

ABSTRACT

PROSTHESIS

The invention relates to a prosthesis to replace a missing extremity of a living being,
5 which has: one or more prosthetic links driven by means of actuators (101), first sensors
(102), which sense a current state $ZUS(t)$ of the prosthesis; an interface to second sensors
(103), which sense biosignals $SIG_{BIO}(t)$ of the living being to control the missing
extremity; third sensors (104) for sensing data $D_{UMG}(t)$, which describe a current
environment of the prosthesis; a prediction unit (105), which determines, based on the
10 biosignals $SIG_{BIO}(t)$ and on the state $ZUS(t)$ of the prosthesis and of the data $D_{UMG}(t)$, a
model $M_A(t)$ of an action A to be executed with the prosthesis and predicts motions
 $B_{eweg}(M_A(t))$, dependent on the model $M_A(t)$, of the prosthetic links for a period of time
 $[t, t+\Delta t]$; 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
15 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
20 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 $Sig(t)$,
based on the currently valid, predicted motions $B_{eweg}(M_A(t))$ or $B_{eweg}(M_{A'}(t))$ or based on
25 the reflexive and/or protective motion autonomously controlled in an open-loop/closed-
loop manner, for controlling the actuators and controls/regulates the actuators based on
the control signals $Sig(t)$.

Fig. 1