Resource Sharing

Sharing of computational knee models (and relevant data) as resource has been conducted through the "Downloads" section of the project website at https://simtk.org/projects/openknee. All download packages are disseminated using the Creative Commons Attribution 4.0 International License (https://creativecommons.org/licenses/by/4.0/). This license allows anyone to share (to copy, distribute, transmit the work), to remix (to adapt the work), and to make commercial use of the work under the following conditions: i) attribution – one must attribute the work in the manner specified by the author or licensor (but not in any way that suggests that they endorse you or your use of the work); ii) share alike – if one alters, transforms, or builds upon this work, one may distribute the resulting work only under the same or similar license to this one. This licensing scheme provides utmost dissemination and promote open science. It also does not restrict any type of use, academic or commercial.

Magnetic resonance imaging and joint mechanical testing data was disseminated for 8 specimens in the previous budget period. Additional 13 specimens were acquired and magnetic imaging and an abridged set of joint mechanics data were collected according to the specifications. These specimens were courtesy of Todd Pataky, PhD and Grant 17H02151 from the Japan Society for the Promotion of Science after their intended use. Dissemination information for these additional specimens are provided below. All download packages are available at the "Downloads" section of the project website, with direct ling provide below.

Project Download Location: https://simtk.org/frs/index.php?group_id=485

Package. Open Knee(s) - Generation 2 - Specimen 10 (added in this budget period)

Release Date(s). July 29, 2019 (g2-s10-v0.1.0.20190729)

Package Description. This release provides anatomical imaging data for Open Knee(s) – Generation 2 – Specimen 10.

Downloads. 8 unique users as of December 19, 2019.

Package. Open Knee(s) - Generation 2 - Specimen 11 (added in this budget period)

Release Date(s). July 30, 2019 (g2-s10-v0.1.0.20190730)

Package Description. This release provides anatomical imaging data for Open Knee(s) – Generation 2 – Specimen 11.

Downloads. 5 unique users as of December 19, 2019.

Package. Open Knee(s) - Generation 2 - Specimen 12 (added in this budget period)

Release Date(s). July 30, 2019 (g2-s10-v0.1.0.20190730)

Package Description. This release provides anatomical imaging data for Open Knee(s) – Generation 2 – Specimen 12.

Downloads. 7 unique users as of December 19, 2019.

Package. Open Knee(s) - Generation 2 - Specimen 13 (added in this budget period)

Release Date(s). July 30, 2019 (g2-s10-v0.1.0.20190730)

Package Description. This release provides anatomical imaging data for Open Knee(s) – Generation 2 – Specimen 13.

Downloads. 7 unique users as of December 19, 2019.

Package. Open Knee(s) - Generation 2 - Specimen 14 (added in this budget period)

Release Date(s). July 30, 2019 (g2-s10-v0.1.0.20190730)

Package Description. This release provides anatomical imaging data for Open Knee(s) – Generation 2 – Specimen 14.

Downloads. 6 unique users as of December 19, 2019.

Package. Open Knee(s) - Generation 2 - Specimen 15 (added in this budget period)

Release Date(s). July 31, 2019 (g2-s10-v0.1.0.20190731)

Package Description. This release provides anatomical imaging data for Open Knee(s) – Generation 2 – Specimen 15.

Downloads. 7 unique users as of December 19, 2019.

Package. Open Knee(s) - Generation 2 - Specimen 16 (added in this budget period)

Release Date(s). July 31, 2019 (g2-s10-v0.1.0.20190731)

Package Description. This release provides anatomical imaging data for Open Knee(s) – Generation 2 – Specimen 16.

Downloads. 6 unique users as of December 19, 2019.

Package. Open Knee(s) - Generation 2 - Specimen 17 (added in this budget period)

Release Date(s). July 31, 2019 (g2-s10-v0.1.0.20190731)

Package Description. This release provides anatomical imaging data for Open Knee(s) – Generation 2 – Specimen 17.

Downloads. 6 unique users as of December 19, 2019.

Package. Open Knee(s) - Generation 2 - Specimen 18 (added in this budget period)

Release Date(s). July 31, 2019 (g2-s10-v0.1.0.20190731)

Package Description. This release provides anatomical imaging data for Open Knee(s) – Generation 2 – Specimen 18.

