Associate Director of the Zeego Laboratory, Department of Radiology, Stanford University, USA

01.2016 - present Creation and maintenance of the JOINT group webpage and of the Zeego Lab webpage, Stanford University, USA

01.2015 - 12.2015 Contribution to the Musculoskeletal CT Imaging Research Group webpage, University of California San Francisco, USA

01.2010 - 12.2011 Contribution to the Institute for Surgical Technology and Biomechanics webpage, University of Bern, Switzerland

**SUPERVISION OF JUNIOR RESEARCHERS**

03.2017 – 02.2018 Fatih Chengiz, M.Sc. thesis on Automatic segmentation of the meniscus from MR images, University of Erlangen-Nürnberg, Germany

06.2016 – 08.2016 Alyssa Hobson and Sandra Ortellado, Summer student project on Segmentation of knee bones from weight-bearing cone-beam computed tomography images, Stanford University, USA

06.2016 – 08.2016 Francisco Lopez and Heidi Poppe, Summer student project on Subject’s support platform for weight-bearing cone-beam computed tomography imaging, Stanford University, USA

05.2015 – 12.2015 Caroline Mai Chan, Development of webapp for reference line positioning during high-resolution peripheral quantitative computed tomography imaging, University of California San Francisco, USA

06.2014 – 12.2015 Andrew Yu, Internship during the MrOS project, University of California San Francisco, USA

09.2010 – 03.2011 Saloni Soin, M.Sc. thesis on Preformed cranial implants, University of Bern, Switzerland

11.2009 – 10.2010 Andreas Siegrist, B.Sc. thesis on Bone material property assignment for finite element analysis, Fachhochschule Nordwestschweiz Biel and University of Bern, Switzerland

**TEACHING**

The following teaching activities are without remuneration

11.2007 Guest Lecturer, Surgery Without All the Blood (RAD 70N), Stanford University, USA

“Introduction to Interventional Radiology at the Zeego Lab”

04.2017 - 06.2017 Co-instructor (50%), Orthopaedic Bioengineering (BIOE/ME 381), Stanford University, USA

Lectures on bone anatomy, physiology, mechanics, imaging, disease, and fracture

Laboratory in bone fixation

01.2017, 01.2018 Guest Lecturer, Clinical Needs and Technology (BIOE 301B), Stanford University, USA

“Introduction to X-ray-based Imaging”

“Minimally Invasive Therapies in Swine” (Laboratory)

10.2016 Guest Lecturer, Introduction to Bioengineering Research (BIOE 390/MED 289), Stanford University, USA

“Weight-bearing Imaging of the Knee Using C-arm CT”

03.2015 Guest Lecturer, Image Processing and Analysis II (BI 265), University of California San Francisco, USA

“Active Shape and Appearance Modeling in Medical Imaging”

01.2014, 01.2015 Guest Lecturer, Musculoskeletal Imaging (BI 240), University of California San Francisco, USA

“Assessment of Bone Strength - Foundations of FE and microFE”

12.2009 Guest Lecturer, Medical Image Analysis, ETH Zürich, Switzerland

“Statistical Shape Models”

10.2009 Guest Lecturer, Medical Image Analysis, University of Bern, Switzerland

“Statistical Shape Models”

**SCIENTIFIC REVIEWING ACTIVITIES**

*Grant reviewer*

2015 – 2016 American Society for Bone and Mineral Research

*Journal reviewer*

2016 - present Physica Medica

2016 - present Biomechanics and Modeling in Mechanobiology

2015 - present Journal of Computer Methods in Biomechanics and Biomedical Engineering

2014 - present Journal of Bone and Mineral Research

2014 - present Journal of Medical Imaging and Health Informatics

2014 - present Bone

2013 - present Journal of Biomechanics

2013 - present Medical Physics

2011 - present IEEE - Transaction on Medical Imaging

**ACTIVE MEMBERSHIPS IN SCIENTIFIC SOCIETIES**

2016 - 2017 International Society for Magnetic Resonance in Medicine

2016 - 2017 Osteoarthritis Research Society International

2012 - 2015 American Society of Bone and Mineral Research

2008 - 2010 European Society of Biomechanics

**ORGANIZATION OF CONFERENCES**

07.2008 Organization staff of 16th Congress of the European Society of Biomechanics. Lucerne, Switzerland

05.2006 – 05.2007 Organizing committee member of Objective Measures in Cochlear and Brainstem Implants –5th International Symposium and Related Additional Events. Varese, Italy

