



Serval

Serval, the last in a line of robot iterations, is meant to serve as a quadruped for agile movement. We use the previously researched mechanisms, control structures and gained knowledge in the electronics development to build a combined and hopefully higher performing robot. Serval consists of an active 3-DOF spine (combining advantages from Lynx and Cheetah-Cub-S), leg units with adduction/abduction mechanism and a scaled ASLP-version of Cheetah-Cub-AL. All motors (Dynamixel MX64R and MX28R) are combined with in-series elastics to protect the rather sensitive gearboxes from harm in different load scenarios. The robot is equipped only with a minimal sensor set, consisting of a low-cost, medium-grade IMU. Collaborations, started close to the end of this thesis will provide contact and GRF sensing with capacitive sensors as well as a sensitive skin for physical guidance. Control is realized through inverse kinematics for the legs, (for now) offsets in the spine and an underlying CPG-network for pattern generation. Reflexes, like in Oncilla, were not yet implemented, but are ongoing and future work.



Key Features

- IMU, (sensitive skin, GRF-sensors (in implementation))
- Inverse kinematics control with in-series elastics
- Standard Servo-motors
- On-board power supply
- Possibility of up to 300g (distributed) payload

Possible Applications

- Researching loss of limb strategies
- Researching different feet or legs designs
- Exploring different neural networks inspired by animals
- Platform for sensor carrier, such as camera
- Animal gait exploration, versatility
- Exploring in narrow spaces

Access information

Corresponding infrastructure	École Polytechnique Fédérale de Lausanne BioRobotics Lab
Location	Route Cantonale, 1015 Lausanne, Switzerland
Unit of access	Working day



Technical specifications

RC servo motor	Dynamixel MX64R /MX28R
dhip-shoulder	0.378m
dshoulder-shoulder	0.211m
lhip, standing height	0.228m
Mactuators+electr, sum	2.167
Mrobot	3.56 kg
Active degrees of freedom	15
Gait type	Various, main trot
Body lengths per second	2.11
Froude number $FR (v^2/G/lhip)$	0.27
Maximum speed, v_{max}	0.8 m/s
Control board	Odroid XU4
Power supply, tethered, battery	12V (3S Lipo)



Additional information

Publication under Review, website after that

Videos: <https://go.epfl.ch/ExperimentsServal>

3DPDF: <https://go.epfl.ch/3DPDFServal>