

RoboFEI Adult Size Robot: Cronus Parameter

As requested, a description of how the parameters in the proto were derived from the datasheets.

Motor Dynamixel XH540-W270 14.8V

- Backlash = $0.25[^\circ] * (\pi/180) \approx 0.0058 \text{ [rad]}$. Backlash = 0.01 [rad] ¹
- Resolution = $4096 \text{ [pulse/rev]} = 12 \text{ bits encoder} * (2\pi)/(2^{12}) \approx 0.0015 \text{ [rad]}$
- MaxTorque = 12.9 [N.m] ¹
- MaxVelocity = 3.87 [rad/s] ¹
- DampingConstant = 2.92 [Ns/m] ¹
- StaticFriction = 1.49 [N.m] ¹

¹ value from https://cdn.robocup.org/hl/wp/2021/05/v-hsc_model_specification_v1.03c.pdf appendix

Accelerometer & Gyroscope (UM7)

Both sensors were acquired from the UM7, an Attitude and Heading Reference System utilized in the real robot. The sensors utilizes 8-bit integer to store data, meaning a range of 0 to 254 of returned values.

Accelerometer (8th page)

- Dynamic Range = $\pm 8 \text{ [g]} * 9.80665 = \pm 78.453 \text{ [m/s}^2\text{]}$
- Lookup Table = $\begin{bmatrix} -78.453 & 0 & 0 \\ & 78.453 & 254 & 0 \end{bmatrix}$

Gyroscope (7th page)

- Dynamic Range = $\pm 2000 \text{ [}^\circ\text{/s]} * (\pi/180) = \pm 34.907 \text{ [rad/s]}$
- Lookup Table = $\begin{bmatrix} -34.907 & 0 & 0 \\ & 34.907 & 254 & 0 \end{bmatrix}$

Logitech HD Webcam C920

The camera can be set up to 1920 x 1080 pixels, although by limitations imposed the recording value is set to 800 x 600 pixels.