**Project Requirements Document**

Project: “Catch the Light”

Team Life-support

Group Members: Nickolas LaForce, Alec Pimentel, Jay Votta, Dylan Souza

Customer: Dr. Viall

Project Description

Phase 1 of the project is to faithfully recreate the “Catch the Light” game on display in the Science and Engineering building. Team Life-support will be tasked with a “documentation of design” challenge where they will document every connection in the original game, along with an analysis of how the game operates. Any knew knowledge that the team acquires is also to be included in the documentation. The game will then be recreated and downscaled into a surface mount version of “Catch the Light”. The second phase of the project is to design a more advanced version of the “Catch the Light” game with the use of a microcontroller.

Phase 1 Requirements

**Documentation**

1. The original “Catch the Light” game’s connections will be documented by creating schematics using the following software:
   * Eagle
   * Fritzing
2. One report will be created that explains in detail how the original “Catch the Light” game operates.
3. The report specified above will also contain any new knowledge that was obtained by the team as a result of the project.

**Building of the “Catch the Light” Game**

1. The size of the PCB will be 10 x 10 cm. If needed, team Life-support will be able to increase the size of the board with customer consent.
2. The game will be recreated using only discrete logic. The use of a microcontroller is not permitted.
3. The game will be powered by a 12V constant power supply
4. Although team Life-support is not constricted to an official price cutoff for this version of the game, the team will present the customer with a bill of material. The components will not be ordered until permission to proceed is granted by the customer.

**Components on the PCB**

1. All components on the PCB will be surface mount.
2. One pushbutton with external connections will be present on the board.
3. All components on the board are to be placed by the Pick and Place Machine with exception of the external connections for the pushbutton.
4. The IC chips that will be used on the PCB are as follows:

|  |  |
| --- | --- |
| **IC Chips to be Used** | |
| **Quantity** | **IC Chip Type** |
| 1 | LM7805 |
| 3 | NE555N |
| 1 | SN74LS138N |
| 1 | D004D7406N |
| 2 | SN74LS08N |

1. The electronic components that will be used on the PCB will be based on the original product’s design. The components required to replicate this design are as followed:

|  |  |  |
| --- | --- | --- |
| **Resistors** | | |
| **Quantity** | **Value** | **Type** |
| 8 | 330Ω | R0805 |
| 1 | 1kΩ | R0805 |
| 2 | 2.2kΩ | R0805 |
| 1 | 3.3kΩ | R0805 |
| 1 | 47kΩ | R0805 |

|  |  |
| --- | --- |
| **Capacitors** | |
| **Quantity** | **Value** |
| 1 | 22µF |
| 1 | 100µF |

|  |  |
| --- | --- |
| **LED's** | |
| **Quantity** | **Color** |
| 1 | Yellow |
| 7 | Red |

Phase 2 Requirements

**Building the Advanced Version of the “Catch the Light” Game**

1. This version of the game will operate using the Atmega328pb microcontroller.
2. The capacitive touch button on the Atmega328pb microcontroller will be used in place a pushbutton. The maximum response time that it takes for the board to respond from the user’s press is 0.5 seconds.
3. The board will be engraved with the following three designs:
   * + Mascot
     + Name of Institution
     + ECE program
4. The price of the game is restricted to $3.00 per unit in quantities of 100.
5. The “Catch the Light” game will be powered by a self-latching power supply that shuts off the device after 5 minutes of no user activity, extending battery life.
6. One 1.5V coin cell battery will be used to power the game.