



CONCEPT FOR HALODI'S EVE

Presented by

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INTRODUCTION

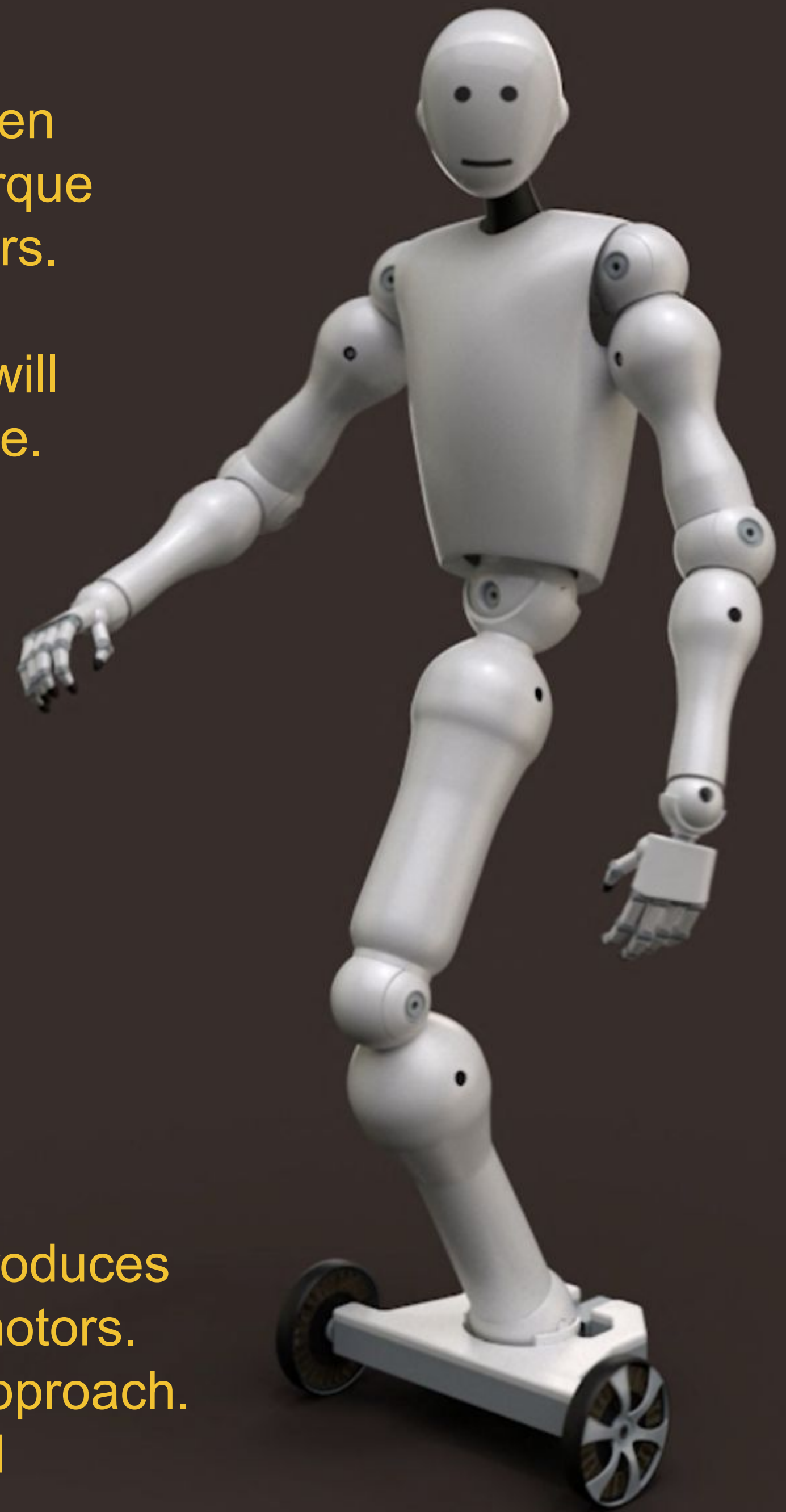
Torque control is necessary for the safe interaction between robots and the world. Unfortunately, robots that enable torque control are unattainable for most developers and final users. That's why Halodi has been developing Eve - a full sized, human strength, joint torque control humanoid robot that will serve industry and the general public at an affordable price.

