

Assignment 2 – Binary Mastermind
CSCE 4114 – Embedded Systems – Fall 2018
Due Date – Friday, October 26th, 11:59 PM CT

Description: This assignment is designed to give you practice with designing state machines and converting state machines to C code for embedded systems. You are to develop this assignment for the RIMS microcontroller simulator. You may choose to use the RIBS state machine tool if you choose, but only the output C file will be used for evaluation of code. The assignment implements the behavior of the board game “Mastermind” with 8-binary inputs. In this game, the input vector “A” will act as a binary input. The secret password will be included as a global constant called “SECRET_CODE” in a .c file called “secret_code.h”



Expected Operation: The following will define the behavior of the program you will develop:

1. The game will boot by flashing the output vector B three times (like LEDs lighting up)
2. The game will then return to a state where the output vector D holds the value “10”, as the number of guesses that the player has left
3. The game will at this point accept input by selecting individual inputs on A, and submitting the guess through a **debounced** button click on C0.
4. While waiting for input, the output on B will cycle through the LED outputs twice a second. That is, the LED on B0 will flash, then B1, then B2, and so on until B7. This pattern will occur twice each second except when giving an output to the user.

5. The game will give an output on B declaring the number of incorrect bits on the guessed code, and decrementing D by one. The B output will display for two seconds. After the output, the waiting pattern will be displayed again.
6. If the player guesses the secret code, then the game will flash the output on B0-B3 five times in rapid succession to display a win condition
7. If the player guesses 10 times and D reaches 0, then the game will flash the output on B4-B7 five times in rapid succession to display a lose condition
8. Following either end condition, the UART will transmit one of two messages; Either "Game Won in x Guesses!" where x is the number of guesses, or "Game Lost".
9. Following either end condition, the game will reset back to the original state, and allow the player to guess again.

Rubric: The project will be graded according to the following rubric:

Category	Description	Percentage
Implement Behavior	The behavior of the system should be implemented as defined by the expected behavior. Each of the 9 behaviors need to operate correctly.	50%
State Machine Diagram	Make a diagram of the state machine(s) that compose the system. The state machine should clearly note the states, transitions, and actions of each state. Shared variables between state machines should be shown, with what SM controls the variable, and what SMs read from the variable.	20%
Coding Comments & Style	Use appropriate coding styles. Comment functions with a description about their behavior, any parameters, any return values, and any shared variables which it manipulates.	15%
Report	A simple, one- or two-page report. The report should have the project name (e.g. Binary Mastermind), a short description of what you did, and the outcomes (e.g. Did it pass all example tests, if not, why not, etc...).	15%

Table 1: Grading Rubric

These documents should be uploaded through Blackboard to the TA before the beginning of the next lab. Documents turned in after this deadline are subject to the course late policy.