

# Backyard Splashpad Specifications Document

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James S. Humble

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## **Acknowledgements**

No-one has helped us significantly enough to deserve to be mentioned in the Acknowledgments.

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## Revision History

<b>Revision</b>	<b>Description</b>	<b>Author</b>	<b>Date</b>	<b>Approval</b>
1	Initial Revision	James and Braydan	Oct 24, 2018	
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## Specifications

# 1 SCOPE

(a) General: This document describes the design and verification requirements of the Backyard Splash Pad. The Backyard Splash Pad is used to provide backyard entertainment for adults and children alike.

(b) Acronyms:

**BSP:** Backyard Splash Pad

## 2 APPLICABLE DOCUMENTS

(a) Government Documents

(b) Industry Documents

IEC 60529



### 3 STAKEHOLDER REQUIREMENTS

The stakeholders for the Backyard Splash Pad are:

1. Dr. Don Cripps
2. Jolynne Berrett
3. The Families of Braydan Allen and James Humble
4. The USU ECE Department

#### 3.1 Stakeholders Requirements

The primary stakeholders needs are described below.

- **Dr. Don Cripps The device:**

1. Must be complicated enough to challenge the designers.

- **Jolynne Berrett. The device:**

1. Must have a useful, readable user manual.

- **The Families of Braydan Allen and James Humble will be the primary users of the device. The device:**

1. Must not present safety/shock hazards to any user.
2. Must have an easy user interface.
3. Must be able to run in a typical backyard.
4. Must have multi-colored lights.

- **The USU ECE Department is funding the project. The device:**

1. Must be low in initial cost (design and prototype).
2. Must meet the pedagogical requirements of the course (ECE 4820/4830/4840/4850) for which it is designed.

## 4 ENGINEERING REQUIREMENTS

### 4.1 System Overview

The Backyard Splash Pad is comprised of four main components: a device controller, a user interface, a mechanical system, and an object-tracking system. The device controller receives input from the user interface and uses it to control the mechanical system. The user interface presents information about the system to the user and accepts input from the user. The mechanical system controls the flow of water. The object-tracking system detects objects near the Splash Pad and reports information to the controller. See Figure 2.

#### 4.1.1 Functional Diagram

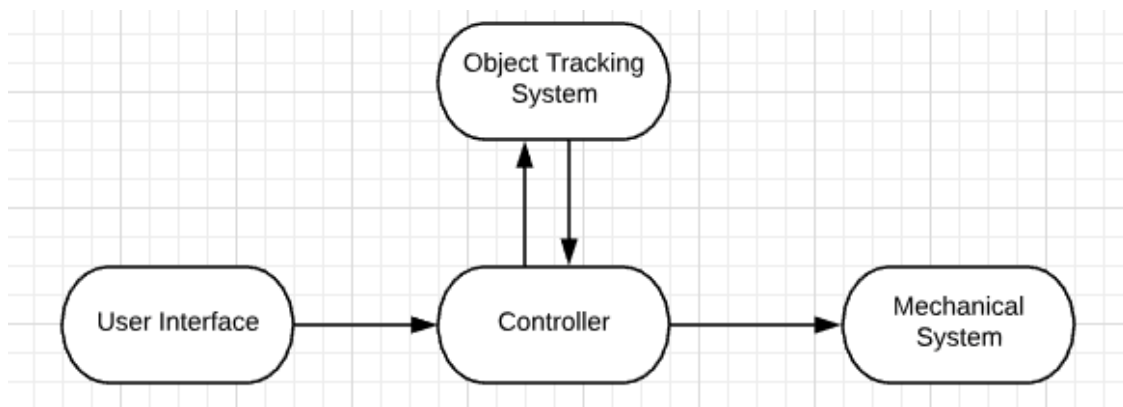


Figure 1: Functional Diagram.

### 4.2 Functional Requirements

#### 4.2.1 Controller

The controller is the part of the system that controls the physical outputs.

##### 4.2.1.1 Stream Control

The controller shall be able to turn on and off each water stream individually.

##### 4.2.1.2 Light Control

The controller shall be able to turn on and off each light individually.

##### 4.2.1.3 Color Control

The controller shall be able to change the color of each light individually.

#### **4.2.1.4 Responsive to Object Tracking System**

The controller shall be able to turn on a specified nozzle as directed by the Object Tracking System.

#### **4.2.1.5 Programmed Display**

The controller shall have at least one pre-programmed fountain routine containing light changes and water streams turning on and off.

### **4.2.2 User Interface**

The user interface is the part of the system that accepts input from the user and translates it into commands that the controller can execute.

