

Emulating Digital Commutation and Field-Oriented Control in BLDC Motors Using Analog Hall Sensors

Author: Ralph Poell (Poell~E Motor)

Contact: poellemotor@gmail.com

1. Introduction & Objective

...

2. Background on BLDC Motors and Commutation

...

3. Approach: Using Two Analog Hall Sensors

...

4. Challenge: Offset and Reference Misalignment

...

5. Signal Correction: Vector Rotation and Virtual Sin/Cos Basis

...

6. Sector Alignment Comparison

...

7. Sinusoidal Current Generation for FOC

...

8. Conclusions & Insights

...

9. Licensing & Publication Intent

This work is intended to be fully open source and accessible to anyone. No commercial restrictions are placed on its use or adaptation. To ensure it remains openly available and to prevent future patenting by third parties, this work is released under the MIT license.

Appendix A: MIT License

MIT License

Copyright © 2025 Ralph Poell

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the “Software”), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED “AS IS”, WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.