Gwansik Park

Curriculum Vitae

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1627 Quail Run, Charlottesville, VA 22911

EDUCATION

Ph.D., Mechanical and Aerospace Engineering — May 2017
Department of Mechanical and Aerospace Engineering
University of Virginia
Dissertation – Injury Risk Functions based on Response of Population Finite Element Models: Application to femurs under dynamic loading

M.E., Mechanical Engineering — Feb 2007
Department of Mechanical Engineering
Sogang University
Thesis: Evaluation Method of the Tire Durability using FEA

B.S., Mechanical Engineering — Feb 2005
Department of Mechanical Engineering
Sogang University

PROFESSIONAL EXPERIENCE

Biocore, LLC — June 2017 - Present
Senior Engineer

University of Virginia, Center for Applied Biomechanics — 2012-2017
Graduate Research Assistant

Samsung Corning Precision Materials — 2007-2011
Assistant Manager, Finishing Design and Engineering Group

Sogang University — 2005-2007
Graduate Research Assistant

Sogang University — 2003-2005
Undergraduate Research Assistant

AREAS OF EXTERTISE / RESEARCH INTERESTS

- Injury biomechanics
  - Human body FE modeling
  - Subject-specific FE modeling / Population-based FE modeling
  - Statistical shape analysis
  - Developing the injury risk function
  - Bone and soft tissue mechanics
  - Side impact occupant protection
- Finite Element Analysis (FEA)
  - Impact analysis
  - Static and dynamic structural analysis
  - Thermal-Structural / Fluid-Structural analysis
  - Fracture analysis
- Optimization, manufacturing technology (cutting and grinding of LCD glass)

PROJECTS

Year	Project	Sponsor
2017-Present	- NFL Engineering Roadmap - NFL Fundamental Research – Foot shape analysis - NFL Digital Athlete - NFL Turf Innovation	NFL
2016-2017	Lower Leg Biofidelity and Injury Risk Assessment	NHTSA
2016	Implications of New USNCAP and Challenges for Improved Real World Protection of Front Seat Occupants	Autoliv
2014-2015	100 Real world crash reconstructions using WSID dummy	Honda R&D Americas
2014	PMHS Belt-pull test for abdominal response	Hyundai Motors
2012-2013	Side impact investigation – comparison of biofidelity of lateral impact surrogates	Honda R&D Americas
2010-2011	Robust design of new glass edge grinding machine	Samsung Corning Precision Materials
2010-2011	Analysis and improvement of glass edge waviness after grinding process	
2009-2010	Optimization of laser cutting process of LCD glass	
2008-2009	Development of glass belt type edge polishing machine	
2007	Impact simulation of LCD BLU(Back Light Unit)	
2006	Development of the FMECA for the railroad system	Korea Railroad Research Institution
2005-2006	Tire durability analysis considering temperature and interface crack growth	Hankook Tire
2005-2006	A study on the crash performance of air bag firing circuit connectors	Hyundai Motors
2005	An experimental study on the fatigue strength of the	Dentium

	implant fixture	
2004-2005	Hydroplaning analysis using LS-DYNA and upgrade of the FDM code	Hankook Tire
2004	Implications of improved friction model for Tires	Hankook Tire
2003-2004	Design of golf driver to reduce the drag force	Bando Golf

RELATED SKILLS

- 13-years experience on computational aided engineering with ABAQUS, LS-DYNA, ANSYS (Workbench), Hypermesh, Solidworks, AutoCAD, Blender, OpenSim
- Programming skills using MATLAB, Fortran, Python
- Experimental experiences on cadaveric testing, impact testing of LCD module, machine vibration testing, and fatigue and strength testing
- Statistical analysis using Minitab, SAS
- Statistical shape analysis

PUBLICATIONS

A. Journal Publications

A1. Bailey, A.M., Sanchez, E.J., Park, G. et al. (2020) Development and Evaluation of a Test Method for Assessing the Performance of American Football Helmets. *Ann Biomed Eng*. Sep 22. https://doi.org/10.1007/s10439-020-02626-6

A2. Kent, R, Forman, J, Bailey, A, Cormier, J, Park, G, Crandall, J, Arbogast, KB, Myers, B. (2020). Surface Contact Features, Impact Obliquity, and Preimpact Rotational Motion in Concussive Helmet-to-Ground Impacts: Assessment via a New Impact Test Device. *Ann Biomed Eng*. Sep 22. doi: 10.1007/s10439-020-02621-x

A3. Park, G., Kent, R. (2020). Foot Shape Analysis of Professional American Football Players, *Footwear Science*, 12(3):153-159. DOI: 10.1080/19424280.2020.1769203

A4. Giudice, J.S., Caudillo, A., Mukherjee, S., Kong K., Park, G., Kent, R., Panzer, M., (2020). Finite Element Model of a Deformable American Football Helmet Under Impact, *Annals of Biomedical Engineering*, 48, pages1524–1539. DOI: 10.1007/s10439-020-02472-6

A5. Giudice, J.S., Park, G., Kong, K., Bailey, A., Kent, R., Panzer, M.B. (2019). Development of open-source dummy and impactor models for the assessment of American football helmet finite element models. Annals of biomedical engineering, *Ann Biomed Eng*, 47(2):464-474.

A6. Park, G., Forman, L.J., Kim, T., Crandall, J.R. (2018) Injury Risk Functions Based on Population-Based Finite Element Model Responses: Application to Femurs under Dynamic Bending. Traffic and Injury Prevention, Traffic Injury Prevention, *Traffic Injury Prevention*, 19:sup1, S59-S64, DOI:0.1080/15389588.2017.1398402

A7. Chen, H., Bollapragada, V., Kim, T., Nie B., Park, G., Crandall, J. (2018) Improvement of lateral shoulder impact response of a multi-body pedestrian model. *International Journal of Crashworthiness,* 23:2, 134-143, DOI:10.1080/13588265.2016.1221371

A8. Park, G., Kim, T., Forman, L.J., Crandall, J.R. (2017): Prediction of the structural response of the femoral shaft under dynamic loading using subject-specific finite element models, Computer Methods in Biomechanics and Biomedical Engineering, 20:11, 1151-1166, DOI: 10.1080/10255842.2017.1340459.

A9. Park, G., Kim, T., Panzer, M.B., Crandall, J.R. (2016) Validation of Shoulder Response of Human Body Finite-Element Model (GHBMC) Under Whole Body Lateral Impact Condition. *Annals of Biomedical Engineering*, 44:8,2558-76.

A10. Kim, T., Shaw, G., Lessley, D., Park, G., Crandall, J.R., Svendsen, A., Whitcomb, B., Ayyagari, M., Mishra, P., Markusic, C. (2016) Biofidelity evaluation of WorldSID and ES-2re under side impact conditions with and without airbag. *Accident Analysis & Prevention*, 90:140-151.

A11. Poplin, G.S., McMurry T.L., Forman J.L., Hartka T., Park, G., Shaw G., Shin J., Kim H.J., Crandall J. R. (2015) Nature and etiology of hollow-organ abdominal injuries in frontal crashes. *Accident Analysis and Prevention*, 78: 51-57.

A12. Poulard, D., Subit, D., Donlon, J.P., Lessley, D., Kim, T., Park, G., Kent, R.W. (2014) The Contribution of Pre-impact Spine Posture on Human Body Model Response in Whole-body Side Impact, *Stapp Car Crash J.* 58:385-422.

A13. Park, K., Oh, C., Kim, T., Jeong, H., Kim, Y. (2006) An Improved Friction Model and Its Implications for the Slip, the Frictional Energy, and the Cornering Forces and Moments of Tires. *Journal of Mechanical Science and Technology*, 20:1399-1409.

A14. Park, K., Kim, T., Jeong, H., Kim, S. (2006) Consideration of the Frictional Force on the Crack Surface and Its Implications for Durability of Tires. *Journal of Mechanical Science and Technology*, 20:2185-2193.

A15. Oh, C., Kim, T., Jeong, H., Park, K., Kim, S. (2008) Hydroplaning Simulation for a Straight-Grooved Tire by Using FDM, FEM and an Asymptotic Method. *Journal of Mechanical Science and Technology*, 22:34-40, 2008.

B. Conference Proceedings (Peer-Reviewed)

B1. Gepner, B., Bollapragada, V., Acosta, S., Park, G., Poplin, G., Forman, J., Comparison of Thor LX xversion and dorsiflexion response in component test, sled tests and full vehicle crash tests, *25th International Technical Conference on the Enhanced Safety of Vehicles (ESV)*, Michigan, USA.

B2. Park, G., Kim, T., Forman, J., Panzer, M.B., Crandall, J.R. (2016) Prediction of Structural Response of Femoral Shaft under the Dynamic Combined Loading Condition using Subject-Specific Finite Element Models. *IRCOBI Asia Conference 2016*, Seoul, South Korea.

B3. Bollapragada, V., Kim, T., Park, G., Crandall, J.R., Daniel, T. , Gupta, A. (2016) Development of a Multibody Human Leg Model based on Beam Approximation. *IRCOBI Asia Conference 2016*, Seoul, South Korea.

B4. Kim, T., Park, G., Montesinos, S., Subit, D., Bolton, J., Overby, B., Forman, J., Crandall, J.R., Kim, H. (2015) Abdominal Characterization under Lab Belt Loading, *ESV 2015*, Gothenburg, Sweden

B5. Park, G., Kim, T., Crandall, J.R., Svendsen, A., Saunders, N., Markusic, C. (2014) Evaluation of Biofidelity of Side Impact Computational Surrogates (ES-2re, WorldSID, GHBMC), *SAE Technical Paper* 2014-01-0541.

