# Humanoid Virtual Athletics Challenge 2025 Regulations

HVAC2025 Committee

1. Common Regulations

1.0. Submissions that do not comply with the regulations

- Simulation results that partially violate the regulations stated below could be submitted to the challenge. However, since fair comparison will no longer be possible, such submissions will be treated as non-official.
- Examples of partial violation of the regulation include:
    - Using other simulation engines (e.g., mujoco)
    - Modifying the setting of the simulation engine and/or robot model to lower the difficulty level (including “easy mode” described in the old regulations): e.g.,
        - assign extremely large inertia to the base link
        - apply external force to the links
        - set large friction coefficient to avoid slipping

1.1. Simulation Environment

- Use Choreonoid development version or release version 2.0 or later.

1.2. Robot Model

- Basically .body format is recommended. Other formats including OpenHRP and loading URDF via plugin are also OK.
- No limitation to the number of joints.
- The actuated joint type must be either revolute or prismatic.
- The total mass of the robot must be 40kg or greater. There is no upper limit.
- The power of each actuator is limited to 1kW.
- In the initial configuration, the robot must be inside a box of the size X×Y×Z = 70×70×200[cm^3]. Here, the center of the bottom face of the box matches the world coordinate origin. Apart from this condition, the initial position and posture of the robot is arbitrary.
- The mass and the inertia must be set as practically realizable values.
- Self collision detection of the robot can be turned off. Collision detection of any link of the robot and the environment must be turned on.

1.3. Field Model

- A field model consisting of a .body file and optionally a SimpleController designated for each challenge category must be used. Unless otherwise noted in the category-specific regulations, editing the model file is not allowed.

### 1.4. Project file

- A .cnoid file designated for each challenge category must be used. Project file may be edited within the range permitted by the regulations.

### 1.5. Controller

- A controller must be implemented as a SimpleController of Choreonoid. OpenRTM plugin may be used. Moreover, an external control system (e.g., ROS) may be used via some bridging mechanism

### 1.6. Actuation

- The actuation of each actuated joint must be either Velocity or Torque.
- Torque mode is recommended in terms of simulation stability.
- Only joints can be directly actuated. Links must not be directly actuated.

### 1.7. Sensing

- Sensors supported by Choreonoid (ForceSensor, RateGyroSensor, AccelerationSensor , RangeSensor) may be used. There is no limit to the number of sensors used.
- The joint angle and velocity may be read from the simulator via SimpleControllerIO.
- The absolute pose and velocity of the links may be directly retrieved from the simulator via SimpleControllerIO.

### 1.8. Simulator Setting

- AIST simulator must be used.
- The simulation setting of the sample project file must be used. Changing the simulation setting to improve the precision of simulation is allowed.
  ex) set time_step smaller than 0.001
- Changing parameters that alter the physical behavior (e.g., friction coefficient, penetration depth) is not allowed.

### 1.9. Robot Operation

- The robot may be manually operated via some input device such as gamepad.
- The state of the robot may be monitored in the 3D view of Choreonoid. The view point

may be freely changed.

### 1.10. Time Limit

- The duration of simulation must not exceed 5 minutes (measured in simulation time).

### 1.11. Common Evaluation Item

- In addition to the evaluation items specific to each challenge category, the following common measures are used for evaluating the performance.
- Realtime Factor
    - The ratio of elapsed simulation time and computation time.
    - The value will be displayed in the message view of Choreonoid after each simulation.

## 2. Running Simulation and Submitting Results

### 2.1. Execution of Simulation

Execute the following steps to run simulation and save the result.

1) Start up Choreonoid
2) Load the project file
3) Start up the external control system (if necessary)
4) Start simulation
5) Stop simulation
6) From the right-click menu of the WorldLogItem, choose “Save project as log playback archive” and save the log data.
   Confirm that [logname].cnoid and [logname] directory is generated.
7) Terminate Choreonoid

### 2.2. Submitting Log Data

・Archive the log data ([logname].cnoid and [logname] directory) into a .zip or a .7z, and upload it to the URL sent to you upon registration.
Notify the committee that you have uploaded a new result.

・The submission of the following together with log data is recommended.

・Video file of the screen capture of simulation (mp4)

・Some document (e.g. powerpoint) describing the background of your simulation

・Submission is accepted during the challenge period only (see the web page for exact period).