A Portable Real-Time Polarimeter by the Use of the Spinning Waveplate Method

Julian Nicolai, Wilfrid-Shaun Nortey-Noye, Brendan Ford, and Adam Thomson

Department of Electronics, Carleton University

Department of Electronics

Carleton University

Introduction

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed turpis leo, egestas a mi et, pharetra fringilla risus. Sed lacinia felis ut feugiat laoreet. Interdum et malesuada fames ac ante ipsum primis in faucibus. Cras leo.

Section 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Cras a ex commodo, venenatis est ullamcorper, accumsan sapien. Sed diam turpis, tempus a congue at, finibus et arcu. Phasellus iaculis, massa sed feugiat euismod, quam sem eleifend ligula, ut tincidunt mi elit vitae nibh. Mauris erat nibh, gravida eget dui in, vestibulum laoreet enim. Vestibulum aliquet commodo nulla, non faucibus nunc semper ut.

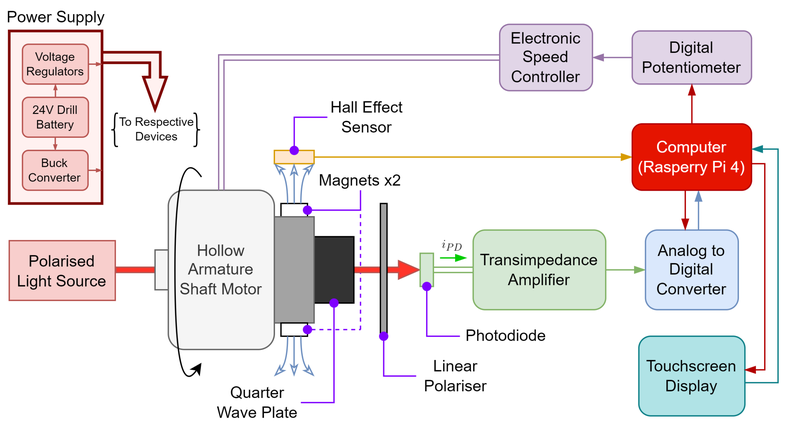

Figure 1: Labelled tilted FBG diagram; operating principles and dimensions.

Highlight Section

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Fusce in nisi orci. Proin maximus varius fermentum. Nunc eu lacinia elit. In hac sed [1].

$$L = \Sigma_{i=0}^{N-1} |P_{i+1} - P_i| \tag{1}$$

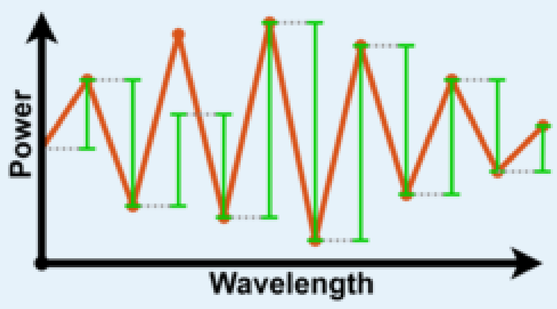

Figure 2: The sum of the green lines is the contour length.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Morbi sed ipsum nec massa interdum malesuada non ac nulla. In vitae urna in ante sollicitudin tempor in eu eros. Sed condimentum, magna quis efficitur vestibulum, purus erat accumsan sem, eu interdum est sapien elementum dui. Suspendisse viverra.

Alert Section

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Fusce in nisi orci. Proin maximus varius fermentum. Nunc eu lacinia elit. In hac sed.

Section 2

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed blandit massa id maximus tristique. Curabitur eget viverra sem. Quisque sit amet rhoncus elit. Nunc accumsan eros dui, nec tincidunt tortor interdum condimentum. Fusce tincidunt eget turpis eu eleifend. Nullam aliquam quam amet.

