Test task for C language skills

Description of the problem:

Electronic control unit is based on an STM32 MCU. The ECU controls a linear actuator. The actuator can be extended, shrinked or kept in steady state. Moving the actuator is controlled by two digital outputs (GPIO). Setting one pin enables moving in one direction, another - in opposite direction. Endpoints of the actuator's working range are configured mechanically by adjusting 2 end switches. Actuator can pass the switches. Moving velocity is constant and equal in both directions.

For testing 2 LEDs and 2 buttons are used. LEDs are connected to the control outputs and indicate movement of the actuator. Buttons are used to imitate the end switches.

Task:

Implement a homing function which will allow to set the actuator into the middle position (middle of the distance between the end switches).

Requirements:

The solution must be implemented in C language and use the STM32 HAL driver. The code must not contain any hardware specific functions or variables (except for mapping IOs). Function must not block the execution (should run as a step of a superloop).

Evaluation criterias:

- Solution correctness and robustness (sensor/actuator fault protection, debouncing)
- Code cleanness, maintainability (parametrization) and reusability
- Problem decomposition approach
- *Solution that will work with asymmetric speeds (extension and shrinking speeds are constant but are not equal to each other) will be a strong plus