

# Sensor Selection for Ball-on-Beam Project

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## 1 Introduction

The successful realization of the ball-on-beam project necessitates careful sensor selection, with a focus on accuracy and precision. In this document, we explore different sensor options, with a spotlight on Time-of-Flight (ToF) sensors.

## 2 Sensor Comparison

Sensor Type	Description
Infrared (IR) Distance Sensors	Emit infrared light to measure reflection time, suitable for distance measurement and object presence detection.
Ultrasonic Distance Sensors	Emit sound waves and measure reflection time, facilitating non-contact distance measurement.
Time-of-Flight (ToF) Sensors	Utilize laser/LED light to measure reflection time, enabling highly accurate distance calculations.
Laser Distance Sensors	Employ laser light for precise distance measurements; offer elevated accuracy with potential cost implications.
Reflective Opto Sensors	Detect object presence through light reflection, valuable for relative object positioning.
Capacitive/Inductive Proximity Sensors	Detect object presence without physical contact, suitable for defined range detection.

Table 1: Comparison of Different Sensor Types

### **3 ToF Sensors: Ideal Choice**

Among the sensor types evaluated, ToF sensors stand out as a promising choice for our ball-on-beam project.

#### **3.0.1 Principle and Advantages**

ToF sensors employ light pulses to measure distances, excelling in accuracy and real-time responsiveness.

#### **3.0.2 Applications**

The capabilities of ToF sensors make them well-suited for applications such as:

- Precise object detection and obstacle avoidance.
- Reliable position sensing in confined spaces.
- Dynamic environments requiring real-time measurements.

### **3.1 Conclusion**

After thorough assessment, we've selected ToF sensors as the optimal choice for our ball-on-beam project. These sensors provide accurate, real-time distance measurements, aligning seamlessly with our project's precision requirements.

#### **3.1.1 Educational Value**

In addition to its technical advantages, the choice of ToF sensors also serves an educational purpose. By opting for ToF sensors, we aim to enhance our understanding of sensor technology and gain practical experience in utilizing such advanced sensing methods.