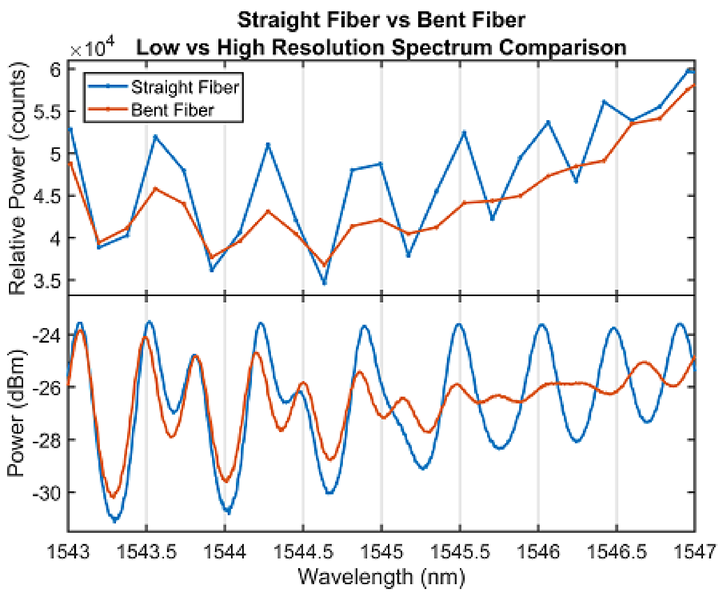

Figure 3: When bending is introduced to a 3 mm, 4° TFBG the peak prominence decreases. This phenomena can still be observed using low-resolution equipment.

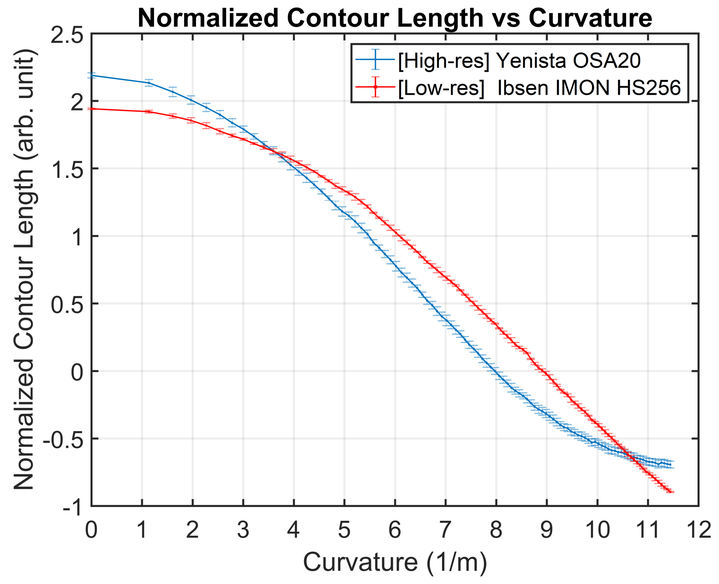

Figure 4: Comparing equipment by applying CLA indicates high performance despite the low resolution.

Section 3

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec lobortis orci felis, ut feugiat odio congue et. Praesent ut egestas quam. Mauris efficitur semper ornare proin.

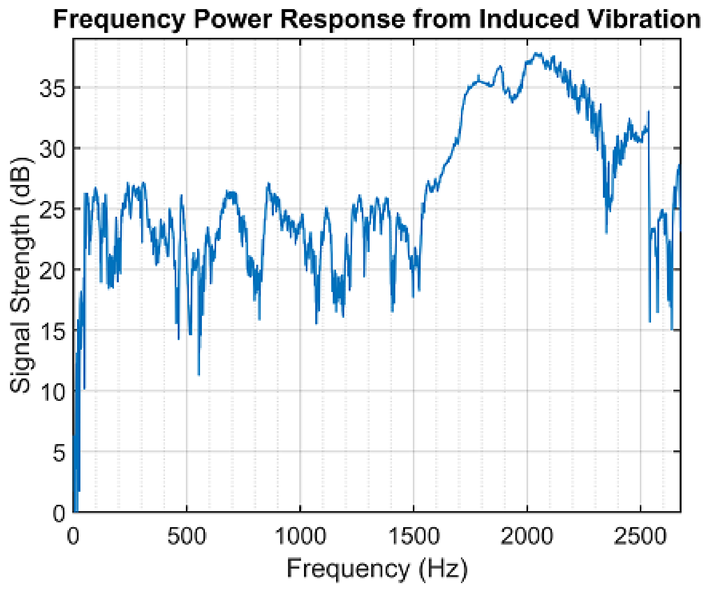

Figure 5: A fiber in a fixed-fixed cavity (resonant frequency of 2 kHz) can detect external induced vibrations accurately.