#### **4.2.2.1 User Nozzle Control**

The user interface shall allow the user to select what nozzle(s) are turned on.

#### **4.2.2.2 User Color Control**

The user interface shall allow the user to select what color the LEDs are.

#### **4.2.2.3 User Object Tracking Control**

The user interface shall allow the user to enable or disable the object tracking system.

### **4.2.3 Mechanical System**

The mechanical system is the physical aspect of the system. The mechanical system produces all of the functional output of the system.

#### **4.2.3.1 Water Flow**

The mechanical system shall be able to create seven water streams that are 6.0 ft or less.

#### **4.2.3.2 Water and Dust Resistance**

The mechanical system shall conform to the IP65 standard.

#### **4.2.3.3 Operation Time**

The mechanical system shall be able to operate continuously for 10 minutes.

#### **4.2.3.4 Safety**

The mechanical system shall not provide electrical shock to users.

#### **4.2.4 Object Tracking System**

The Object Tracking System is the part of the system that senses objects in the area surrounding the splash pad, and sends commands to the controller based on the position of objects detected.

##### **4.2.4.1 Minimum Object Size**

The object tracking system shall be able to detect any object larger than an NBA regulation sized basketball that is within 2.0 ft of any nozzle.

##### **4.2.4.2 Lighting Levels**

The object tracking system shall be able to function when the sun is 20 degrees above the horizon.

##### **4.2.4.3 Automatic Calibration**

The Object Tracking System may be able to automatically adjust to differences if its position relative to the splash pad is changes.

### **4.3 Support Requirements**

#### **4.3.1 Device Controller**

#### **4.3.2 User Interface**

##### **4.3.2.1 Interface Platform**

The User Interface may require an android phone for more advanced features.

#### **4.3.3 Mechanical System**

##### **4.3.3.1 Power Consumption**

The system shall operate on 1000.0 Watts or less.

##### **4.3.3.2 Power Supply**

The system shall be powered by a standard 120 V electrical outlet.

##### **4.3.3.3 Size**

The system shall fit within a cube that is 10 ft on an edge.

#### **4.3.4 Object Tracking System**

##### **4.3.4.1 Size**

The object tracking system shall fit within a cube that is 6 inches on a side.

##### **4.3.4.2 Container**

The object tracking system shall have a case.

##### **4.3.4.3 Mounting**

The object tracking system case shall have a mounting interface.

## 5 VERIFICATION OF REQUIREMENTS

### 5.1 System Overview

The Backyard Splash Pad is comprised of four main components: a device controller, a user interface, a mechanical system, and an object-tracking system. The device controller receives input from the user interface and uses it to control the mechanical system. The user interface presents information about the system to the user and accepts input from the user. The mechanical system controls the flow of water. The object-tracking system detects objects near the Splash Pad and reports information to the controller. See Figure 2.

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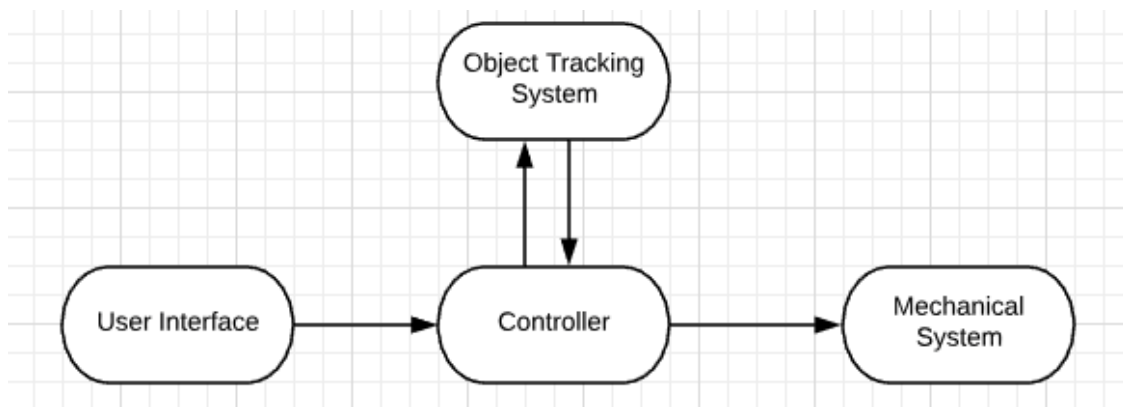


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<b>Paragraph Number</b>	<b>Test Type</b>	<b>Tester's Name</b>	<b>Pass/Fail</b>	<b>Date</b>