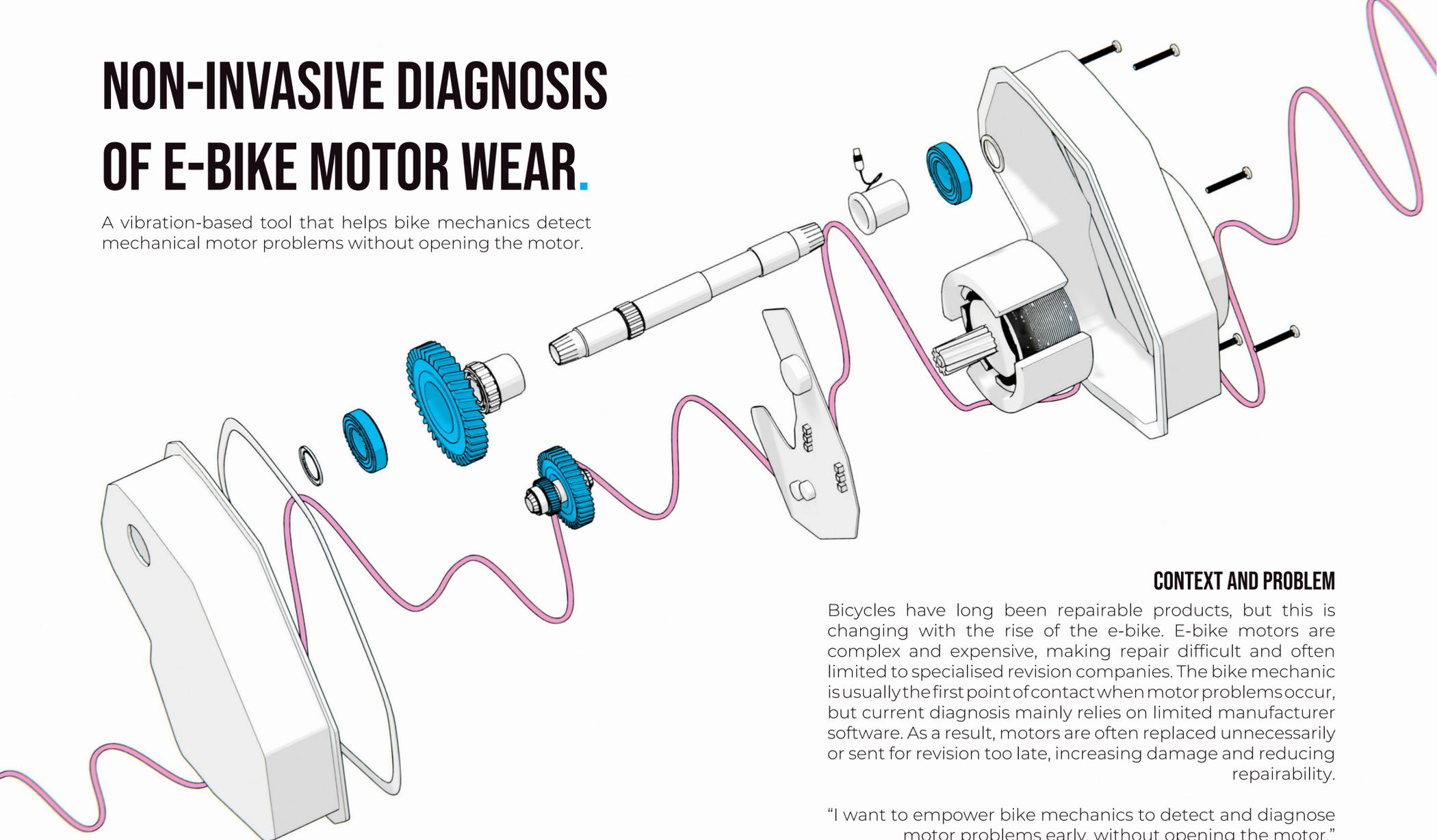# NON-INVASIVE DIAGNOSIS OF E-BIKE MOTOR WEAR.

A vibration-based tool that helps bike mechanics detect mechanical motor problems without opening the motor.


CONTEXT AND PROBLEM

Bicycles have long been repairable products, but this is changing with the rise of the e-bike. E-bike motors are complex and expensive, making repair difficult and often limited to specialised revision companies. The bike mechanic is usually the first point of contact when motor problems occur, but current diagnosis mainly relies on limited manufacturer software. As a result, motors are often replaced unnecessarily or sent for revision too late, increasing damage and reducing repairability.

"I want to empower bike mechanics to detect and diagnose motor problems early, without opening the motor."

SOLUTION

This project proposes a vibration-based diagnostic tool for non-invasive assessment of e-bike motor condition. A piezoelectric sensor is positioned against the motor housing while the bicycle is suspended and the motor runs on walk-assist. The sensor captures vibration signals that reflect the internal mechanical behaviour of the motor.