Section 4

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec eleifend sollicitudin mauris. Nunc mollis gravida turpis, vel fermentum sem suscipit eu. Proin a elementum lorem. Suspendisse vulputate erat eu sapien consectetur, vitae aliquam metus sagittis. In hac habitasse platea dictumst. Vivamus cursus egestas sapien, sed imperdiet sapien mi.

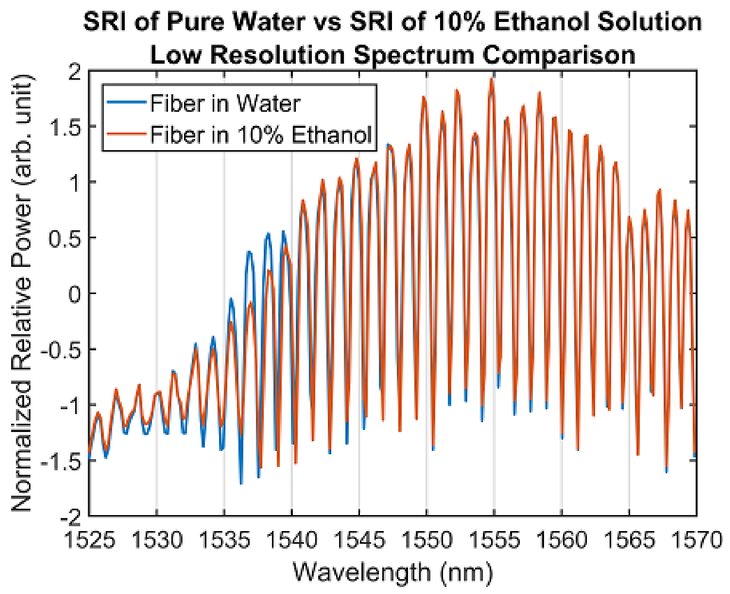

Figure 6: Ethanol has a slightly higher refractive index than water. This small increase leads to a large change in the TFBG spectra.

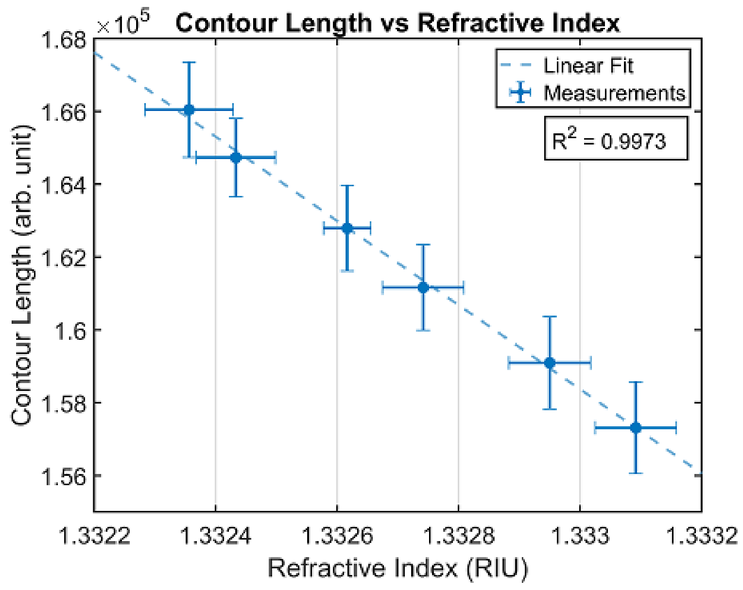

Figure 7: Using CLA on low-res data, an accuracy of ±83.5 CLU per 10^{-4} RIU with 95% confidence within $\pm 0.024 \times 10^5$ CLU (Contour Length Units) was achieved.

Conclusion

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec eleifend sollicitudin mauris. Nunc mollis gravida turpis, vel fermentum sem suscipit eu. Proin a elementum lorem. Suspendisse vulputate erat eu sapien consectetur, vitae aliquam metus sagittis. In hac habitasse platea dictumst. Vivamus cursus egestas sapien, sed imperdiet sapien mi.

References

[1] Martyna Wawrzyk.
The spectrum length method in quantitative interpretation of selected optical spectra.
Informatyka, Automatyka, Pomiary w Gospodarce i Ochronie Środowiska, 12(2):20–23, Jun. 2022.

[2] Jacques Albert, Li-Yang Shao, and Christophe Caucheteur.
Tilted fiber Bragg grating sensors.
Laser & Photonics Rev., 7(1):83–108, 2013.