

FROGGER

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6.111 Final Project

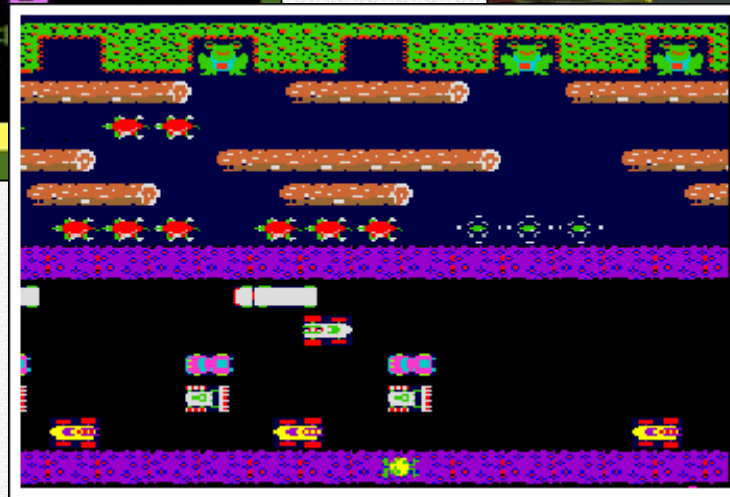
Evolution of Frogger



Atari

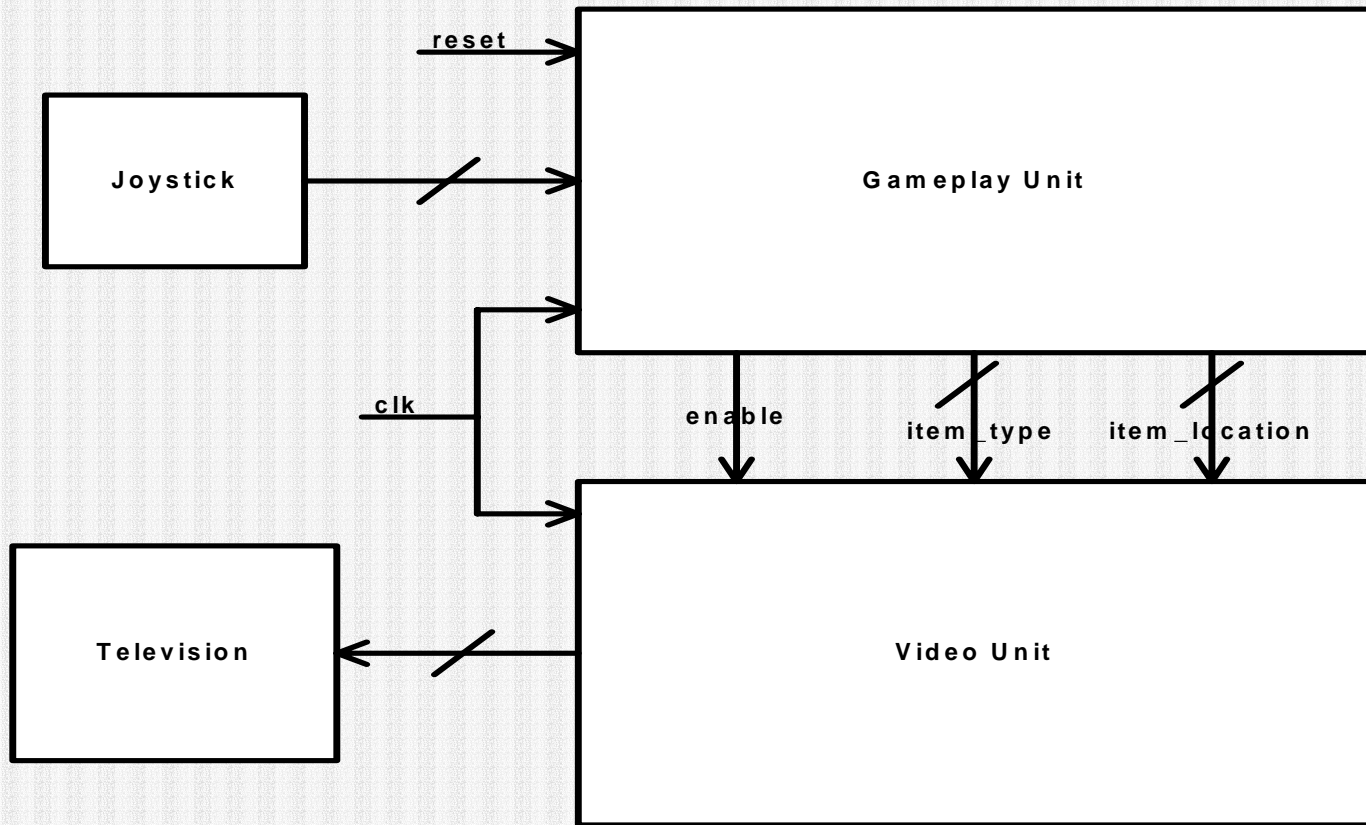


PSX



Original Arcade

Basic Block Diagram



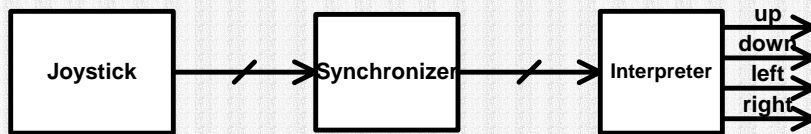
Gameplay Unit

- Accepts user input from joystick
- Updates frog position based on input
- Moves other objects (cars, logs, turtles) based on current velocity
