ECE 411
Homework 2
Project Proposal
Dr. Mark Faust

October 13th, 2014

T03
Robert “Tyler” McNichols
Wesley Murar
Edgard Musafiri
Sarmad “Sam” Butti

Project Ideas:

1. Tic Tac Toe

This would be a two player game of tic tac toe using an LED matrix to represent the game board. The game would feature dual color LED's to represent each player. The game will automatically choose each player and will be able to detect when a winning move is played. The board will then congratulate the winner and reset itself, ready for a new game to begin.

2. Connect-Four

Connect four is essentially a two player game where each player is distinguished by a different color disc, within a 6 x 7 vertically suspended grid. The objective of the game is to attempt to connect four of the same color disc either vertically, horizontally, or diagonally, as the first player to do so wins. The scope of the project would essentially entail creating the connect four game, by creating a 6 x 7 matrix of bi-colored LEDs that would separate the two players. As the LEDs would be stored in a separate component, that would contain a switch that would arbitrate the turns between. The matrix columns would have a particular allocated address, where the microcontroller would keep track of the players inputs. The microcontroller would responsible for tracking whether or not a player has reached the objective of the game.

3. Coin Counter

This coin counter would be made of a flat surface, such as a plastic plate, with pressure sensors under it to measure the weight of coins placed on the surface. It will have a button or buttons to make a selection of what kind of coin that will be placed on it, like a quarter or dime for example. A microcontroller that will be able to read the measurement from the pressure sensors and given the selection of what kind of coin it is, it will give the amount of coins that were placed on the device. We would need to use some sort of display peripheral. An algorithm would be developed to take the measurement and determine the weight and then use some math to divide the total weight by the average weight of the specific coin to find the number of the coins placed.

4. Smart Solar Charger

Building a battery charger that will get power from a mini solar panel to charge a rechargeable battery. It will have a microprocessor to be able to read the charge on the battery and when it is determined that the battery is full, it would stop charging as to not over charge the battery under the sun. We would add a couple of LEDs that will indicate “charging” and “full” states of the device. We would possibly add a button to select the kind of battery that is plugged to the charger for the microcontroller to determine what voltage would be the “full” voltage. A display would be needed to show the type of battery chosen.

Decision Matrix

Project	Time required	Coolness/Fun	Use outside of class	Current knowledge of Topic	Motivation	Results
Tic Tac Toe	3	4	5	4	5	64
Connect Four	2	4	4	3	3	50
Coin Counter	2	3	2	2	2	36
Smart Solar Charger	2	4	2	2	3	42
Weight	4	4	2	4	2	

Scale	Rating
1	Super Bad
2	Bad
3	Middle
4	Good
5	Super Good

Project Proposal:

The Objective:

The main objective of this project is to complete a project from guidelines to inception to presentation in a ten week term. We will work in a group of four to create an idea for this project and see it through to completion using our personal expertise and interests. The main requirements are to include at least one actuator, sensor, a processor, and to draft the components on a dual-layer PCB. Our personal requirements, or goals, are to create something exciting, cool, and fun to share with those around us.

The Goals:

We will create a two player Tic Tac Toe game. The game play of this project will be as such:

- A 3x3 grid of dual color LED's to indicate each players move
- A spinning knob or circular touch sensor for the players to choose their spot
- Embedded logic that will determine when a winning move is played
- Logic that will automatically switch players after each turn
- A low-profile case to enclose everything and keep game play simple

The Solution:

We will use an Atmel microcontroller loaded with the Arduino Bootloader to run our game. It will perform the following functions:

- Hold a bulb on the board a solid color, indicating the respective player's turn and switch colors after each turn
- Pulse the selected light the respective player's color while they choose their spot
- Read analog input from a potentiometer to allow each player to choose their spot
- When a button is pressed, hold the selected bulb the player's color who selected it for the remainder of the game
- If a bulb has been selected, omit it from allowing the next player to choose that location
- When a winning move has been played—or in the case of a cat's game—flash a special pattern, indicating the winning player
- At the end of the game, clear the board and start the game over

We will allow user input in the following manners:

- A spinning knob or a circular touch potentiometer to allow a player to choose their location
- A push button that allows the player to choose their selected location

The logic will be implemented in the following manner:

- A 3x3 grid of dual-color LED's will act as the game board
- An extra LED will indicate the color of the respective turn