

About Philips Drachten

At Philips Drachten, we develop innovative products in the Personal Care and Personal Health domains, including shavers, trimmers, epilators and electric toothbrushes. As part of a multidisciplinary engineering environment, you will work on real product technology together with experienced electronics, software and mechatronics engineers.

Assignment

For selected high-end products, a Phase-Locked Loop (PLL) is used to detect and identify the connected unit or attachment, such as a shaver, brush or trimmer. This master thesis focuses on understanding the current PLL implementation and investigating opportunities to improve its performance, robustness and implementation in embedded software.

The following elements are part of the assignment:

1. Investigate PLL theory and options (via books and analytical calculations and simulations).
2. Investigate / get understanding in how the PLL is currently implemented.
 - Check its behavior and compare with theory.
3. Investigate possible improvement options of how the PLL algorithm can be optimized.
 - By using modelling and simulation tools (e.g., Matlab / Simulink).
4. Implement the best PLL improvement option in software (on a MicroController).
 - Investigate the PLL setup in the current software.
 - Change the software towards the new implementation.
5. Check the new defined system against the old way of working.
 - Define test setup and test cases.
 - Evaluate and compare performance / responses.

What we are looking for

You are a Master's student in Electrical Engineering, Mechatronics Engineering, Control Engineering, or a related field. You have an interest in control systems, embedded software and modelling/simulation.

Practical information

- **Type of assignment:** Master thesis

- **Preferred duration:** At least 5 months
- **Location:** Philips Drachten
- **Initiator/Supervisor:** Bernardo Mulder