Marlene Fritsch, Jonas Dengel, Leonard Schoch

Project 1

Part 1

Calculation for maximum pulse rate:

RPM_{Motor}: 129 @ 5V (155 RPM @ 6V)

RPS_{Motor}: $\frac{129}{60} = 2.15$

Gear Factor: 100

Time of Revolution: $\frac{1}{\text{RPSMotor} \cdot \text{Gear Factor}} = 0.00465\ s$

Encoder Reflectors: 14 (including both encoder signals)

Encoder Period: $\frac{\text{Time of Revolution}}{\text{Encoder Reflectors}} = \frac{0.00465\ s}{7} = 664.45\ \mu s$ (**Minimum Time between sampling**)

Encoder Pulse Rate: $\frac{1}{\text{Encoder Period}} = 1505\ Hz$

Since we are continuously counting the edges, the code theoretically can handle all the pulse changes in time.

Measuring the pulse rate with the oscilloscope results in an encoder period of 682.5 µs which is almost equal to the calculated value.

Part 2

Our implementation of the encoder reading should result in a counting value of 700 per revolution because the datasheet states that we have 1400 per revolution on both encoder signals. After printing the counting value to the serial port and rotating the wheel slowly for one revolution we can tell that the counting value is lower than the expected value (around ~500 - 600). Hence, it can be said that the serial output interferes with the counting or the implementation itself takes up too much time.

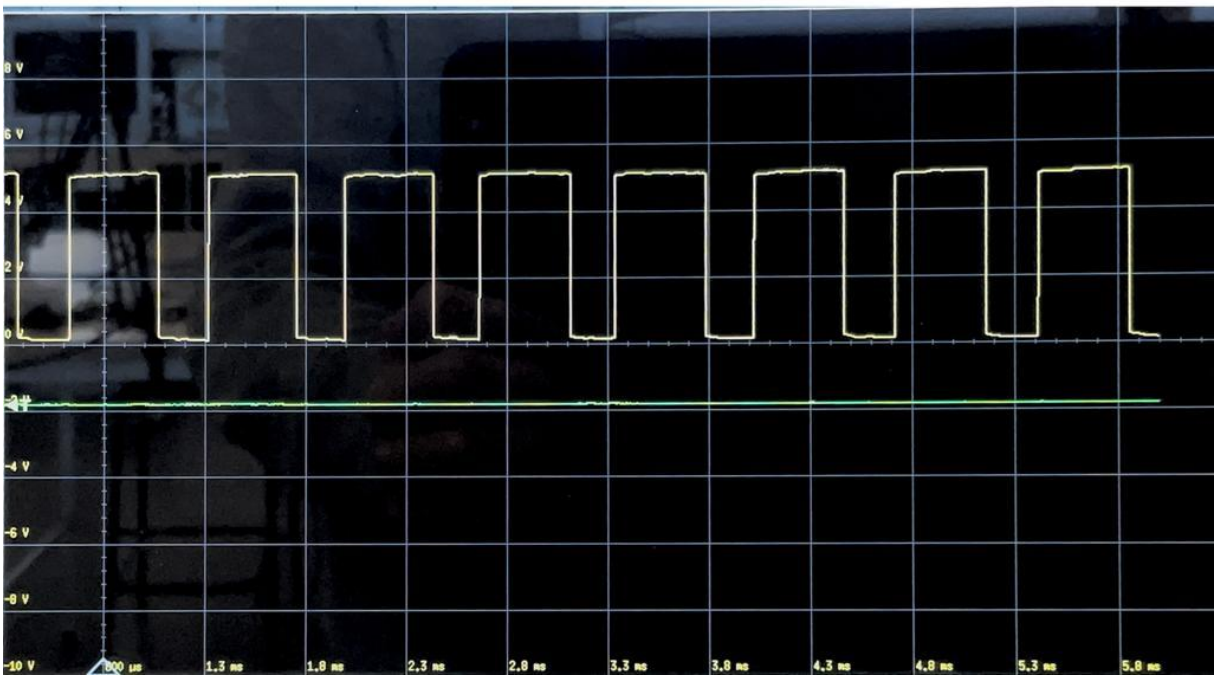
Part 3

After implementing the counter to be triggered by the internal interrupt the value of 700 per revolution can be achieved.

Github Link: https://github.com/Marlenexyz/EMBE-Group

Youtube Link: https://www.youtube.com/watch?v=K-5Ds7jzSbE

Fetched data with the oscilloscope:



Experimental setup: