Guidelines for EN2532 Final Virtual Robot Competition on Webots

1. The competition will be held on the week starting on the **5th of July**. A **sample arena for testing** will be provided at least **two weeks** prior to the date of the competition.
2. Contestants should complete all Webots programming in **C/C++** languages.
   Note: C/C++ are the most commonly used languages for embedded systems programming. If the physical competition was to be held, programming ability in C/C++ would have been required (e.g. Arduino).
3. **Camera** (in Webots) is **not** allowed for your robot implementation.
4. All sensors, actuators, and other components (e.g. batteries etc.) used in the robot should correspond to a **real-world element** (**model number** and **datasheet** should be available). All parameters of the simulated sensor/actuator should be configured to be very close to the real-world element.
   Note: The specifications for the motors provided by ENTC can be found via the link, https://www.pololu.com/product/3216/specs.
5. The number of sensors/actuators/components **should not exceed the input-output capacity** of a chosen microcontroller platform that can be used for creating a physical robot for a similar task. (E.g. Arduino Mega).
   Note:
   - Webots platform does not require you to define a virtual microcontroller. However, you are expected to pick a suitable microcontroller and evolve the design of you robot while considering the inherent limitations of the microcontroller. For instance, Arduino Uno facilitates 6 Analog Read pins, and therefore, the number of analog sensors you can interface directly with it will also be 6.
   - You are expected to draw a reference wiring diagram, emphasizing the interfacing of sensors, actuators, power converters and power sources with the microcontroller. You can color code the wires at your discretion (Fig. 1).

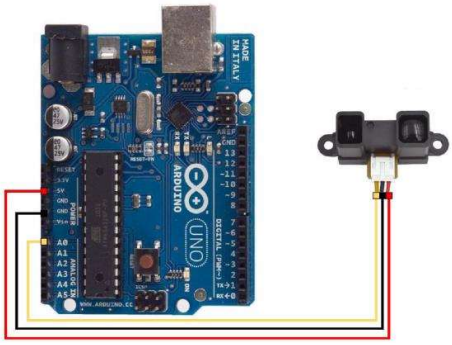

Figure 1: A simple wiring diagram between an Arduino Uno and an IR sensor. Red: Vcc (+5V), Black: Ground (0V), Yellow: IR sensor output (0 – 2.8V for GP2Y0A02YK sensor)

6. The robot simulated in Webots should correspond to a **CAD design**. CAD design should include **all the components** required to run the robot in a real-world environment. For the purpose of simulation on Webots, you are allowed to simplify the design of the robot body. However, the **total weight** and the **center of gravity** of the robot should be preserved.
7. For evaluation purposes the basicTimeStep field of the WorldInfo node will be set to **16ms**.
   Note: https://cyberbotics.com/doc/guide/tutorial-5-compound-solid-and-physics-attributes#basictimestep-erp-and-cfm recommends values between 8 and 16 for regular use of Webots.
8. The **lighting** of the arena (e.g., using DirectionalLight nodes) will be defined in the sample testing arena that will be provided and will not be changed during evaluation.
9. Evaluations will be conducted on a PC with a **Nvidia GPU**.
   Note: https://cyberbotics.com/doc/guide/system-requirements
10. **Windows** operating system is preferred for your Webots simulation (If any contestant wants to be evaluated on Linux, please inform).

Evaluation criteria

Contestants will be evaluated on the following criteria.

1. Task completion
2. Engineering approach
3. Total approximate cost / part utilization

* percentages will be notified to you in due time