Project paper essay

Literature, Russian Literature

The objective of this project is to create interactive components in the Catastrophe room of the AC. The development team must create an interactive game in accordance with the present teeming in the challenge center as well as the existing storyline of the multi-room missions. The scope of this project includes the design, programming and installation of the Landmine game for the Catastrophe room as pictured in Figure 1. Figure 1 : Catastrophe Room In the Landmine game, participants enter the room and are instructed to navigate the floor grid and step on the power sign 0 across the room. They are also told that if they step on a square tile and the lights flash yellow they are to stop so they do not activate a landmine and thus fail the mission.

If they do move, the lights will flash red and the game will end. The participants will successfully complete the mission if they are able to accomplish the goal of reaching the aforementioned power sign without activating a landmine. Upon reaching the power sign, the landmines will be disabled allowing the participants to leave the room. The Landmine game uses strategically placed pressure switches to simulate landmines as shown in Figures 2 and 3. Sound effects will also accompany the triggering, activation, and deactivation of the landmines. When the mission is complete, the participants will be provided a Radio-Frequency Identification (RIFF) card. Figure 2: Pressure Switch Figure 3: Pressure Switch Diagram II.

MISSION REQUIREMENTS The development team must create a storyline and design interactive activities in accordance with the present teeming in the challenge center. It is imperative that all games meet the following specifications set forth by the Salvation Army: Write a potential storyline following the guidelines of the Salvation Army Use one room in he challenge center The room must include interactive components Each interactive component must be adaptable to any existing teeming and storyline Each game must run a maximum of 5 minutes Each game must be suited to children of ages 7-15 years Interactive components must be multi-faceted so as to promote teamwork Games must be adaptable for different levels of difficulties All building safety and electrical guidelines and codes must be followed Ill. DESIGN APPROACH A 5-step approach was followed in the creation of the game: 1. Determine a potential story for the game 2. Determine the components required (microelectronics, switches, lights, power supplies, sound systems) 3. Create test code 4. Test components and develop small scale implementation of components 5. Final implementation and testing The interactive systems must be responsive and accurate in order to obtain a flawless game.

To make this possible the following guidelines were used: The Ordains Mega 2560 was chosen to be the master microelectronic All voltages were provided by an external power sources Each component was tested individually before implementation Components were Estes after soldering and connection to the control box The Ordains Mega 2560 powered by a 16 Much AT mega 1280 processor, was chosen as a primary microelectronic because it has 54 digital input/output pins and 16 analog inputs as shown in Figure 4 [2] [3]. The Mega 2560 has the ability to communicate serially with other microelectronics and is easily programmable using the Ordains Integrated Development Environment (DID). In addition, 8-bit shift registers (Parallel-Len/Serial- Out Shift Register – CHANNEL) are used for input/output

(1/0) between the Ordains and the switches as shown in Figures 5 and 6 [4]. Figure 4: Ordains Mega Figure 5: Ordains to Shift Register Connection Figure 6: Shift Register to Pressure Switch Connection 1. The operation of the floor switches were based on negative logic, that is when a switch is not stepped on it will have a voltage value of +V, and when it is stepped on, it will be grounded or have a value of OVA. 2. The floor switches were connected to the Ordains though 8-bit shift registers.

There are 32 floor switches, which require 34 pins on the Ordains and this includes a clock and latch. However, each shift register can handle eight switches, so using four shift registers will reduce the number of ins used on the Ordains to six pins, as shown in Figures 5 and 6. .

A wave shield as shown in Figure 7 is connected to an Ordains Nun as shown in Figure 8 to control the sound system. Due to unavailability of serial ports on the Nun, the Softhearted library was used to facilitate communications with the Mega. 4. The ambient light uses 80 digital RUG Leeds connected to the wave shield. Figure 7: Wave Shield Figure 8: Ordains Nun Figure 9 is the flowchart for the landmine game. The flowchart describes the overall operation of the game and provides a generalized flow of the progression of the name. Figure 9: Flowchart of Landmines Game The interior lighting will use 80 Red Green Blue (RUG) Light Emitting Diodes (Leeds) the Leeds will be white as the participants start the challenge as shown in Figure 10. Participants will be asked to navigate the grid starting from a safe zone and while traversing the grid, participants will try to avoid “ landmines” (predetermined grid obstacles).

