Biomechanics of human body for medical treatment, welfare and health technology by using CAE (Computer Aided Engineering) are studied in this study group. Furthermore, biomechanics of animal and plant for considering mechanical adaptation of nature and "Bionic Design" (bio-inspired design) to apply engineering design are studied. We analyze mechanical stress and strain condition on the inside of human body to approach clinical problem involved biomechanics by using CAE such as finite-element method and simulation procedure of musculoskeletal system. We also analyze stress and deformation of animal and plant, which have special structure, tissue and function, to get inspiration for mechanical engineering design.

Master/Doctor course: Education policy, curriculum, typical activity in the laboratory

Graduate students have a seminar about biomechanics and bionic design by all the members as well as standard tuition. In the seminar, students give presentation about current results of own research subject, or review related papers, and have a free discussion with exchanging their ideas. All of the presentation, review and discussion is held by English.

Daily life in the laboratory, etc.

We study collaborating with the nursing laboratory and the orthopedic laboratory of medical science school, so students have chance to interchange with researchers of the different fields. There are unusual materials and equipment in the laboratory as the mechanical engineering, such as a hospital bed, dummy models of human body, skeletal preparations, etc.

Message or comments by the laboratory faculty staffs

We think "learning by yourself" is a basis for graduate student's research. Graduate students should work on their research subjects while deepening the understanding by their pace. A different field exchange can make new idea and technology, therefore discussion between the students who work on a different subject is important to rise their knowledge and capacity.

Recent Master theses in these 3 years (+ more if appropriate)

<table>
<thead>
<tr>
<th>year.month</th>
<th>Thesis title (including English translation of Japanese thesis title)</th>
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<tbody>
<tr>
<td>2020.3</td>
<td>Estimation of exerted force in manual lifting task using wearable device</td>
</tr>
<tr>
<td>2020.3</td>
<td>A study on mechanical evaluation of crab's chela</td>
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<tr>
<td>2020.3</td>
<td>Evaluation of mental workload during automobile driving based on eye-movement measurement</td>
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<tr>
<td>2020.3</td>
<td>Evaluation of the influence of sit-standing posture on muscle load by experiment and simulation</td>
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<tr>
<td>2019.3</td>
<td>Development of thermal deformation analysis model of multitasking machine tool with turrets considering bed</td>
</tr>
<tr>
<td>2019.3</td>
<td>Optimum design of thin walled structure using evolutinal computation and buckling analysis considering compression and bending load</td>
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<tr>
<td>2019.3</td>
<td>A study on musculoskeletal analysis of giraffe neck in swing motion and its mechanical adaptation</td>
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<tr>
<td>2018.3</td>
<td>The mechanical evaluation of body pressure dispersion mattresses by numerical analysis and understanding the characteristic</td>
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<tr>
<td>2018.3</td>
<td>A study of optimum design for prosthetic socket</td>
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<tr>
<td>2018.3</td>
<td>A study on seed ejection function of Orixa Japonica by finite element analysis</td>
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<tr>
<td>2017.3</td>
<td>Development of the bio-innovative design technology using bone shape and its applications</td>
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<tr>
<td>2017.3</td>
<td>A study on finite-element analysis of curved folding structure and its application</td>
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<tr>
<td>2017.3</td>
<td>A study on efficiency of the bedsore prevention mattress by using musculoskeletal models</td>
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<tr>
<td>2017.3</td>
<td>A study on optimum design of stiffeners layout of thin-walled structures considering buckling</td>
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<tr>
<td>2016.3</td>
<td>Development of Design Optimization Technique of Cross-Sectional Shape of Thin Walled Structure by Evolutionary Computation Considering Buckling</td>
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<td>2016.3</td>
<td>The Development of a Hip Dummy Model for Mechanical Evaluation of Body Pressure Dispersion Mattresses</td>
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<tr>
<td>2015.3</td>
<td>Development of a finite-element model of the buttocks for using mechanical evaluation of body pressure dispersion mattress</td>
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<tr>
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<tr>
<td>2014.3</td>
<td>A study on the orthodontic force by using the orthodontics simulation based on a stress of a periodontal ligament</td>
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<tr>
<td>2014.3</td>
<td>Mechanical analysis of giraffe neck by using musculoskeletal model</td>
</tr>
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<td>2013.3</td>
<td>Finite element analysis of bone stress and muscle force in the musculoskeletal system of spine</td>
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<tr>
<td>2013.3</td>
<td>Development of a finite-element model of the human finger and its application for injury risk assessment</td>
</tr>
<tr>
<td>2013.3</td>
<td>Optimization of cooling channel of a plastic injection molding die by using a topology optimization method</td>
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<tr>
<td>2013.3</td>
<td>A study on a rocking mechanism of curved folding plastic sheet</td>
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<td>2012.9</td>
<td>The optimization design of cooling fin of LED heat sink</td>
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<tr>
<td>2012.9</td>
<td>A study on the risk evaluation of the wrist bone fracture due to fall down</td>
</tr>
<tr>
<td>2019.3</td>
<td>A Study on Development of Evaluation Method for Thermal Deformation of Multi-tasking Machine and Its Applications</td>
</tr>
<tr>
<td>2012.9</td>
<td>Optimum design of HGV front structure for pedestrian safety</td>
</tr>
<tr>
<td>2010.9</td>
<td>A study on the residual stress of the autochory plant fruits</td>
</tr>
<tr>
<td>2006.3</td>
<td>Development of an individual mechanical analysis method of bone based on medical images and its application</td>
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