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## Design of modular exoskeleton mechanism with autonomous control system

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The subject of the invention is an exoskeleton walking robot type modular platform. The modularity will be based on the option to replace respective mechanical components (joints, limbs, drives) but also components of controlling programme (upright standing and motion algorithms, controlling, track determining).

Parts of exoskeleton are designed with modular solution. Each of bigger modules shall be constructed using simple geometries and parts. Construction should be easy to disassemble and assemble again.

This approach allows to:

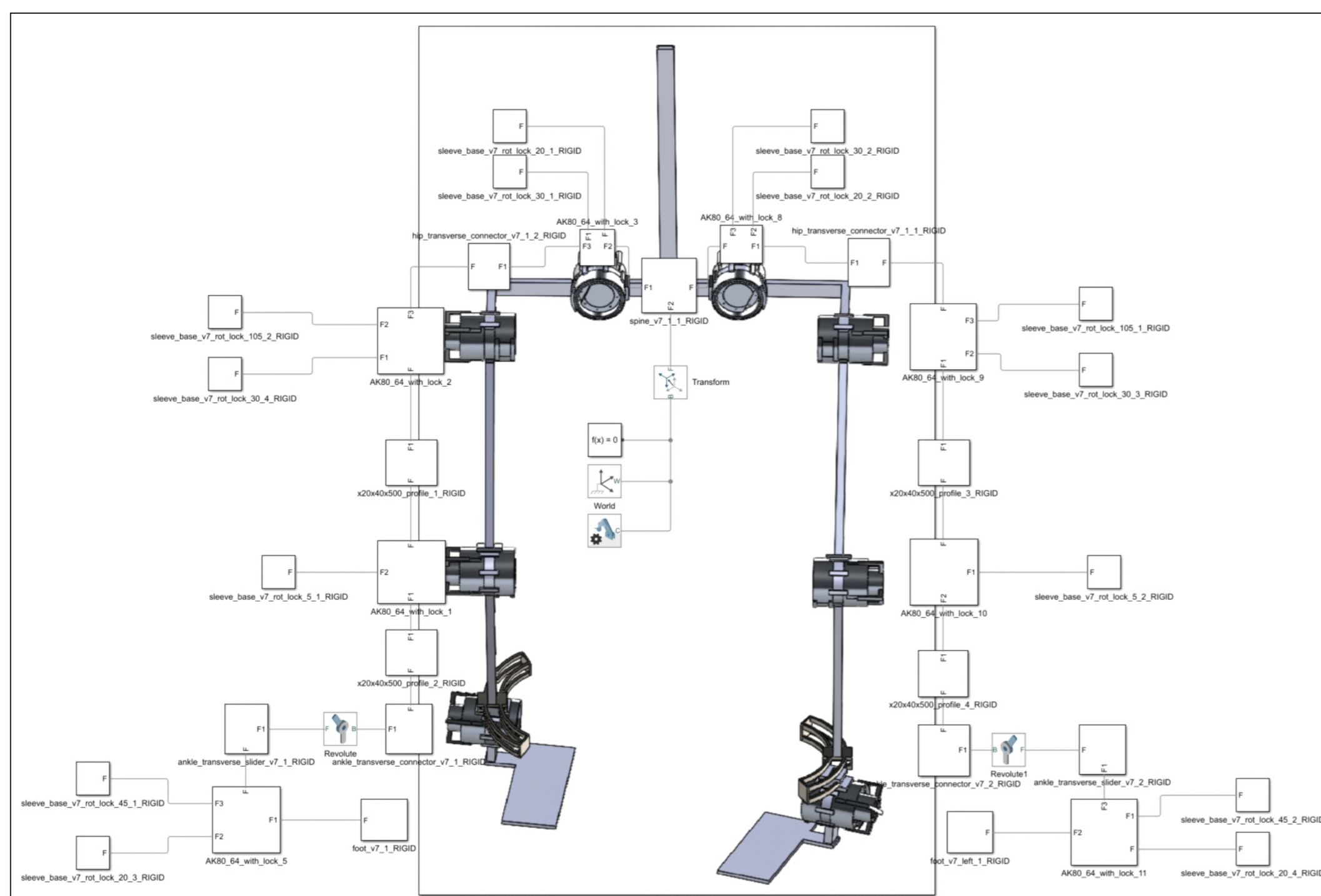
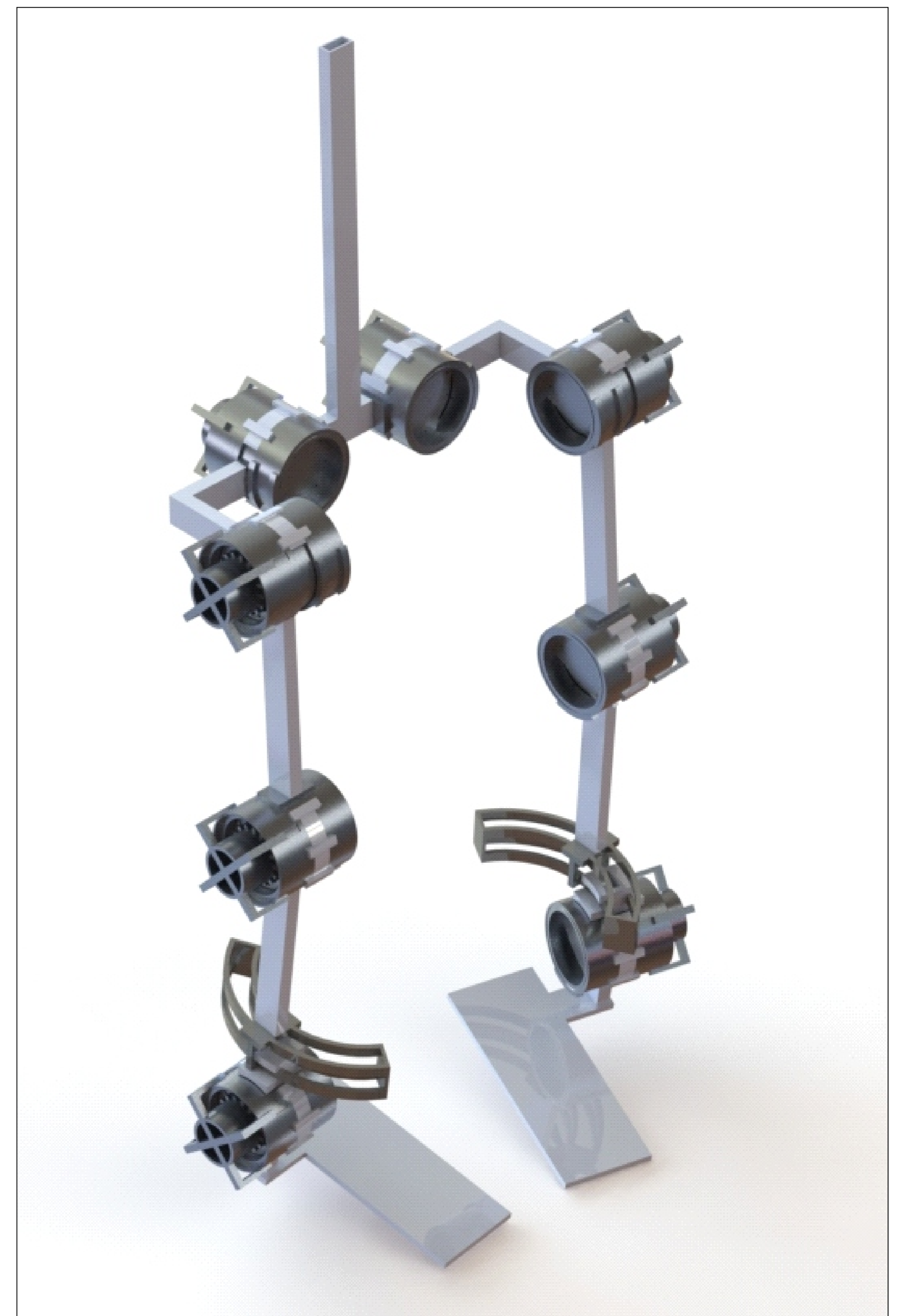
- minimize production costs,
- increase serviceability level,
- adjust construction to user needs,
- upgrade exoskeleton by adding new version of the parts,
- replace only broken parts, no need to replace all the motor module.

Exoskeleton control system also uses modular approach. That means in case of specific use cases (eg. Rehabilitation exoskeleton shall work only for one leg, no powerful motors needed), there is no need to rewrite all the control software. Implementation of new module should be quick and easy.

This approach allows to:

- replace the motors to more powerful/cheaper/more energy-efficient,
- add new ways of controlling exoskeleton,
- implement new sensors to construction,
- fix code quicker in case of any errors occurrence.

Exoskeleton is designed to be controlled by human or it can be automated. Control system will have function of auto-stabilize and autonomous walking. Thanks to many sensors attached to system, it will be able to detect instability and make a movement correction in order to save user from falling down.



Thanks to modularity of both construction and control system, this exoskeleton can be treated as a base for more advanced and more job-suited mechanism. After modification, it can be used in various industries:

- medical (precision of control, reduced cost),
- military (High efficiency, resistant to environmental factors),
- manufacturing (high power and durability),
- other industry branches (emergency services, space industry etc.).

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