

Virtual Yahtzee!

<https://sites.google.com/view/noahcdlsyahtzee/home>

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Project Overview:

The proposed project is to create a virtual port of the game of Yahtzee. The game of Yahtzee is played by rolling 5 dice and optionally rerolling any set of dice up to two more times to get a score based on the combination of die at the end. Players play for 13 rounds to achieve the highest score. The game will be recreated using a graphical interface via LCD to display die rolls, a joystick to control and select die, and a text-based interface via Bluetooth to display game instructions and scoring. Alarms will also be utilized to regulate idle time to keep the game moving by regulating idle time to 1 minute, otherwise the game continues. High scores will be saved for future games to motivate players.

Peripherals:

- Gamecube Controller
 - The controller will be used in tangent with the graphical interface to select the die to keep before rerolling and to start the game.
 - The controller will interface with the STM32L476G board via UART connection.
- HC-05 Bluetooth Module
 - The Bluetooth module will allow users to play the game and see instructions using a Bluetooth device such as a phone or laptop.
 - The module will communicate with the STM32L476G board via USART terminal connection.
- ILI9341 TFT LCD
 - The external LCD display will serve as a graphical interface to view dice rolls and select dice to roll.
 - The LCD display will interface to the STM32L476G board via SPI connection.
- Timer Alarm
 - The alarm will act as an idle time counter to keep the game moving and prevent players from stalling rounds.
 - The alarm is built into the STM32L476G board and will interface via software interrupts.
 - Alarm can also be used to poll controller data

Goals:

- Develop a functioning game of Yahtzee with a graphical and text based interfaces that is easy to use and interact with.

Responsibilities:

- Interface the SPI LCD display to the STM32L476G board and create a graphical user interface
- Develop a finite state machine to run the Yahtzee game
- Implement USART terminal with the Bluetooth module to provide in game instructions

- Program controller to interact with game for dice selection and game control
- Implement alarms appropriately for 1 minute idle time while in play

Software Structure:

The Yahtzee implementation will be driven by the STM32L476G board. The board will be coded using a finite state machine to host the main game functionality such as rolling die and tally scoring. The USART Bluetooth module will be connected via IO pins and the STM32L476G will transmit messages over the USART protocol based on the current state of the game. The LCD display will be connected via IO pins and will be configured using the STM32L476G board's SPI interface to draw the graphical interface. The graphical interface will be coded to draw simple shapes such as squares and circles to represent die and will also display text. The controller will be connected via IO pins of the STM32L476G board in a UART configuration. The code for the controller is documented online so implementation will mainly revolve around setting up the USART protocol and grabbing data. The controller will be polled via timer interrupt when new data arrives, and the state machine will respond to inputs appropriately by either selecting dice or removing dice. The on-board alarm will be configured via interrupt such that when a round starts, the alarm counts down and if an action has not occurred in over a minute, the game will continue to play on its own.

Block Diagram

