Project Requirements

Project: ”Catch the Light”

Team Life-Support

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Customer: Dr. Viall

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1 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 down-scaled 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.

2 Phase 1 Requirement

2.1 Documentation

1. The original "Catch the Light" game's connections will be documented by creating schematics using both Eagle and Fritzing.

2. One report will be created that explains in detail how the original "Catch the Light" game operates.

2.2 Building of the Catch the Light Game

1. The size of the PCB will be no more than 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 7400 series discrete logic. The use of a microcontroller is not permitted.

3. The game will be powered by a 12V constant voltage 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.

2.3 Components on the PCB

1. All components on the PCB will be surface mount.

2. One push-button with external connections will be present on the board.

3. All SMD components on the board are to be placed by the Pick and Place Machine.

4. The IC chips that will be used on the PCB can be found in table 1.

5. 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 can be seen in tables 2-4. NOTE: All capacitors, resistors and LEDs will be of size 0805.

IC Chips	
Quantity	IC Chip Type
1	5V Regulator
3	555
1	74138
1	7406
2	7408
1	74163

Table 1: IC Chips to be used

Capacitors	
Quantity	Value
1	22μF
2	100μF

Table 2: Capacitors to be used

LED's	
Quantity	Color
1	Yellow
7	Red

Table 3: LED's to be used

Resistors	
Quantity	Value
8	330Ω
5	1kΩ
2	2.2kΩ
1	3.3kΩ
1	47kΩ

Table 4: Resistors to be used

3 Phase 2 Requirements

3.1 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 push-button. The maximum response time that it takes for the board to respond from the user's press is 0.1 seconds.
3. A total of 16 led will be used, with 1 Yellow, 2 Red, 13 Blue LEDs.
4. The board will be silkscreened with the following three designs: University Mascot, Name of Institution, ECE department.
5. The price of the game is restricted to 3 dollars per unit in quantities of 100.
6. The "Catch the Light" game will be powered by a self-latching power supply that shuts off the device after 30 seconds of no user activity.
7. One coin cell battery will be used to power the game.