

# Autonomous Pool Playing Robot

## High-Level Architectural Design

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Date	Revision #	Comments	Authors
22/12/2016	1	- Document initialized	Eric Le Fort

Table 1: Revision History

# **1 Introduction**

## **1.1 System Description**

## **1.2 Overview**

## **1.3 Naming Conventions & Definitions**

This section outlines the various definitions, acronyms and abbreviations that will be used throughout this document in order to familiarize the reader prior to reading.

### 1.3.1 Definitions

Table 2 lists the definitions used in this document. The definitions given below are specific to this document and may not be identical to definitions of these terms in common use. The purpose of this section is to assist the user in understanding the requirements for the system.

Table 2: Definitions

Term	Meaning
X-axis	Distance along the length of the pool table
Y-axis	Distance across the width of the pool table
Z-axis	Height above the pool table
End-effector	The end of the arm that will strike the cue ball
$\theta$	Rotational angle of the end-effector
Cue	End-effector
Personal Computer	A laptop that will be used to run the more involved computational tasks such as visual recognition and the shot selection algorithm
Camera	Some form of image capture device (e.g. a digital camera, smartphone with a camera, etc.)
Table State	The current positions of all the balls on the table
Entity	Classes that have a state, behaviour and identity (e.g. Book, Car, Person, etc.)
Boundary	Classes that interact with users or external systems

### 1.3.2 Acronyms & Abbreviations

Table 3 lists the acronyms and abbreviations used in this document.

Table 3: Acronyms and Abbreviations

Acronym/Abbreviation	Meaning
VR	Visual Recognition
PC	Personal Computer
$\mu C$	Micro-Controller
EE	End-Effector
EEB	End-Effector Base
EEA	End-Effector Arm
PWM	Pulse Width Modulation
I/O	Input/Output

## **2 Mechanical Components**

### **2.1 X-Rails**

### **2.2 Y-Rails**

### **2.3 Camera Mount**

### **2.4 Arm**

### **2.5 Arm Base**

### **2.6 Bridge**

### **2.7 End-Effector**

### **2.8 End-Effector Arm**

### **2.9 End-Effector Base**

### **2.10 Cable Management System**

## **3 Electromechanical Components**

### **3.1 X-Rail Motors**

### **3.2 Y-Rail Motor**

### **3.3 Rotational Motor**

### **3.4 End-Effector Actuator**

### **3.5 User Controls**

## **4 Electrical Components**

### **4.1 Power Supply**

### **4.2 Transformer**

### **4.3 AC to DC Converter**

### **4.4 $\mu C$**

### **4.5 Controllers**

### **4.6 Actuators**

### **4.7 Sensors**

## **5 Circuit Design**