## CLAIMS

1. A prosthesis for replacing a missing extremity of a living being, particularly a human being, which has:

- one or more prosthetic links driven by means of actuators (101), wherein the proximal prosthetic link has a mechanical interface for fixing the proximal prosthetic link to the living being;
- first sensors (102), which sense a current state ZUS(t) of the prosthesis, particularly a state of contact between the prosthesis and the environment;
- an interface to second sensors (103), which sense biosignals $SIG_{BIO}(t)$ in the living being for controlling the missing extremity;
- third sensors (104) for sensing data $D_{UMG}(t)$, which describe a current environment of the prosthesis, particularly objects and/or other living beings located in the environment;
- a prediction unit (105), which determines a model $M_A(t)$ of an action A to be performed by means of the prosthesis on the basis of the biosignals $SIG_{BIO}(t)$ and the state ZUS(t) of the prosthesis and the data $D_{UMG}(t)$ and predicts motions $B_{eweg}(M_A(t))$, dependent on the model $M_A(t)$, of the prosthetic links for a time period $[t, t+\Delta t]$;
- an evaluating unit (106), by means of which the discrete decision E to replace the action A with another action A'(E) can be determined on the basis of an evaluation of the biosignals $SIG_{BIO}(t)$, of the state ZUS(t), of the data $D_{UMG}(t)$, and of the predicted motions $B_{eweg}(M_A(t))$ in accordance with a specified evaluation scheme, wherein the action A'(E) can define a reflexive and/or protective motion of the prosthesis that is autonomously controlled in an open-loop/closed-loop manner, and wherein, if the action A'(E) does not define such a reflexive and/or protective motion of the prosthesis that is autonomously controlled in an open-loop/closed-loop manner, the prediction unit (105) determines a model $M_{A'}(t)$ of the action A' to be performed by means of the prosthesis and predicts motions $B_{eweg}(M_{A'}(t))$, dependent on the model $M_{A'}(t)$, of the prosthetic links for a time period $[t, t+\Delta t]$; and
- a control unit (107), which derives control signals Sig(t) for controlling the actuators and controls/regulates the actuators based on the control signals Sig(t), based on the currently valid, predicted motions $B_{eweg}(M_A(t))$ or $B_{eweg}(M_{A'}(t))$ or based on the reflexive and/or protective motion autonomously controlled in an open-loop/closed-loop manner.

2. The prosthesis according to claim 1,

wherein the control unit (107) has an input interface, by means of which a user of the prosthesis prompts, by means of an input, the control unit (107) to stop any sort of motion of the prosthesis.

3. The prosthesis according to either claim 1 or 2,

wherein the evaluating unit (106) is designed and set up such that a decision E for an action A'(E), which defines a reflexive and/or protective motion of the prosthesis that is autonomously controlled in an open-loop/closed-loop manner independently of the biosignals $SIG_{BIO}(t)$, is determined on the basis of the current state ZUS(t) and/or of the data $D_{UMG}(t)$.

4. The prosthesis according to any of claims 1 to 3,

wherein the evaluating unit (106) is designed and set up such that a decision E for an action A'(E), which defines a reflexive and/or protective motion of the prosthesis that is autonomously controlled, is then triggered when

- a current motion of the prosthetic links deviates from the predicted motion $B_{eweg}(M_A(t))$ or $B_{eweg}(M_{A'}(t))$ of the prosthetic links by more than a specified limit; and/or
- a current motion of the prosthetic links deviates from a learned model, which observes the nominal states of the prosthesis and corresponding critical deviations from the nominal states; and/or
- it is discernible based on the current state ZUS(t) and the data $D_{UMG}(t)$ that the action A or A'(E) to be executed with the prosthesis was not or will not be executed or was or will be executed in a flawed manner; and/or
- an unintentional collision of one or more prosthetic links with an object in the environment has occurred or will occur; and/or
- a temperature recorded by a temperature sensor of the prosthesis reaches or exceeds a limit G2; and/or
- a distal end of the prosthesis has approached an object up to a specified distance or environment envelope; and/or
- the current state ZUS(t) of the prosthesis corresponds to a state to which the following applies: $ZUS(t) \notin \underline{\mathbf{Z}}_{ZUS,erlaubt}$, wherein $\underline{\mathbf{Z}}_{ZUS,erlaubt}$ indicates the quantity of all allowed states ZUS(t).

5. The prosthesis according to any of claims 1 to 4,

wherein the control unit (107) is designed and set up such that a further motion of the prosthesis takes place based on currently sensed biosignals $SIG_{BIO}(t)$ and/or after an input of a user of the prosthesis by means of an interface of the control unit after an execution of a reflexive and/or protective autonomous motion, wherein the interface is designed and set up for manual optical and/or acoustic and/or tactile input.

6. The prosthesis according to any of claims 1 to 5,

wherein the first sensors comprise one or more of the following sensors:

- joint sensor(s) for sensing a motor position, motor speed, and/or a motor acceleration,
- output sensors,
- acceleration sensors,
- force sensors for determining the forces transferred to an environment due to the individual prosthetic links and for determining forces transferred from an environment onto the individual prosthetic links as well as for determining interaction forces between the prosthesis and the prosthesis wearer,
- torque sensors for determining the torques transferred to an environment due to the individual prosthetic links and for determining torques transferred from an environment onto the individual prosthetic links,
- tactile sensors, particularly an artificial skin, for local sensing of effective forces and torques,
- temperature sensors for sensing temperatures acting upon the prosthesis,
- humidity sensors for sensing humidity acting upon the prosthesis.

7. The prosthesis according to any of claims 1 to 6,

wherein the control unit (107) provides multiple apps (control programs and control parameter sets) for controlling the prosthesis, wherein each app defines an operating mode of the prosthesis, and wherein the control unit has an interface, particularly a wireless interface, to a mobile unit, by means of which a respective app can be selected and configured for controlling the prosthesis.

8. The prosthesis according to any of claims 1 to 7,

wherein the second sensors (103) comprise one or more electromyography sensors and/or one or more electroencephalography sensors, wherein the individual sensors are applied to the living being or implanted in the living being.

9. The prosthesis according to any of claims 1 to 8,

wherein the control unit is designed and set up such that an automatic adapting of the mechanical active and/or passive impedance, particularly the stiffness of the prosthesis, takes place through a corresponding change in the control signals Sig(t), based on the current state ZUS(t) and the data $D_{UMG}(t)$.

10. The prosthesis according to any of claims 1 to 9,

wherein the prediction unit (105) is designed and set up such that the sensing of model $M_A(t)/M_{A'}(t)$ is implemented as a learning-capable process, which autonomously learns motions $B_{eweg}(M_A(t))/ B_{eweg}(M_{A'}(t))$ of the prosthetic links based on historical data, for executing an action A/A' for this.