**PRIZES**

10.2014 Young Investigator Award, poster presentation, second author, American Society for Bone Mineral Research

**INVITED PRESENTATIONS**

16.12.2015 University of Erlangen-Nuremberg, Erlangen, Germany

“Bone quality by QCT and HR-pQCT: Translation to multicenter clinical research”

22.12.2015 Istituti Ortopedici Rizzoli, Bologna, Italy

“Bone quality by QCT and HR-pQCT: Translation to multicenter clinical research”

16.09.2014 2nd XtremeCT User Meeting, Houston, TX, USA

“Intra- and inter-operator variability in HR-pQCT scan positioning”

**OUTREACH ACTIVITIES**

2012 Volunteer teacher for scientific activity on DNA extraction, National Youth Leadership Forum, University of California San Francisco, USA

**WEB APPLICATION**

09.2015 Web application for training and evaluation of operator scan positioning for High Resolution Peripheral Quantitative Computed Tomography (HR-pQCT).

<http://webapps.radiology.ucsf.edu/refline>

**PUBLICATIONS IN PEER-REVIEWED SCIENTIFIC JOURNALS**

1. Pang E.Q., Coughlan M., Bonaretti S., Finlay A., Bellino M., Bishop J., Gardner M.J. **Assessment of Open Syndesmosis Reduction Techniques in an Unbroken Fibula Model: Visualization vs. Palpation.** J. Orthop Trauma. 2018.

<https://www.ncbi.nlm.nih.gov/pubmed/30169400>

1. Maier J., Black M., Bonaretti S., Bier B., Eskofier B., Choi J.H. Levenston M., Gold G., Fahrig R., Maier A. **Comparison of Different Approaches for Measuring Tibial Cartilage Thickness.** J Integr Bioinform. 14(2),1-10. 2017. <https://www.ncbi.nlm.nih.gov/pubmed/28753537>
2. Bonaretti S., Vilayphiou N., Chan C. M., Yu A., Nishiyama K., Liu D., Boutroy S., Ghasem-Zadeh A., Boyd S.K., Chapurlat R., McKay H., Shane E., Bouxsein M.L., Black D.M., Majumdar S., Orwoll E.S., Lang T.F., Khosla S., Burghardt A.J**. Operator variability In Scan Positioning is a Major Component of HR-pQCT Precision Error and is Reduced by Standardized Training.**Osteoporos Int. 28(1), 245-257. 2017. <https://www.ncbi.nlm.nih.gov/pubmed/27475931>
3. Bonaretti S.., Holets M., Majumdar S., Lang T.F., Khosla S., Burghardt A.J. **The Comparability of HR-pQCT Bone Quality Measures is Improved by Scanning Anatomically Standardized Regions.**Osteoporos Int. 28(7), 2115-2128. 2017. <https://www.ncbi.nlm.nih.gov/pubmed/28391447>
4. Carballido-Gamio J., Bonaretti S., Kazakia G.J., Khosla S., Majumdar S., Lang T.F., Burghardt A.J. **Statistical Parametric Mapping of HR-pQCT Images: A Tool for Population-Based Comparison of Micro-Scale Bone Features.** Ann Biomed Eng. 45(5), 949-962. 2017. <https://www.ncbi.nlm.nih.gov/pubmed/27830488>
5. Ghasem-Zadeh A., Burghardt A.J., Wang X.F., Iuliano S., Bonaretti S., Bui Q.M., Zebaze R., Seeman E. **Quantifying Sex, Race and Age Specific Differences in Bone Microstructure Requires Measurement of Anatomically Equivalent Regions.** Bone. 101, 206-213. 2017. <https://www.ncbi.nlm.nih.gov/pubmed/28502884>
6. Carballido-Gamio J., Bonaretti S., Saeed I., Harnish R., Recker R., Burghardt A.J., Keyak J.H., Harris T., Khosla S., Lang T.F. **Automatic Multi-Parametric Quantification of the Proximal Femur with QCT.** Quant Imaging in Med and Surg. 5(4), 552-568. 2015. <https://www.ncbi.nlm.nih.gov/pubmed/26435919>
7. Bonaretti S.., Carpenter D.R., Saeed I., Burghardt A.J., Yu L., Bruesewitz M., Khosla S., Lang T. **Novel Anthropomorphic Hip Phantom Corrects Systemic Interscanner Differences in Proximal Femoral vBMD.**Phys Med Biol. 59, 7819-7834. 2014. <https://www.ncbi.nlm.nih.gov/pubmed/25419618>
8. Carpenter R.D., Saeed I Bonaretti S., Schreck C., Keyak J.H., Streeper T., Harris T.B., Lang T.F. **Inter-scanner Differences in In Vivo QCT Measurements of the Density and Strength of the Proximal Femur Remain After Correction with Anthropomorphic Standardization Phantoms.** Med Eng Phys. 36, 1225-1232. 2014. <https://www.ncbi.nlm.nih.gov/pubmed/25001172>
9. Bonaretti S., Seiler C., Boichon C., Reyes M., Büchler P. **Image-based vs. Mesh-based Statistical Appearance Model of the Human Femur: Implications for Finite Element Simulations.** Med Eng Phys. 36, 1626-1625. 2014. <https://www.ncbi.nlm.nih.gov/pubmed/25271191>
10. Kistler M., Bonaretti S., Pfahrer M., Niklaus R., Büchler P. **The Virtual Skeleton Database: An Open Access Repository for Biomedical Research and Collaboration.** J Med Internet Res. 12;15(11):e245. 2013. <https://www.ncbi.nlm.nih.gov/pubmed/24220210>
11. Schulz A.P., Reimers N., Wipf F., Vallotton M., Bonaretti S., Kozic N., Reyes M., Kienast B.J. **Evidence Based Development of a Novel Lateral Fibula Plate (VariAx Fibula) Using a Real CT Bone Data Based Optimization Process During Device Development.** Open Orthop J. 6,1-7. 2012. <https://www.ncbi.nlm.nih.gov/pubmed/22312417>