DIRECT-DRIVE *

- Backdrive-ability and sensitivity of a robot are proportional to the square of transmission ratio. That's why it is important to keep it low. With Eve, the ratio is 1.1 in her wrist, 3.9 in her knee and a maximum of 5 in her torso.
- No extra torque sensor means no phase delay.
- No elastic element in the loop enables significantly higher controllable frequency.

REVOLUTIONARY STRONG MOTOR

The in-house designed high torque PMSM servo motor produces 3 times higher torque per weight than other commercial motors. The strong motor is a key to enabling Eve's direct drive approach. The motor is deep integrated with our in-house developed high-speed driver and communication interface.



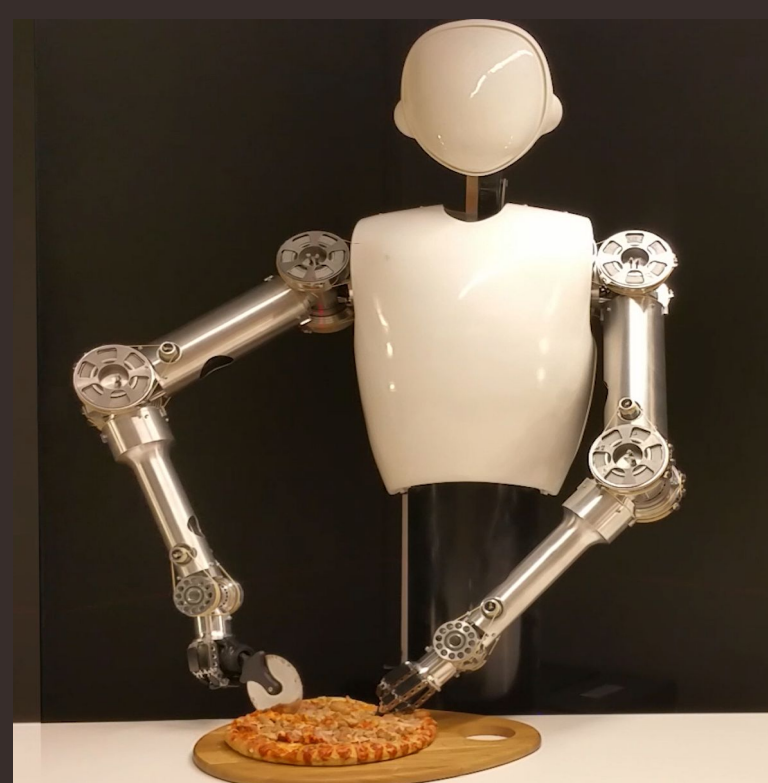