- Tests for collisions between the frog and the walls or other objects
- Outputs objects and locations to the video unit

User Interface

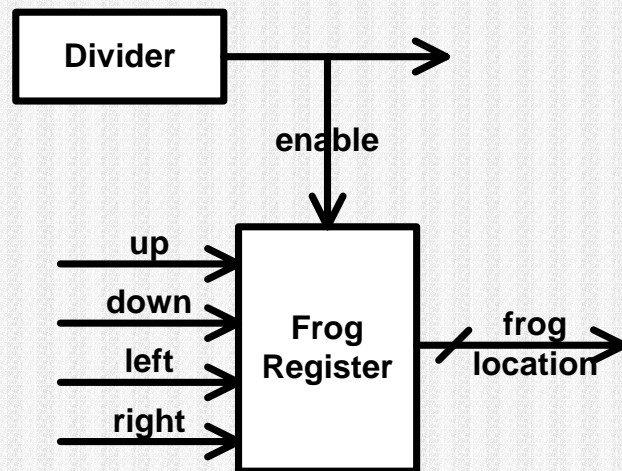


Standard Atari Joystick



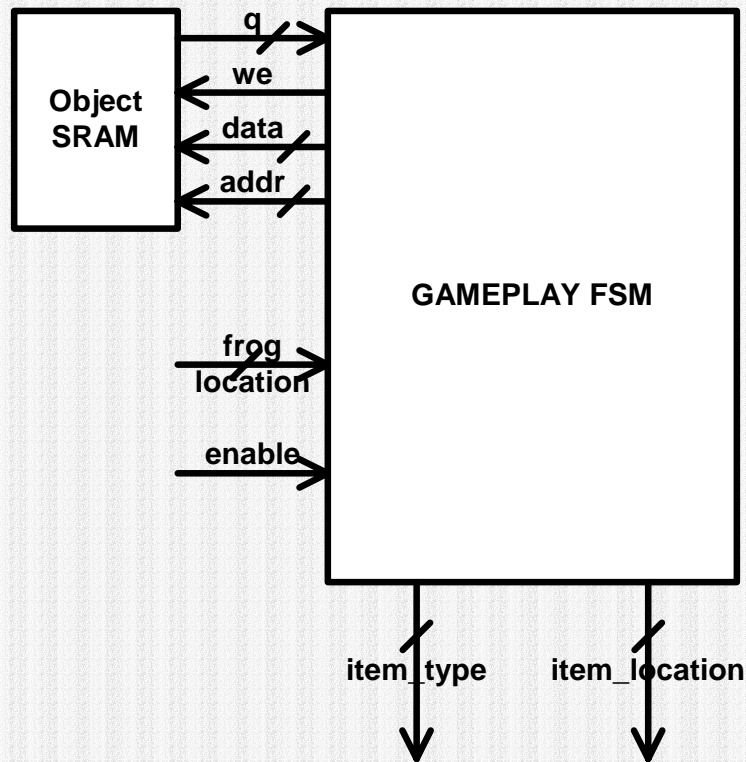
- Syncs joystick input to system clock
- Interprets input into four bits used to control the frog
- Atari joystick has 5 pinouts (N,S,E,W, fire button) that are forced low when a direction is pressed