PEER-REVIEWED CONFERENCE PAPERS

1. Kistler M., Bonaretti S., Boichon C., Rochette M., Büchler P. **Methods to Accelerate Finite Element Calculations in Biomechanics Using a Statistical Database of Pre-Calculated Simulations.** 10th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering. 11-14 April 2012. Berlin, Germany.
2. Bonaretti S., Seiler C., Boichon C., Büchler P., Reyes M***. Mesh-based vs. Image-based Statistical Model of Appearance of the Human Femur: a Preliminary Comparison Study for the Creation of Finite Element Meshes.*** Mesh Processing in Medical Image Analysis - MICCAI 2011 workshop. 18 September 2011. Toronto, Canada.
3. Bonaretti S., Helgason B., Seiler C., Reyes M., Büchler P. **Combined Statistical Model of Bone Shape and Mechanical Properties for Bone Modelling.** 9th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering. 24-27 February 2010. Valencia, Spain.
4. Bonaretti S., Reimers N., Reyes M., Nikitsin A., Joensson A., Nolte L., Büchler P. **Assessment of Peri-Articular Implant Fitting Based on Statistical Finite Element Modelling.** Computational Biomechanics for Medicine III – MICCAI 2008 workshop. 10 September 2008. New York, NY, USA.

CONFERENCE ABSTRACTS

1. Maier J., Aichert A., Mehringer W., Bier B., Eskofier B., Levenston M., Gold G., Fahrig R., Bonaretti S., Maier A. **Feasibility of Motion Compensation using Intertial Measurements in C-arm CT. IEEE Nuclear Science Symposium & Medical Imaging Conference.** 10-17 November 2018. Sydney, Australia.
2. Bier B., Berger M., Maier J., Unberath M., Hsieh S., Bonaretti S., Fahrig R., Levenston M., Gold G., Maier A. **Object Removal in Gradient Domain of Cone-Beam CT Projections.** IEEE Nuclear Science Symposium & Medical Imaging Conference. 29 October – 5 November 2016. Strasbourg, France.
3. Bonaretti S., Carballido-Gamio J., Keyak J., Saeed I., Yu L., Bruesewitz M., Burghardt A.J., Khosla S., Lang T.F. **QCT Intra- and Inter-Scanner Precision in Estimation of Proximal Femur Strength***.* American Society for Bone and Mineral Research. 9-12 October 2015. Seattle, WA, USA.
4. Bonaretti S., Vilayphiou N., Yu A., Holets M., Nishiyama K., Liu D., Boutroy S., Ghasem-Zadeh A., Boyd S.K., Chapurlat R., McKey H., Shane E., Bouxein M.L., Lang T.F., Khosla S., Cawton P.M., Black D.M., Majumdar S., Orwoll E.S., Burghardt A.J. **Standardized Training For HR-pQCT Scan Positioning Reduces Inter-Operator Precision Errors: The MrOs Multicenter Study Experience.**American Society for Bone and Mineral Research. 9-12 October 2015. Seattle, WA, USA.
5. Bonaretti S., Holets M., Derrico N.P., Nishiyama K., Liu D., Boutroy S., Raymond D., Ghasem-Zadeh A., Seeman E., Boyd S.K., Chapurlat R., McKay H., Shane E., Bouxsein M.L., Lang T.F., Khosla S., Burghardt A.J. **The Role of Intra- and Inter-Operator Variability in HR-pQCT Precision.** International Bone Densitometric Workshop. 13-17 October 2014. Hong Kong.
6. Carballido-Gamio J., Bonaretti S., Kazakia G.J., Khosla S., Lang T.F., Burghardt A.J***.* Population-Based Local Multi-Parametric Comparisons of HR-pQCT Studies.** International Bone Densitometric Workshop. 13-17 October 2014. Hong Kong.