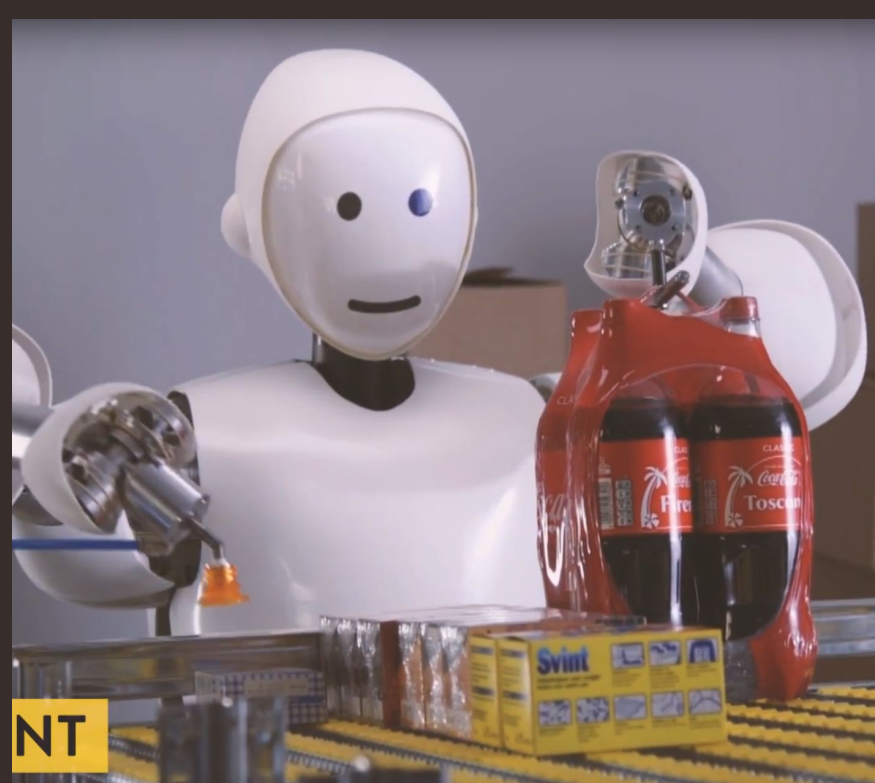
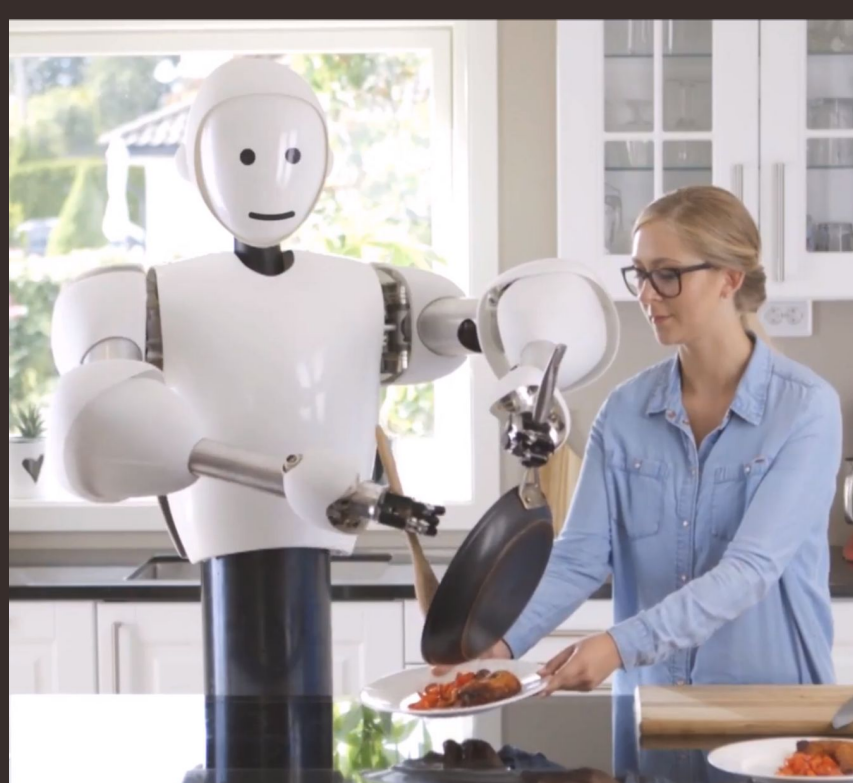
BACKLASH-FREE, FRICTIONLESS & LOW-INERTIA TRANSMISSION

Nonlinear terms such as backlash and friction are the enemy of robot controllers. Eve's cable-driven differential transmission has no backlash, very low friction (~2-5%) and low inertia. The differential transmission produces at least 3 times more torque advantage than serial ones.

THE FUTURE OF EVE

The future version of Eve will have whole body state estimator and whole body balance control, teleoperation VR control, cloud based AI and more.

PROOF OF CONCEPT DEMOS



[*] Bernt Øivind Børnich and Phuong Nguyen, "Designing our home service robot from the ground up"
<http://robohub.org/designing-our-home-service-robot-from-the-ground-up/>