Frog Register



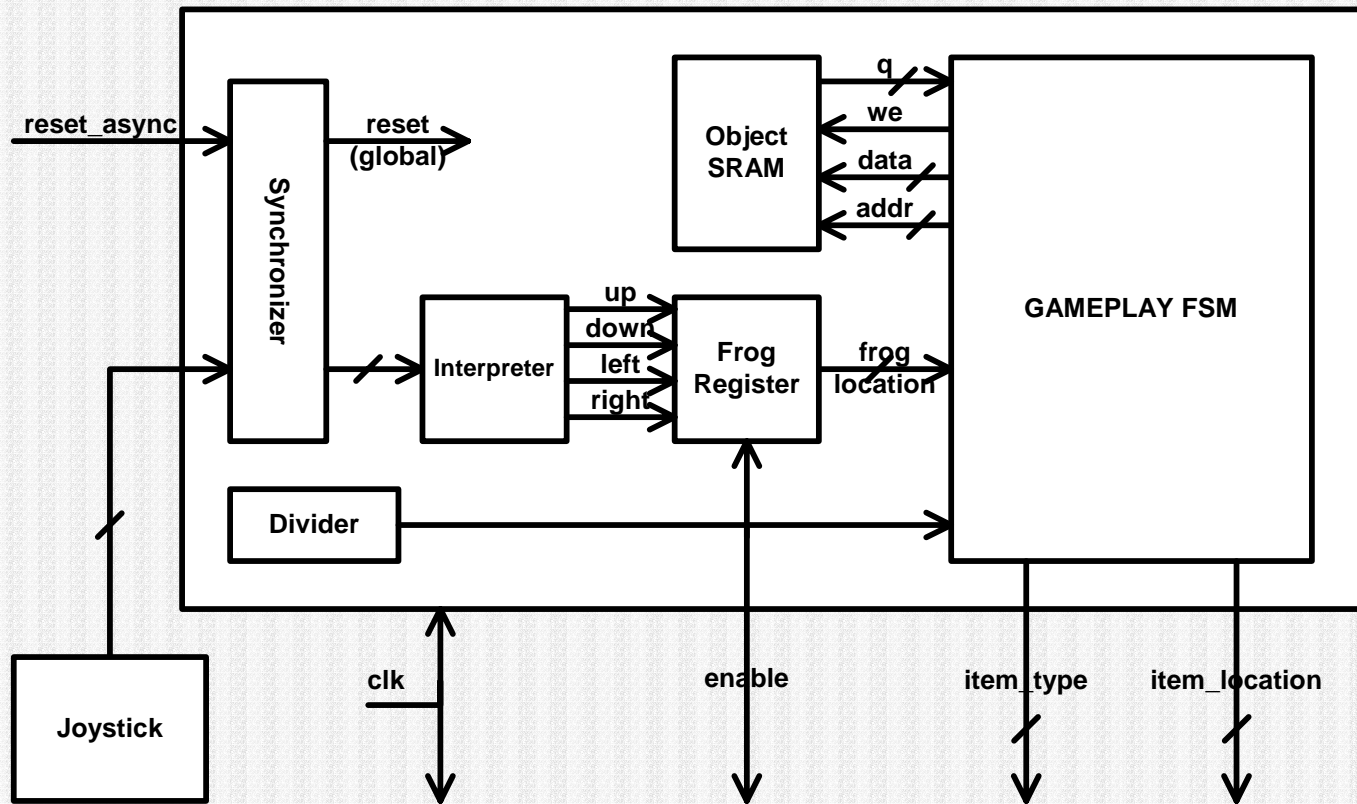
- Small FSM to control frog
- Accepts directional inputs from interpreter
- Updates frog location when enabled

Gameplay FSM



- Stores object type, location, and velocity in SRAM
- Updates each object location on enable
- Tests for collisions
- Outputs each object and location serially to video unit