7. Bonaretti S., Holets M., Derrico N.P., Nishiyama K., Liu D., Boutroy S., Chapurlat R., McKay H., Shane E., Bouxsein M., Lang T., Khosla S., Burghardt A.J. **Intra- and Inter-Operator Variability in HR-pQCT Scan Positioning.** American Society for Bone and Mineral Research. 12-15 September 2014. Houston, TX, USA.
8. Bonaretti S., Holets M., Saeed I., McCready L., Lang T., Khosla S., Burghardt A.J. **Comparability of HR-pQCT Bone Quality Measures Improved by Scanning Anatomically Standardized Regions.** American Society for Bone and Mineral Research. 12-15 September 2014. Houston, TX, USA.
9. Carballido-Gamio J., Bonaretti S., Saeed I., Harnish R., Recker R., Burghardt A.J., Keyak J., Harris T., Khosla S., Lang T**. Automatic QCT Quantification of the Proximal Femur: vBMD, Bone Volume, Cortical Bone Thickness and Finite Element Modeling.** American Society for Bone and Mineral Research. 12-15 September 2014. Houston, TX, USA. Poster.
10. Ghasem-Zadeh A., Burghardt A.J., Zendeli A., Bonaretti S., Bjornerem A., Wang X.-F., Kazakia G., Zebaze R., Seeman E. **Assessing Age, Sex and Racial Differences in Cortical Porosity Requires Adjustment for Site-Specific Variation in the Selected Region of Interest.** American Society for Bone and Mineral Research. 12-15 September 2014. Houston, TX, USA.
11. Bonaretti S., Saeed I., Burghardt A.J., Yu L., Bruesewitz M., Khosla S., Lang T.F. **Effect of Body Size on the Quantification of Bone Mineral Density from QCT Images Using a Novel Anthropomorphic Hip Phantom.** American Society for Bone and Mineral Research. 4-7 October 2013. Baltimore, MD, USA.
12. Carballido-Gamio J., Bonaretti S., Holets M., Saeed I., McCready L., Majumdar S., Lang T.F., Khosla S., Burghardt A.J. **Automated Scan Prescription For HR-pQCT: A Multi-Atlas Prospective Registration Approach.** American Society for Bone and Mineral Research. 4-7 October 2013. Baltimore, MD, USA.
13. Kistler M., Bonaretti S., de Oliveira M.E., Boichon C., Rochette M., Büchler P. **Statistical Model of Appearance to Accelerate Finite Element Calculations in Biomechanics.**19th Congress of the European Society of Biomechanics. 1-4 July 2012. Lisbon, Portugal.
14. de Oliveira M.E., Kistler M., Hellmuth, R.A.D, Gerber N., Schumann S., Bonaretti S., Büchler P. **A Consistent Method for Modelling Subject Specific Muscoloskeletal Systems.** 19th Congress of the European Society of Biomechanics. 1-4 July 2012. Lisbon, Portugal.
15. Sigurðardóttir B., Bonaretti S., Örlygsson G., Sigurjónsson Ó.E., Ferguson S.J., Helgason B. **Are Iso-Elastic Femoral Stems Beneficial for Secondary Implant Stability in Cementless THA?** The Annual Meeting of the Swiss Society for Biomedical Engineering. 22 August 2011. Bern, Switzerland.
16. Bonaretti S., Seiler C., Rochette M., Helgason B., Reyes M., Büchler P. **Statistical Finite Element Model for the Virtual Skeleton Database.** NCCR Co-Me Scientific Advisory Board Meeting. 9-10 February 2011. Interlaken, Switzerland.
