

# MEMS tunable polarization rotator for optical communication

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# MEMS tunable polarization rotator for optical communication

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**Abstract**  
Describe briefly about the system

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# 1

Chapter 1

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## Introduction

**1.1 Motivation**

**1.2 Objectives**

**1.3 MEMS and silicon photonics**

**1.4 Importance of these systems**

**1.5 Outline of this thesis**

# **2**

Chapter 2

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## **State of the art**

### **2.1 Optical waveguides**

### **2.2 Polarization in optical waveguides**

### **2.3 Polarization rotator**

#### **2.3.1 Passive polarization rotator**

#### **2.3.2 Active polarization rotator**

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## **Design and simulation**

### **3.1 Approach**

### **3.2 Choice of simulation**

### **3.3 Designing the experiment**

#### **3.3.1 Use case: Passive polarization rotator**

#### **3.3.2 Use case: Active polarization rotator**

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# Fabrication



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Chapter 5

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## **Results**

### **5.1 Experimental setup for measurement**

### **5.2 Results**

### **5.3 Analysis**

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Chapter 6

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## Conclusions

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Chapter 7

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## Limitations and future work

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## Chapter 8

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# Acknowledgments

### 8.1 Sample

Here I have cited the [1] and [2] just for fun.

# Bibliography

- [1] Analog Systems, “ADXL335 Datasheet. <http://www.analog.com/media/en/technical-documentation/data-sheets/ADXL335.pdf>,” 2010.
- [2] D. Kiburz, R. Jacobs, F. Reckling, and J. Mason, “Bicycle accidents and injuries among adult cyclists,” *The American journal of sports medicine*, vol. 14, no. 5, pp. 416–419, 1986.