Build Your Robot 2020

Electronic hardware and embedded software

Design a simple microcontroller based system which controls a DC motor driving a rack and pinion mechanism in order to transform the rotational motion in linear motion. The module and the length of the rack and pinion is by your choice. The system shall also include a minimal user interface.

Functional specifications:

1. The system shall be able to drive the motor in both directions of rotation.
2. The velocity of the shaft shall be measured and displayed in real time on the user interface.
3. The acceleration shall also be measured and displayed in real time on the user interface.
4. The user shall be able to set a target value to control the position of rack and then confirm it to start the movement. The mechanism shall stop if the rack will reach one of the ends.
5. Actual position shall be displayed in real time on the user interface.

The circuit shall be powered from a +24V supply (or less, depending on the motor specifications).

Please submit the source code and schematic (in PDF format)!

Good luck!