17. Bonaretti S., Helgason B., Seiler C., Reyes M., Büchler P. **Statistical Finite Element Modeling: Application to Orthopaedic Implant Design.** Graduate School for Cellular and Biomedical Sciences Symposium. 28 January 2011. Bern, Switzerland.
18. Bonaretti S., Seiler C., Reyes M., Büchler P. **Statistical Finite Element Modeling for the Virtual Skeleton Database.** NCCR Co-Me Research Networking Workshop. 26-27 August 2010. Zürich, Switzerland.
19. Bonaretti S., Helgason B., Seiler C., Reyes M., Büchler P. **A Statistical Shape Model of Bone Anatomical Variability for Finite Element Assessment of Bone Mechanics.** 17th Congress of the European Society of Biomechanics. 5-8 July 2010. Edinburgh, Scotland.
20. Bonaretti S., Seiler C., Helgason B., Reyes M., Büchler P. **Statistical Finite Element Modeling for the Virtual Skeleton Database.** NCCR Co-Me Scientific Advisory Board Meeting. 19-20 February 2010. Winterthur, Switzerland.
21. Bonaretti S., Helgason B., Seiler C., Reyes M., Büchler P. **A Statistical Shape Model of Bone Anatomical Variability for Finite Element Assessment of Bone Mechanics.** Graduate School for Cellular and Biomedical Sciences Symposium. 27 January 2010. Bern, Switzerland.
22. Bonaretti S., Seiler C., Büchler P., Reyes M. **Computing Average Anatomical Images: Comparison between Thin-Plate Spline and Log-Euclidean Approach.** The Annual Meeting of the Swiss Society for Biomedical Engineering. 27-28 August 2009. Bern, Switzerland.
23. Bonaretti S., Büchler P., Reimers N., Schmidt W., Seiler C., Weber S., Reyes M. **Automatic Bone Density Evaluation from CT Images.** Computer Assisted Orthopaedic Surgery. 17-20 June 2009. Boston, MA, USA.
24. Bonaretti S., Nikitsin A., Reimers N., Joensson A., Rueckert D., Reyes M., Büchler P. **Shape and Biomechanical Model for Population-Specific Design of Anatomical Peri-Articular Implants.** CTI Medtech Event. 2 September 2008. Bern, Switzerland.
25. Bonaretti S., Reimers N., Rueckert D., Reyes M., Gonzales-Ballester M.A., Büchler P. **Statistical Finite Element Analysis for Bone Modelling.** 16th Congress of the European Society of Biomechanics. 6-9 July 2008. Lucerne, Switzerland.
26. Bonaretti S., Büchler P., Rueckert D., Reyes M., Gonzáles M.A., **Statistical Finite Element Model for Bone and Implant Modeling.** NCCR Co-Me Scientific Advisory Board Meeting. 14 February 2008. Neuchatel, Switzerland.
27. Brega F., Razza S., Bonaretti S., Burdo S. **Morphological and Functional Correlation Using X-Rays and SOE.** Objective Measures in Cochlear and Brainstem Implants – 5th International Symposium and Related Additional Events. 9-12 May 2007. Varese, Italy.
28. Razza S., Bonaretti S., Burdo S. **Acoustical Signal Check: Microphone Integrity Evaluation Through a Common Hearing Aid Analyzer.** Objective Measures in Cochlear and Brainstem Implants – 5th International Symposium and Related Additional Events. 9-12 May 2007. Varese, Italy.
29. Burdo S., Razza S., Bonaretti S., Bani Alunno M., Tognola G. **Cortical Responses and Age at Cochlear Implant.** Objective Measures in Cochlear and Brainstem Implants – 5th International Symposium and Related Additional Events. 9-12 May 2007. Varese, Italy.