

Bryce Tondryk
Pirate Strike Software Requirements
CSC 322: Software Engineering
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Feature #1: LCD Screen mounted on 3D-printed Gun

Must display both images and onomatopoeias (like "Bang, Pop, Boom, etc") on the circular LCD display.

Functional Requirements:

1. The LCD screen shall be circular in shape and compatible with a Raspberry Pi.
2. LCD screen shall show the same image upon powering up to indicate the LCD screen is ready and the gun can be used.
3. This same start-up image shall contain a disclaimer.
4. The LCD screen shall display a random array of onomatopoeias and images when the trigger is pressed.
5. The LCD screen shall be 1.28 inches in diameter.
6. The LCD screen shall have a resolution of 240x240 pixels.

Non-Functional Requirements:

1. The LCD screen shall have minimal latency in showing images/onomatopoeias.
2. The code that displays images on the LCD screen when the trigger is pressed shall work upon connecting to power.
3. The LCD screen and wiring shall not interfere with the functionality of the 3D printed gun.
4. The wires running from the Raspberry Pi to the LCD screen shall be long enough to reach its mounted position.
5. The wires shall avoid disconnecting from the Raspberry Pi when jostled.
6. The code that displays images on the LCD screen when the trigger is pressed shall be properly tested and debugged.

Acceptance Criteria:

1. The LCD display shall display random images/onomatopoeias with a latency of 0.3 seconds or faster when the trigger is pulled.
2. The LCD display shall not randomly display the same image/onomatopoeias four times in a row, 99% of the time.
3. The LCD display shall display the starting screen and disclaimer 15 seconds after connecting to power.
4. Users with 20/80 vision or better shall be able to read the display screen when holding the gun.

Feature #2: Limit Switch

When the trigger is pulled, the limit switch must be pressed to display the images on the LCD screen.

Functional Requirements:

1. The limit switch shall be installed within the gun where it is activated when the trigger is pulled.
2. Upon activation of the limit switch by pulling the trigger, the LCD screen shall display a randomized image within 0.4 seconds.

Non-Functional Requirements:

1. The limit switch shall reliably detect the pulling of the trigger regardless of the angle at which the gun is held.
2. The limit switch shall accurately detect trigger activation when a force is applied to fire the gun.
3. The limit switch shall be durable and capable of withstanding repeated use without loss in performance.
4. The code running on the Raspberry Pi shall promptly detect changes in the limit switch's state and initiate the display of an image on the LCD screen.
5. The limit switch shall detect a change in state every 0.25 seconds to ensure an image is displayed when the trigger is pulled.
6. If the trigger is held for a long duration, more images will be displayed in succession.

Acceptance Criteria:

1. Pulling the trigger shall activate the limit switch 99% of the time.
2. Activating the limit switch will lead to the display of an image or images on the LCD screen.
3. The time it takes when activating the limit switch to displaying the random image on the LCD screen should be 0.3 seconds or faster.

Feature #3: Battery Powered Raspberry Pi

The Raspberry Pi will be powered by a battery to allow mobility in the user of the gun.

Functional Requirements:

1. The battery powering the Raspberry Pi shall be rechargeable.
2. The battery shall output a power of 5 volts to the Raspberry Pi.
3. The Raspberry Pi and its components - the limit switch and the LCD screen shall work as intended with battery power.
4. When connected to the battery, the Raspberry Pi shall run the proper code script.
5. A fully charged battery shall operate the gun continuously without constant need for recharge.
6. The battery shall be securely mounted and integrated into the design of the gun to ensure stability and safety.
7. The battery shall be easily accessible by the user for recharging.

Non-Functional Requirements:

1. The battery shall have a multi-year lifespan with minimal degradation.
2. The battery system shall comply with relevant safety standards to prevent overheating and short circuiting.
3. The battery shall be able to withstand reasonable external forces like falling or jostling.

Acceptance Criteria

1. The battery shall operate continuously for 4 hours without recharging.
2. The battery shall adequately power the Raspberry Pi and its components 99.5% of the time.
3. The battery shall not destroy or damage the Raspberry Pi.

Feature #4: Powered-on python script

The Raspberry Pi should be powered on running the same python script.

Functional Requirements:

1. The Raspberry Pi shall automatically execute a specific Python script upon powering on.
2. The python script shall be stored in a designated directory on the Raspberry Pi's file system.
3. The python script shall perform predefined actions or functions relevant to the operation of the gun.
4. The python script shall continue running until powered off.

Non-Functional Requirements:

1. The python script shall not have unexpected interruptions or errors.
2. The Raspberry Pi's boot time, including the execution of the Python script shall be minimized to ensure rapid readiness for use.

Acceptance Criteria:

1. The python script shall not have unexpected interruptions or errors 99% of the time.
2. The python script shall run within 30 seconds or less when connected to power.