The recorded data is analysed by software and compared with baseline measurements from healthy motors of the same type. Complex vibration data is translated into a clear indication of motor condition and a recommendation for follow-up action. This supports bike mechanics in making objective, well-founded decisions and helps identify mechanical wear at an earlier stage.

PROCEDURE

Setup

Measure
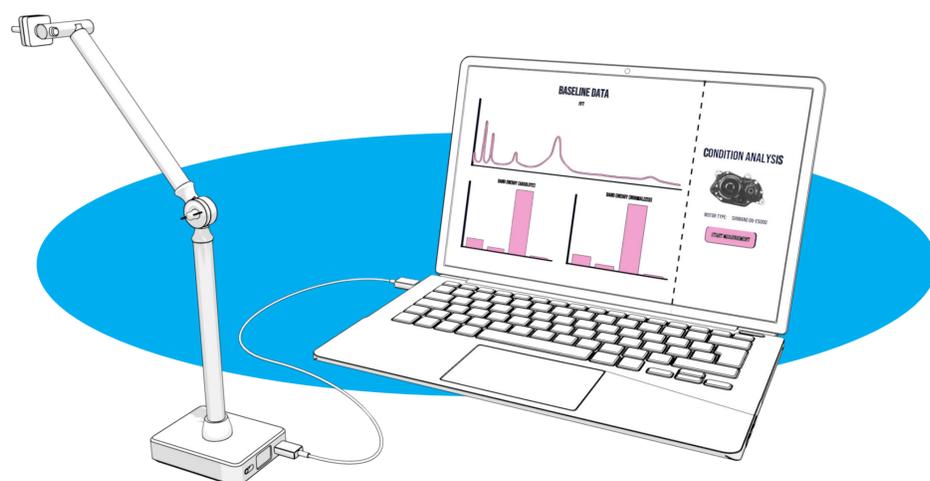
Analyse & advise
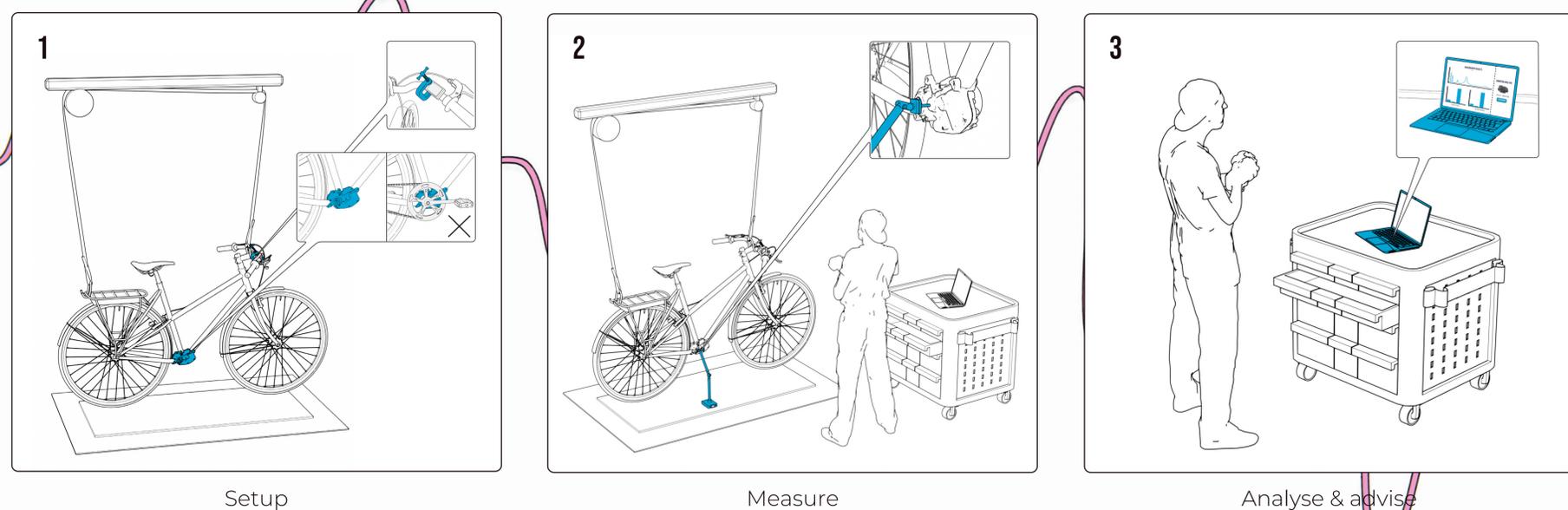
Dion Vijverberg
Developing a non-intrusive diagnostic tool to assess the condition of e-bike motors.
February 16th, 2026
MSc Integrated Product Design

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