6.111 Final Project Checklist

Danny Vo and Jeff Yuan

Video Input (Danny):

- Convert video input from camera from YCRCB into RGB (for tracking and displaying on LCD)

Video Processor (Danny):

- Track the center mass of the LED:
  - Detect green pixel: setting a green threshold for each pixel in the camera image and display only pixels that satisfy this threshold on LCD
  - Output current LED position in pixel coordinate: display current LED vertical and horizontal pixel position on the hex display
  - Draw a brown square (18-pixel) on the current LED position
- Analyze LED light's movement to compute the game control input for Game Logic:
  - Capture position of LED: store these values at every frame in small memory and display them out on hex display
  - Compute the game control input:
    - take different between chosen successive capture position of LED to compute horizontal velocity and game control logic (i.e. left, right)
    - detect a high vertical velocity above a threshold to trigger shoot action
    - display all game control input information on hex display
- Capture game control input and hold it until the Game Logic process it, will also display captured game control input information on hex display

Score Display (Danny):

- Display current score in the game based on enemy killed
- Display counter for current number of lives left (decrement when killed, and increment upon reaching certain score thresholds)

VGA Output (Both):

- Display scrolling background (Jeff)
- Display player ship (Jeff)
- Display 15 aliens (Jeff)
- Display bullet when appropriate (Jeff)
- (If time permits) Display more than 15 aliens (Jeff)
- (If necessary) Double frame buffering (Danny)

Game Logic (Jeff):

- Collision detection:
  - Detect ship's bullet hitting alien (alien should be killed, and bullet disappears)

    - Detect alien crashing into player ship (both destroyed)
    - (If time permits) Detect alien's bullet hitting player ship (ship destroyed, bullet disappears)
- Alien AI:
    - Demonstrate normal alien behavior, flying in formation on the top of the screen, swiveling to the left and right
    - Demonstrate kamikaze attack behavior, flying toward the player ship in attempt to destroy it
    - (if time permits) Demonstrate alien shooting bullets at player, while it is in kamikaze move as described above
- Sprite Art and Animation:
    - Ship and aliens represented by sprites that are faithful to the original game
    - (if time permits) Ship and aliens have death animation
    - (if time permits) Display title screen before game starts, and "game over" screen at the end
- (if time permits) Different levels of game, aliens become faster in later stages

Controller (Jeff):

- Control/play game with labkit buttons
- Interpret signals from video processing module, and convert it into game actions
- Be able to select between the two above controller schemes