Downloads. 7 unique users as of December 19, 2019.

Package. Open Knee(s) - Generation 2 - Specimen 19 (added in this budget period)

Release Date(s). July 31, 2019 (g2-s10-v0.1.0.20190731)

Package Description. This release provides anatomical imaging data for Open Knee(s) – Generation 2 – Specimen 19.

Downloads. 6 unique users as of December 19, 2019.

Package. Open Knee(s) - Generation 2 - Specimen 20 (added in this budget period)

Release Date(s). July 31, 2019 (g2-s10-v0.1.0.20190731)

Package Description. This release provides anatomical imaging data for Open Knee(s) – Generation 2 – Specimen 20.

Downloads. 6 unique users as of 19. Dec. 2019.

Package. Open Knee(s) - Generation 2 - Specimen 21 (added in this budget period)

Release Date(s). July 31, 2019 (g2-s10-v0.1.0.20190731)

Package Description. This release provides anatomical imaging data for Open Knee(s) – Generation 2 – Specimen 21.

Downloads. 8 unique users as of December 19, 2019.

Package. Open Knee(s) - Generation 2 - Specimen 22 (added in this budget period)

Release Date(s). July 31, 2019 (g2-s10-v0.1.0.20190731)

Package Description. This release provides anatomical imaging data for Open Knee(s) – Generation 2 – Specimen 22.

Downloads. 26 unique users as of December 19, 2019.

Open Knee(s) Generation 1 model was updated to be compatible with FEBio v2.7.1 and above.

Package. Open Knee(s) - Generation 1 (added in this budget period)

Release Date(s). Oct 20, 2018 (g1-s1-v1.2.0.1749)

Package Description. Open Knee - Generation 1 model compatible with FEBio v2.7.1 and above. Rigid cylindrical joints were implemented to constraint motion of rigid bodies. Only FEBio input file is provided.

Downloads. 148 unique users as of December 19, 2019.

Total number of downloads for all packages is 35,013 by 1388 unique users, as of December 19, 2019

All the derivative data such as segmentation, geometries, template models, customized models and results are provided for the first 8 Open knee(s) - Generation 2 specimens. They can be found in the source code repository, specifically at:

- https://simtk.org/svn/openknee/oks/oks001/dat/
- https://simtk.org/svn/openknee/oks/oks002/dat/
- https://simtk.org/svn/openknee/oks/oks003/
- https://simtk.org/svn/openknee/oks/oks004/
- https://simtk.org/svn/openknee/oks/oks006/
- https://simtk.org/svn/openknee/oks/oks007/
- https://simtk.org/svn/openknee/oks/oks008/
- https://simtk.org/svn/openknee/oks/oks009/

Cartilage mechanical testing data for Open Knee(s) Generation 2 - Specimen 3 (oks003) are disseminated at:
- http://archive.simtk.org/oks/tissue/oks003/cartilage/

Impact of Resource Sharing

Dissemination of Open Knee(s) data and models enabled the following studies conducted by investigators beyond the Open Knee(s) development team (added in this budget period):

- Shriram, D., Praveen Kumar, G., Cui, F., Lee, Y. H. D. & Subburaj, K. Evaluating the effects of material properties of artificial meniscal implant in the human knee joint using finite element analysis. *Sci Rep* **7**, 6011 (2017).
- Meng, Q., Fisher, J. & Wilcox, R. The effects of geometric uncertainties on computational modelling of knee biomechanics. *R Soc Open Sci* **4**, 170670 (2017).
- Mamalakis, M. Realistic simulation of the knee using modular approach. MS thesis, University of Patras (2017).
- Miller, R. H. Joint Loading in Runners Does Not Initiate Knee Osteoarthritis. *Exerc Sport Sci Rev* **45**, 87–95 (2017).
- Hu, J. *et al.* The role of menisci in knee contact mechanics and secondary kinematics during human walking. *Clin Biomech (Bristol, Avon)* **61**, 58–63 (2018).

Thus far, 13 studies and 4 text books have referenced the project and 25 studies (by investigators other than the Open Knee(s) team) have utilized Open Knee(s) data in some form.