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## **E1 244: Detection and Estimation**

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### **Solution – Final Project**

## **1 Part A: Vehicle Detection**

### **1.1 Derivation**

#### **1.1.1 Detector at the entry, given $B_t$**

#### **1.1.2 Detector at the entry**

#### **1.1.3 Detector at the exit, given $B_t$**

#### **1.1.4 Detector at the exit**

### **1.2 Implementation**

#### **1.2.1 Working of detector at the entry**

#### **1.2.2 ROC of detector at the entry**

#### **1.2.3 Working of detector at the exit**

#### **1.2.4 ROC of detector at the exit**

## **2 Part B: Vehicle Tracking**

### **2.1 Derivation**

#### **2.1.1 State model for Kalman filter**

#### **2.1.2 Kalman filter using velocity measurements**

#### **2.1.3 Kalman filter using position and velocity measurements**

### **2.2 Implementation**