

Friction

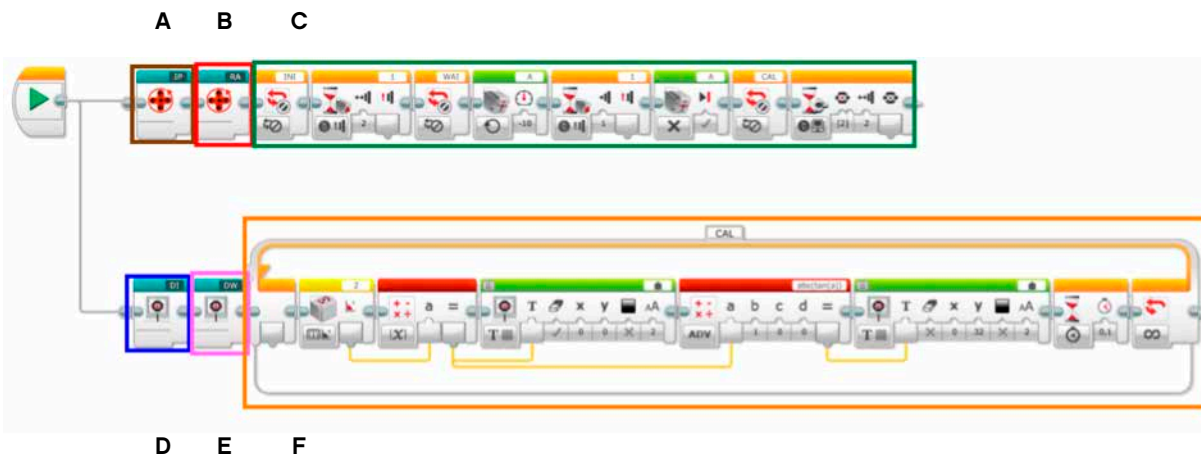
EV3 program description

The program "08" moves a small ramp slowly upward until the operation is interrupted by the user. During the movement, the angle of the ramp to the surface on which the EV3 is placed is measured, and the coefficient of friction is calculated based on the angle. The angle and as well as the coefficient of friction are output on the EV3 Brick Display.

Abbreviations used

- INI Initialization (hourglass animation)
- WAI Wait (Touch Sensor display)
- CAL Calculate (calculation of angle and coefficient of friction)
- IP Init Platform (initialize ramp)
- RA Initialize Gyro and rotation
- DI Display hourglass graphic
- DW Display Touch Sensor graphic

Program summary



Start program

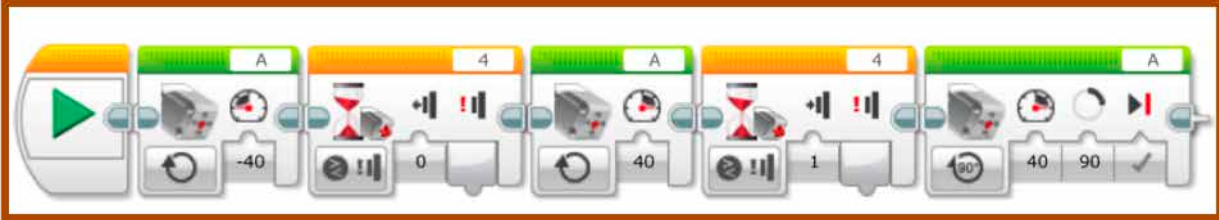
Start the program by pressing the Touch Sensor on Port 1; the ramp is slowly raised (in program part E).

Exit program

Center button or Cancel button on the EV3 Brick (in program part E)

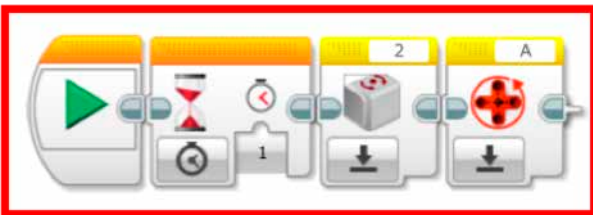
Program parts

Program part A (My Block IP)



In program part A, at first the Medium Motor is turned in the negative direction until it is no longer in contact with the Touch Sensor on Port 4. After that, the motor is turned in the opposite direction until the Touch Sensor presses up against Port 4. The last motor block now holds the inclined plane at the bottom by turning the Medium Motor. Program part A is used to initialize the ramp.

Program part B (My Block RA)



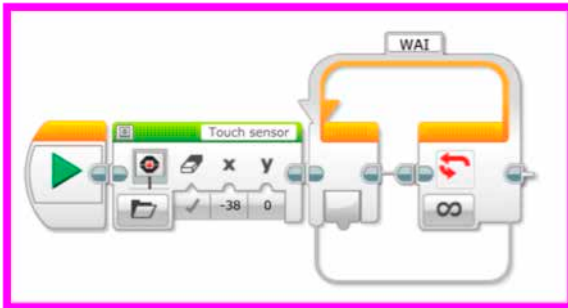
Program part B waits for one second. After that, the Gyro Sensor and the rotation meter of the Medium Motor are reset.

Program part C (My Block DI)



Program part C alternately displays the graphics "Hourglass 0" and "Hourglass 1" for one second each in loop INI. The result is an animation on the EV3 Brick Display.

Program part D



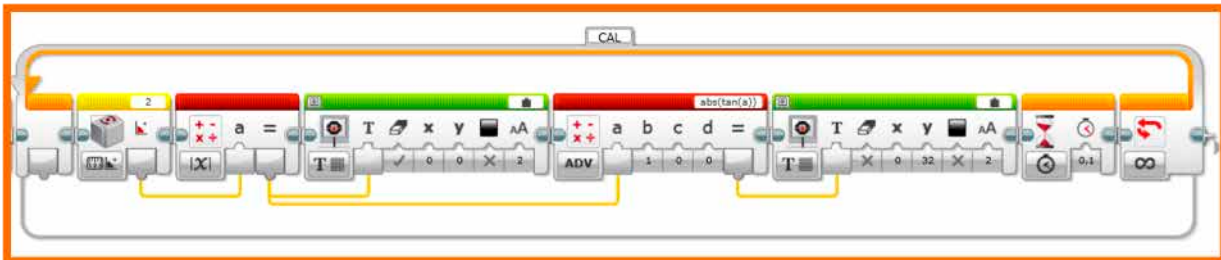
Program part D is used to display a Touch Sensor graphic. Loop WAI at the end is terminated with an interrupt in program part E.

Program part E



At the start of program part E, loop INI from program part C is terminated using a loop interrupt. After that, the program waits for the Touch Sensor on Port 1 to be actuated. Once it has been actuated, an additional loop interrupt is used to terminate loop WAI from program part D. Subsequently, the Medium Motor is turned in the negative direction at speed 10 until the Touch Sensor on Port 1 is actuated again. Next, the Medium Motor is stopped, and a loop interrupt is used to terminate loop CAL from program part F; the program then waits for the Center Button to be pushed to exit the program.

Program part F



Program part F contains loop CAL, which is used to calculate coefficient of friction . The angle is measured using the Gyro Sensor, and the absolute value is determined. The absolute value of the angle is output on the EV3 Brick Display, and the angle is used to calculate coefficient of friction. The coefficient of friction is the tangent of the measured angle. The coefficient of friction is also output on the Brick Display. At the end of the loop, there is a short Wait Block with a duration of 0.1 s.