B6. Park, G., Kim, T., Subit, D., Donlon, J.P., Crandall, J.R., Svenderson, A., Saunders, N., Markusic, C. (2014) Evaluation of Biofidelity of Finite Element 50th Percentile Male Human Body Model (GHBMC) under Lateral Shoulder Impact Conditions. *IRCOBI Conference 2014*, Berlin, Germany.

B7. Park, G., Kim, T., Crandall, J.R., Arregui-Dalmases, C., Luzon-Narro, J. (2013) Comparison of Kinematics of GHBMC to PMHS on the Side Impact Condition, *IRCOBI Conference 2013*, Gothenburg, Sweden.

C. Short Communication and Posters

C1. Park, G., Kim, T., Forman, L.J., Panzer, M.B., Crandall, J.R. (2016) Prediction of the Structural Response of the Femoral Shaft under Dynamic Bending Loading using Geometric Subject-Specific Finite Element Models, *12th annual injury biomechanics symposium*, Ohio, USA.

C2. Park, G., Kim, T., Panzer, M.B., Crandall, J.R. (2016) Subject-Specific Finite Element Model of Thigh Specimen under Dynamic Bending Loading Condition, t*he 12th World Congress on Computational Mechanics*, Seoul, South Korea.

C3. Chen, J. G., Park, G., E. Spratley, M., Salzar, R. S. (2016) Dynamic Bending Response of the Unrestrained Femur in Underbody Blast Loading, Summer Biomechanics, *Bioengineering and Biotransport Conference*, June 29 –July 2, National Harbor, MD, USA.

C4. Park, G., Kim, T., Crandall, J.R., Svendsen, A., Saunders, N., and Markusic, C. (2014) Comparison of GHBMC 50th percentile model response between FBM v3.5 and FBM v4.2 under lateral impact sled test condition, *Proceeding of International Crashworthiness Conference 2014*, Sarawak, Malaysia.

C5. Kim, T., Shaw, G., Lessley, D., Park, G., Crandall, J.R., Markusic, C., Svendsen, A., Saunders, N., and Sunnevang, C. (2014) Evaluation of biofidelity of WorldSID and ES-2re under side impact conditions with and without airbag, *Proceeding of International Crashworthiness Conference 2014*, Sarawak, Malaysia.

C6. Chen, H., Bollapragada, B., Kim, T., Crandall, J.R., Nie, B., Wang, Y., and Park, G. (2014) Improvement of Lateral Shoulder Impact Response of a Multi-body Human Model, *Proceeding of International Crashworthiness Conference 2014*, Sarawak, Malaysia.

C7. Park, G., Kim, T., Ash , J., Lessley, D., Shaw, G., and Crandall, J.R. (2013) Evaluation of ES-2re dummy FE model under side impact sled tests with side airbag condition, *9th annual injury biomechanics symposium*, Ohio, USA

C8. Kim, J., Jeong, H., Cha, D., Park, K., and Park, J. (2008) A Study of Failure Mode, Effects and Criticality Analysis Process for the Railroad System. *Proceedings of 2008 KSME Fall Conference*, pp. 1394-1400

C9. Oh. C., Kim, T., Park, K., and Jeong, H.(2007) A Simplified Hydroplaning Simulation for a Straight-Grooved Tire by Using FDM, FEM and an Asymptotic Method. *2007 IMECE Conference*, Seattle, U. S. A.

C10. Park, K., Kim, T., Jeong, H., and Kim, S., (2006) Evaluation of the Durability of the Tires by Using the Virtual Crack Closure Technique. 2006 *KSAE Fall Conference*, pp.1312-1318.

C11. Jeong, H., Park, G., Kim, T., and Kim, D. (2006) Effects of the Frictional Force on the Strain Energy Release Rate of a Crack and Its Implications for Durability of Tires. *ASME International Mechanical Engineering Congress & Exposition*, Chicago, USA, November 5-10.

C12. Jeong, H., Oh, C., Park, G., Kim, T., K.-S. Jeong (2006) Hydroplaning Simulation for a Straight Grooved Tire Using FDM, FEM, and Asymptotic Solutions. ASME International Mechanical Engineering Congress & Exposition, Chicago, USA, November 5-10.

C13. Oh, C.-W., Park, G., Kim, T., Jeong, H., and Kim, S. (2006) Hydroplaning Simulation for a Tire by Using an Asymptotic Method. *2006 KSAE Fall Conference*, pp. 1307-1311.

D. Patent

D1. Kim, S., Kim, Y., Hideki, M., Jeon, Y., Kim, T., Park, G. Belt Type Edge Polishing Apparatus for Flat Glass. The Republic of Korea Patent No. 2008-0085690.