

**SERENA BONARETTI**  
**Curriculum Vitae**

**PERSONAL INFORMATION**

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Position	Physical Science Research Scientist Associate Director of the Zeego Laboratory Department of Radiology Stanford University School of Medicine
Work Address	Lucas Center for Imaging, Stanford University 1201 Welch Road, Stanford, CA 94305
Email Address	<a href="mailto:serena.bonaretti@stanford.edu">serena.bonaretti@stanford.edu</a>
Webpage	<a href="https://sbonaretti.github.io/">https://sbonaretti.github.io/</a>

**EDUCATION**

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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 “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 “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**

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

03.2016 – present	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

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, and ageing diseases 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

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#### *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

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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

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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 –5<sup>th</sup> International Symposium and Related Additional Events. Varese, Italy

### PRIZES

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

### INVITED PRESENTATIONS

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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. 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

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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.** 10<sup>th</sup> 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.** 9<sup>th</sup> 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

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1. 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.
2. 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.
3. Bonaretti S., Vilayphiou N., Yu A., Holets M., Nishiyama K., Liu D., Boutroy S., Ghasem-Zadeh A., Boyd S.K., Chapurlat R., McKay H., Shane E., Bouxsein 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.
4. 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.
5. 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.
6. 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.
7. 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.

8. 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.
9. 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.
10. 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.
11. 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.
12. 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.** 19<sup>th</sup> Congress of the European Society of Biomechanics. 1-4 July 2012. Lisbon, Portugal.
13. 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 Musculoskeletal Systems.** 19<sup>th</sup> Congress of the European Society of Biomechanics. 1-4 July 2012. Lisbon, Portugal.
14. Sigurðardóttir B., Bonaretti S., Örylgsson 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.
15. 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.
16. 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.
17. 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.
18. 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.** 17<sup>th</sup> Congress of the European Society of Biomechanics. 5-8 July 2010. Edinburgh, Scotland.
19. 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.
20. 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.
21. 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.
22. 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.
23. 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.
24. Bonaretti S., Reimers N., Rueckert D., Reyes M., Gonzales-Ballester M.A., Büchler P. **Statistical Finite Element Analysis**

- for Bone Modelling.** 16<sup>th</sup> Congress of the European Society of Biomechanics. 6-9 July 2008. Lucerne, Switzerland.
25. 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.
  26. Brega F., Razza S., Bonaretti S., Burdo S. **Morphological and Functional Correlation Using XRay and Soe.** Objective Measures in Cochlear and Brainstem Implants – 5<sup>th</sup> International Symposium and Related Additional Events. 9-12 May 2007. Varese, Italy.
  27. 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 – 5<sup>th</sup> International Symposium and Related Additional Events. 9-12 May 2007. Varese, Italy.
  28. 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 – 5<sup>th</sup> International Symposium and Related Additional Events. 9-12 May 2007. Varese, Italy. Presentation.