

# Dynamic Walking presents: The DRAPA-Challenge

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## I. INTRODUCTION AND MOTIVATION

Walking machines for science or industry achieve amazing stability, answer questions of how to manage highly dynamic motion or help us understand fundamental principals of nature. All this is for the sake of advancing knowledge and perhaps helping people to better their lives. Tools of the trade like math, numerous simulators and last but not least advanced mechanics are used to achieve these ambitious goals. Besides some promising exceptions from the maker community (see sec. III), all this is nowadays mostly available to a few, privileged parties. Especially when looking at building a robot, the most restricting factor is the funds available to the individual. We think this is a shame and thus propose the DRAPA initiative and consecutive challenge at Dynamic Walking 2017. DRAPA stands for Dynamic Robust Actuated Passive Ambulation. The goal of the initiative is easily explained: With your scientific knowledge and engineering skills, build and provide a robot, available open-source, to enable researchers and private individuals to explore and verify scientific questions without the hurdle of a huge budget. Not only can researchers gain new collaboration opportunities through this challenge, but students might benefit just as much. Building a robot, controlling it and seeing the result of your work not only on a screen but experiencing it live in front of you can fuel the interest in robotics and make education interactive and exciting.

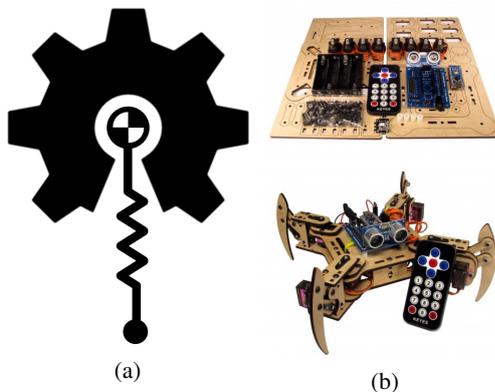


Fig. 1: (a) DRAPA logo, (b) Example of the Meped V2 quadruped robot kit, source see III

## II. FRAMEWORK OF THE CHALLENGE

While we want to provide some hints concerning the implementation of the challenge we must clarify that there is only one TRUE rule, which is imperative to follow:

The robots code, CAD-model, material list, a clear and well organized documentation for production, assembly, design and control must be made available without holding any rights to

it, making it **open source**. This is very important as it mirrors the key spirit of this initiative.

The rest of the rules below can be understood as strong pointers towards a common standard. They should be kept if possible (especially the cost limit), but small deviations are allowed.

- 1) Cost limit: \$100
- 2) Must be legged locomotion
- 3) Must be dynamic
- 4) Actuation: Passive, active or a combination of both
- 5) Steady-State, Repeatable motion on flat ground
- 6) Untethered, self contained
- 7) KISS - Easy to produce/assemble/control
- 8) Use of commonly available and relatively cheap materials (MDF, ABS, POM, cardboard etc.)
- 9) Use of prototyping grade manufacturing systems (Laser cutting, 3D printing, 3-axis milling)
- 10) Provide kit(s) at conference
- 11) Bonus features: cornering/turns, standing up, LEDs...

Other than these you are free to follow your own ideas and invent any mechanism you want. Hopper, biped, quadruped or even more legs are all possible and allowed. We encourage you to follow your intuition and build a robot that will participate in making this challenge a success. Also participation as a group or with student involvement is encouraged.

We will ask you to present and demonstrate your robot and its functionalities in front of the DW-community and an expert-jury (tbd). Additionally a small poster with the main features of the robot should be provided. The jury will crown the winner based on pure scientific, educational and engineering value. An additional popular vote of the whole community crowns the most elegant, amazing or just funny robot.

## III. INSPIRATIONAL WEBSITES

The following websites can give hints or inspiration when building a robot with little budget. The Maker-community is constructing small, cheap systems and starts packing them into robot kits for some time now. Look around, perhaps you will get an idea:

- <https://www.artisansasylum.com>
- <http://www.hackaday.com/>
- <http://www.thingiverse.com/>
- <https://www.intorobotics.com/>
- <https://spiercetechnology.com/shop/home/25-meped-v2-complete-kit.html>

## IV. INSCRIPTION

To organize the challenge and distribute information without spamming the whole community we ask you to inscribe by the **1st of April 2017** with some info about yourself, the project name and type of robot (namely the number of legs) on the following form:

<https://goo.gl/forms/t6NI9GSdja17B5Xj1>

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