Participant location will be determined using pressure switches installed under the flooring and an Ordains processor will read their location and compare it to the selected landmines or power sign square. When a participant steps on a landmine, they will be warned to stay still because the lights will flash yellow three times. If the participant steps off the landmine, the lights will flash red three times and the game will reset. The game is completed when one of the participants steps on the goal tile and the lights flash green three times to signal success. The participants will receive an RIFF card for use in other missions.

Figure 10: LED step ‘ V. SYSTEM DESIGN The Ordains Mega 2560 is powered by an external VI/1. AAA power source.

The Mega 2560 performs at an operating voltage of V. Each of the 54 digital pins on the Mega 2560 can be used as an input or output, and can be programmed using the pinioned(), digitalis(), and digitalis() functions. The RUG and TX pins are used to receive (RUG) and transmit (TX) Transistor-to-Transistor Logic (TTL) serial data. The pressure switches are employed to determine if a participant is on a EX. square foot tile. Four pressure strips are combined in order to make a pressure array that covers the cross section of a tile.

The four pressure strips are soldered together in order to have a common ground and a common voltage. Since the switches are designed to ark on negative logic, a constant voltage of V is maintained across the switches using an external power source. The pressure switches are connected to the master controller using 8-bit shift registers in order to minimize the number of pins used on the Mega 2560. The V leads of the switches were connected to the data pins of the shift registers. Based on negative logic, if the pressure switch not activated, it sends the master controller a message of HIGH (V).

If the pressure switch is stepped on, it sends a message of LOW (OVA). A 2. SQ pull-up resistor is used with each V lead and pressure switch. Pull-up resistors are used in logic circuits to ensure a well-defined logical level of a pin under all conditions [5]. As a total of 32 pressure switches were used, a total of four shift registers are needed.

Each of the shift registers are connected to a common Ground, Latch, Clock and PVC, which are controlled by the master controller. The code in Figure 11 is a loop to read the states of the pressure switches from the shift registers. The data is then saved into an array in order to perform logical operations.

Figure 1 1: Reading Data from Shift Registers The digital RUG LED strips provide the ambient lighting for the interactive game. Four 2-foot strips, containing 20 Leeds each, mounted on the ceiling Joists are connected to each other in series. This is done in order to reduce the number of pins on the master controller. The LED strip has four pins the Ground, Vein, Latch, and Clock. The Leeds are powered by an external V/1.

AAA power source. The Mega 2560 controls the latch and the clock. A LEOPOLD library is available for the Ordains DID for programming the LED strips. The code in Figure 12 is a loop to create LED flashes of RUG color as determined by the master controller by giving the RUG values. Figure 12:

Leeds Flash Code A Wave shield piggybacked onto an Ordains Nun provides the three audio signals: warning, fail and success. The Wave shield has the ability to play any uncompressed kHz, 12 bit, mono Wave (. Wave) files. Audio files are read Off FAT 16 formatted SD/ MAC card.

The wave shield has a standard 3. Mm audio output Jack and can be connected to a speaker. The Mega 2560 serially communicates with this Nun. Since the Ordains Nun does not have any fixed serial communication pins, the Softhearted library on the Ordains DID is used to set two available pins as the RUG and TX pins for communications with the master controller.

The master controller sends a message of O for Warning, 1 for Fail and 2 for Success to the Ordains Nun. Figure 13 is a conditional statement that reads input from the Serial communication and plays the required sound. Figure 13: Softhearted Communication Figure 14 describes the logical flow performed by the master controller. Each switch has a Currents, Serer, Changeover, and Landmines array assigned to it, which keeps track of the status of a switch. If for a particular index, Serer and Currents do not match, there has been a change in the state of the switch and the Changeover for that index increments by one.

Figure 14: Flowchart of Code for Master Controller Based on this information, the program checks if the value of Landmines is one at that index and the ambient lights and sounds play accordingly.