Input:

Expected Behaviour:

Actual Behaviour:

Pass/Fail:

Functional Requirements

Hardware:

- - - - - - - - - - - - - - - -

Requirement #: 12

Requirement Type: 3

Description: The machine must be able to move the end-effector to the determined location and orientation.

Test 12.1:

Verify that X-Rails can synchronously move to the same location at the same speed without getting stuck while loaded

Input: Location along x-direction

Expected Behaviour: Smooth, consistent motion along axis until position is met and immediate stop

Actual Behaviour: -

Pass/Fail: -

Test 12.2:

Verify that Y-Rail can move to a location without getting stuck while loaded

Input: Location along y-direction

Expected Behaviour: Smooth, consistent motion along axis until position is met and immediate stop

Actual Behaviour: -

Pass/Fail: -

Test 12.3:

Verify that EE-Base Motor can orient to a specific angle without getting stuck while loaded

Input: Angle of orientation with respect to the x-axis

Expected Behaviour: Smooth, consistent turning motion until position is met and immediate stop

Actual Behaviour: -

Pass/Fail: -

- - - - - - - - - - - - - - - -

Requirement #: 13

Requirement Type: 3

Description: The machine must be able to move the end-effector to strike the cue ball, taking a shot.

Test 13.1:

Arduino received command to take shot

Input: Command to Arduino to take shot

Expected Behaviour: Arduino initiates shot taking process

Actual Behaviour: -

Pass/Fail: -

Test 13.2:

EE is positioned correctly and waiting command to power piston

Input: Position and orientation components sent to Arduino

Expected Behaviour: System moves to desired location and waits for piston signal

Actual Behaviour: -

Pass/Fail: -

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Requirement #: 14

Requirement Type: 3

Description: The machine must be able to take user input to indicate options such as: take a shot, move out of the way or stop operation.

Test 14.1:

User applies input, then the Arduino indicated a received message

Input: User pressed status button

Expected Behaviour: Arduino output to console correct desired status

Actual Behaviour: -

Pass/Fail: -

Test 14.4:

Stop command during runtime

Input: As system is in motion, stop command is sent

Expected Behaviour: System halts immediately

Actual Behaviour: -

Pass/Fail: -

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Requirement #: 15

Requirement Type: 3

Description: The machine must be capable of moving out of the way to pre-determined locations upon user request.

Test 15.1:

Arduino receives user command to move out of the way => powers motors to move system out of the way

Input: Command to Arduino to move in desired location on either side of table

Expected Behaviour: System indicates acceptance of command and preforms action. Upon completion the system stops

Actual Behaviour: -

Pass/Fail: -

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Requirement #: 16

Requirement Type: 3

Description: The system must be able to move the machine around the table as necessary.

Test 16.1:

Move around perimeter of table to prove that all locations can be reached

Input: Motion command from Arduino

Expected Behaviour: EE will travel around perimeter of table. Inspection that its location is sufficient for shot-taking is required

Actual Behaviour: -

Pass/Fail: -

Test 16.2:

Able to move around table without interfering with balls

Input: Random motion along table

Expected Behaviour: EE moves along table without hitting balls in the table

Actual Behaviour: -

Pass/Fail: -

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Requirement #: 17

Requirement Type: 3

Description: The machine should be able to take a shot regardless of the table state.

Test 17.1:

Random status sent by user followed by shot request

Input: Random state => Take a Shot command

Expected Behaviour: System switches state and initiates shot taking sequence

Actual Behaviour: -

Pass/Fail: -

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Electrical:

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Requirement #: 10

Requirement Type: 4

Description: The system should be able to detect the machine's current physical state at certain location.

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Requirement #: 18

Requirement Type: 4

Description: Power supply for system must be transformed from AC to DC as necessary.

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Non-functional Requirements:

Look & Feel Requirements: Ernest

Requirement #: 2

Requirement Type: LF

Description: The general look and feel of the setup must sufficiently resemble a standard pool table.

Usability & Humanity Requirements: Andrew & Derek

Requirement #: 1

Requirement Type: UH

Description: Players must be able to see the table setup upon their turn.

Requirement #: 2

Requirement Type: UH

Description: The design of the machine shall not greatly inhibit a players ability to make a shot.

Requirement #: 3

Requirement Type: UH

Description: The robot should not interrupt the player's turn.

Performance Requirements: Andrew & Derek

Requirement #: 1

Requirement Type: P

Description: The system will take shots within a reasonable amount of time.

Requirement #: 2

Requirement Type: P

Description: The system will take shots precisely.

Requirement #: 3

Requirement Type: P

Description: The machine should be light.

Requirement #: 4

Requirement Type: P

Description: The body of the machine needs to be rigid.

Operational & Environmental Requirements Ernest

Requirement #: 1

Requirement Type: OE

Description: The system should be able to be powered by a standard 120V AC 60Hz outlet.

Maintainability & Support Requirements: Ernest

Requirement #: 1

Requirement Type: MS

Description: The system software should separate safety critical components from other components.

Requirement #: 2

Requirement Type: MS

Description: The machine must be able to stay in full working order over a reasonable amount of time.

Security & Safety Requirements: Andrew & Derek

Requirement #: 1

Requirement Type: S

Description: High voltage components should be safely secured from users.

Requirement #: 2

Requirement Type: S

Description: Users should not be able to modify system to perform unsafe actions such as setting the power of a shot beyond a certain safe value.

Requirement #: 3

Requirement Type: S

Description: Sensitive electrical equipment needs to be isolated from high voltage.

Requirement #: 4

Requirement Type: S

Description: All high voltage components should have circuit breakers.

Requirement #: 5

Requirement Type: S

Description: The uC must have a voltage regulator.

Requirement #: 6

Requirement Type: S

Description: Users standing at least 2ft outside the perimeter of the setup will be in no danger of being harmed by any action taken by the mechanism.

Requirement #: 7

Requirement Type: S

Description: There will be shutdown buttons located near any moving parts.

Cultural & Political Requirements: Ernest

Requirement #: 1

Requirement Type: CP

Description: There will be no direct references to any political or religious groups.

Legal Requirements: Ernest

Requirement #: 1

Requirement Type: L

Description: There will be no copyright infringement, unlicensed usage of software, or services that have not been properly licensed.