CSEE4840: Embedded Systems Project Proposal

"CU Racing"

Chandan Kanungo(ck2749), Raghavendra Sirigeri(rs3603), Robert Kettlewell(rbk2135), Shikhar Kwatra(sk4094)

Introduction: Our team is proposing the creation of a multiplayer racing game called "CU Racing". This game architecture will leverage the ARM processor for race track graphics rendering, game physics modeling, user interface control, and user input handling of the USB game controllers. The FPGA will handle the tasks of controlling the VGA display, the audio output for the gameplay music, and will potentially offload some of the computation for the game physics engine.

A brief summary of the game is as follows: a "CU Racing" game will start once a sufficient number of players have joined a session (a "CU Racing" game will have the two modes: Two player and multiplayer. Two player option will enable each player to compete with each other using their respective USB Controllers without the network interface. Multiplayer mode involves a similar setting except with more players supported through a client server architecture.) There will be a collection of different tracks to choose from. Each track will have different friction coefficients and bend radii. Players will have to trade off speed and control or risk falling off the track which will result in time penalties. Furthermore, opponent vehicles will be able to bump one another off the track, which will introduce some strategy to the play beyond maximizing driving speed. Once all the cars have completed the total number of laps, the race will end and a new track will be selected.

Description: To help improve our team's probability of delivering a high quality project, we will be taking an incremental design approach that will split our development into a core deliverable and a stretch goal deliverable if time permits. The core deliverable will enable the local game stack and could be considered a successful project in and of itself. However, should our team succeed in delivering the core deliverable in a timely manner, we will transition to enabling the server/client game extension for our stretch goal.

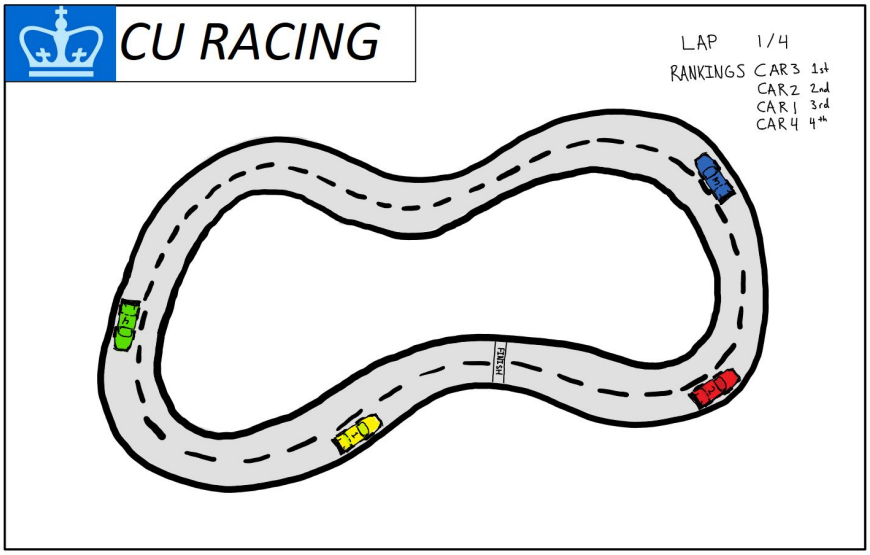

Figure 1 - Graphic of a hypothetical "CU Racing" game track with 4 players connected.

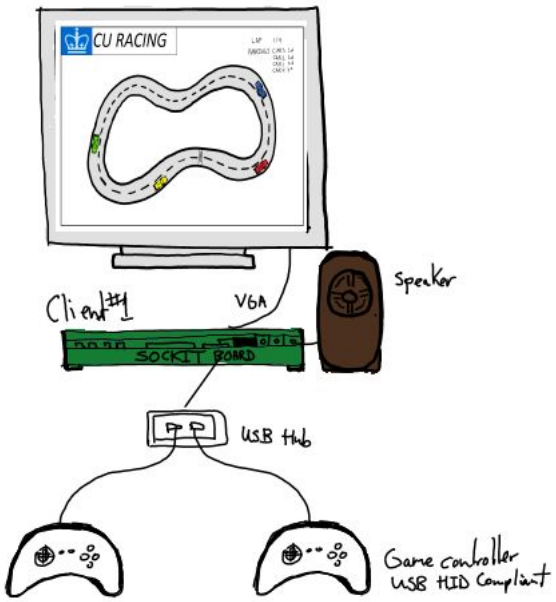

Figure 2 -Core Deliverable : standalone SoCKit board for local play. Networking feature is not enabled.

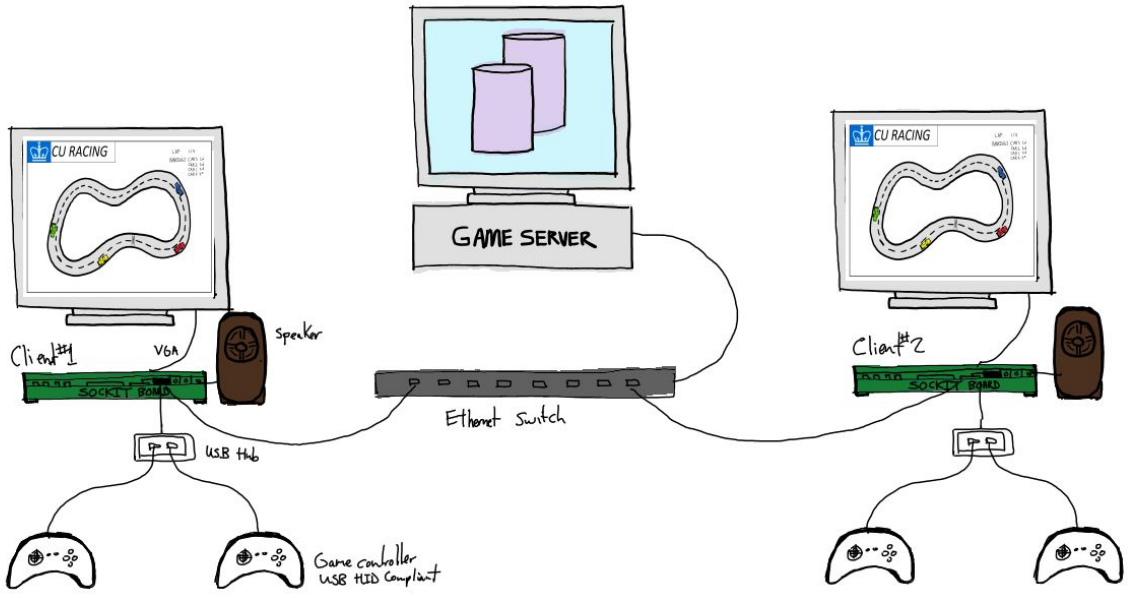

Figure 3 - Stretch goal deliverable : SoCKit boards enabled for local, as well as network play.

Hardware components:

1. Altera SoCKit
2. VGA Monitor
3. USB Hub
4. USB Joystick Controllers
5. Speakers

Development Milestones:

Core Deliverable:

- The first milestone will be Interfacing the Joystick and generating a virtual track.
- The joystick will move a point (representing a race car) through a cartesian coordinate system. This will allow us to tune the game physics engine.
- The second milestone will be to implement a scene rendering algorithm that will display a track and cars moving along the track based on the developments in milestone 1.
- Third Milestone will be to add local multiplayer support, adding game event driven music, complete the User Interface.

Stretch goal deliverable (Extra Milestone): Local Area Network Multiplayer support.