

TankGo! - A 2D Interactive Tank Battle Game Project Proposal

CSEE 4840 Embedded System Design

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TEAM MEMBERS

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GENERAL PROJECT DESCRIPTION

TankGo! is a 2D top-down competitive multiplayer game where two players battle it out in an all-out tank shootout. For the system architecture, it uses the keyboard as user input, the DE1-SoC will be the game console, with a graphics accelerator, and game engine with game AI. A multi-functional server records scores in a database and provides online play capabilities by communicating with multiple DE1s through the internet as the networking communication.

TankGo! Gameplay: Two tanks on either side of the screen battle it out by firing bullets across the screen, collecting power-ups (faster bullets, faster tank, more health) to increase their odds to overcome their opponent. The first to destroy the enemy tank is crowned a victory!

HOW: The DE1 will serve as a game console, connected to a keyboard and VGA screen. The game can also be played in 1-player mode against a computer-controlled AI. Using messages from the keyboard, like signals for going up or down and shooting, the DE1 will draw the updated positions of tanks using the accelerated VGA core. Information about the game and users will be saved on the cloud once a game-winning condition has been met.

ALTERNATIVE IDEAS

Featuring an Android app controller compatible with any Android device, it will be the platform users can control the movement and fire of their tank, show information such as current power-ups or win rate history, and connect to either online multiplayer, local Bluetooth multiplayer, or single player game.

HOW: The DE1 will serve as a game console, connected to two Android phones through the cloud server as game controllers, or to a single Bluetooth device for local two-player. The game can also be played in 1-player mode against a computer-controlled AI. Using messages from Android devices, like signals for going up or down and shooting, the DE1 will draw the updated positions of tanks using the accelerated VGA core. Additionally, the DE1 can also be connected to a game server via an internet connection, and an online version can be played between two DE1s, and the game state/controls will be controlled by the cloud game server. Information about the game and users will be saved on the cloud once a game-winning condition has been met.

MAJOR TASKS:

1. **Detailed design** of essential elements of the project (hardware-software co-design, VGA implementation, memory usage, etc.)

2. Hardware

- DE1-SoC
- VGA Monitor
- a graphics accelerator
- game engine with game AI
- Framerate and Resolution: The VGA display should be 60 frames per second, and the resolution should be ideally 800 * 600.

3. Software

- Keyboard decode
- Game state control
- Start/Pause
- User Interface

-- User Component will consist of a keyboard controlling the tanks in the DE1 SOC game. The software will feature a login page so users can login using their Google account, or use a guest account. There will be options to connect to pause or stop and a stat page showing leaderboards, scores, and personal game information. The gameplay UI will consist of two buttons moving the tanks up and down, and a fire button to shoot bullets.

- Games are a great way for people to get together to have fun and share a good time. The high score and game information can also be shared through social media to promote engagement and build community through similar interests.

POSSIBLE MILESTONES

- Implement basic game logic in hardware
- Render VGA output
- Use the keyboard to control the game states
- Connect hardware and software parts together