Description for the general public

The aim of the research is to conduct biomechanical analyses of previously designed (by the executors of the following project), innovative implantation system for direct skeletal attachment of limb prosthesis (patent application no. P.416266). This system combines the advantages of threaded and interference-fit implants, which distinguishes it from available solutions. Analyses of such a connection method will result in obtaining new data that is necessary to further development of implantation systems for direct skeletal attachment of limb prosthesis, as well as other medical constructions that are placed in bone tissues.

The study will also allow to determine whether the use of such a solution in canines after limb amputation will increase the possibility of proper recovery in comparison to conventional solutions like strap- or socket-attached prostheses. On this basis it will be possible to clearly define if the use of implantation system for direct skeletal attachment of limb prosthesis prolongs their life effectively or only causes the need to perform surgical procedures that unnecessarily burden the organism, in effect influencing animal's health in a negative way. The planned research methods include the integration of veterinary with engineering, being a precursor to the development of, among others, new diagnosis methods of canines' musculoskeletal system disorders. This is important for people that are involved in animal breeding for shows, increasing their chances of getting prestigious awards at international exhibitions, as well as for individuals who would like to provide the best possible veterinary care for their pets. The data obtained from analyses of canine's gait can also be used in robotics to develop quadrupedal robots. These solutions have been recently introduced, among others, by DARPA (the Defense Advanced Research Projects Agency) to carry heavy military equipment over rough terrain during military activities.

In the case of obtaining positive results, it will be possible to further develop the project and extend it to use the designed implantation system in humans after limb amputation. The received data will enhance the quality of amputee's everyday life, e.g. by avoiding stump's rubbing during mounting and dismounting a prosthesis, providing a better control over it, or allowing for quick and easy mounting.