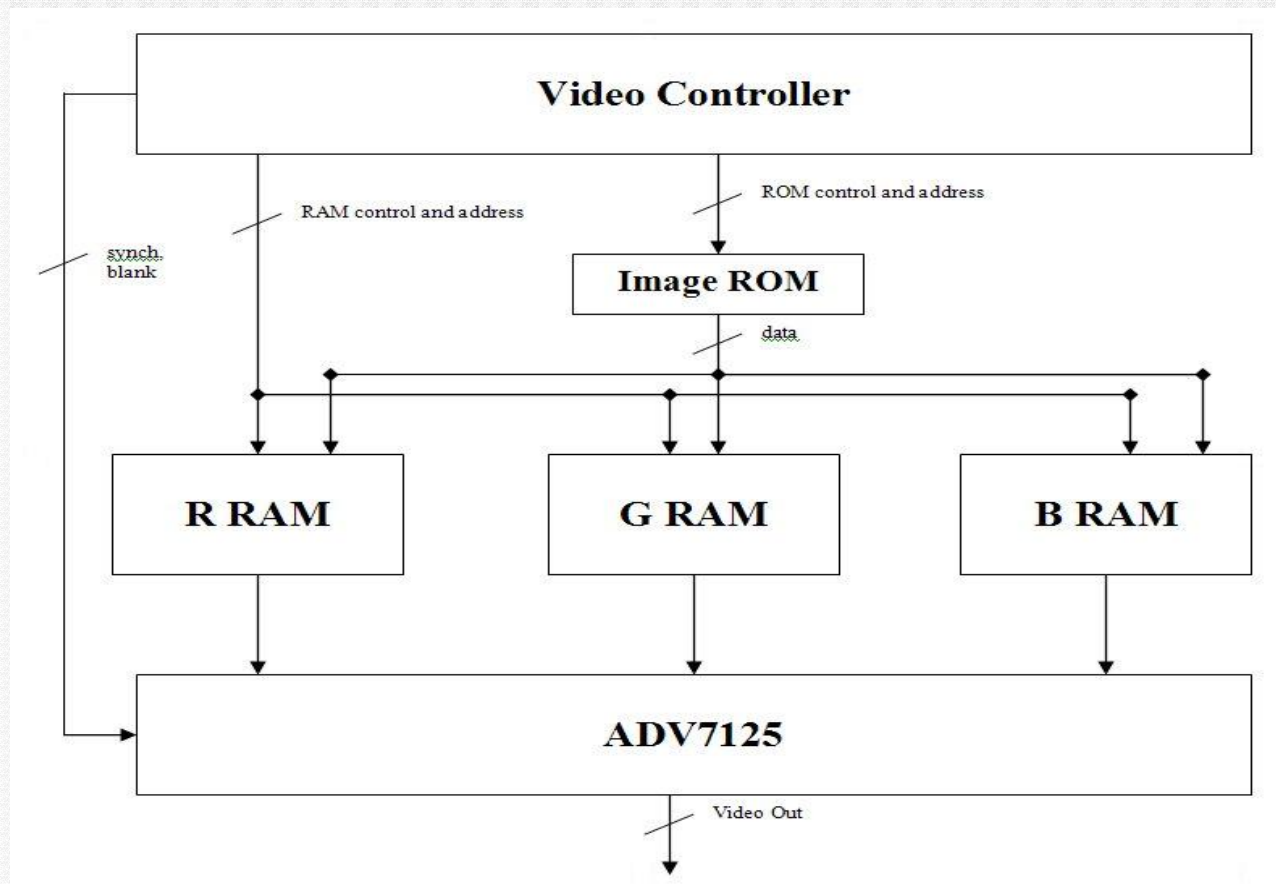
Detailed Block Diagram



Video Unit

- Takes in item location, type, and divider signals
- Outputs video to color monitors
- Uses VGA (Video Graphics Array) format with 640x480 bit resolution

Video Unit Block Diagram



Video Control Flow

1. Write blank board to RAMs
2. Write movable objects from ROM to RAMs with data from Game Unit
3. Output video through ADV7125

Video Controller

- Updates RAMs each video cycle based on Game Unit's input
 - Must correctly address ROM and RAMs to write images to new locations
- Controls addressing to RAMs and blank and synch signals during video output

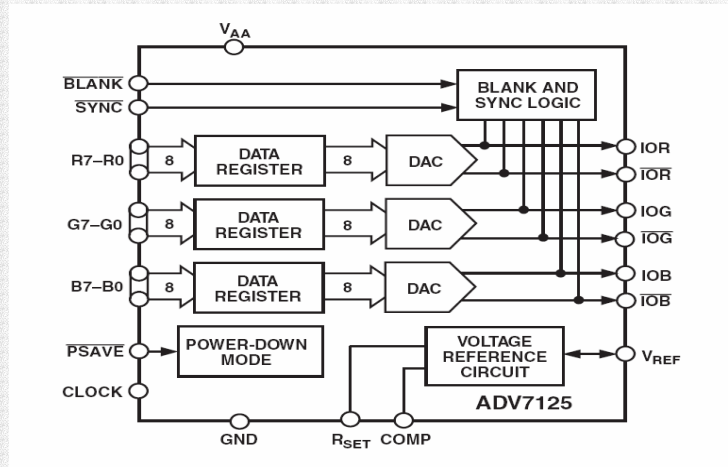
Video ROM (Item Types)

- All images used stored on ROM
 - Backgrounds (road, water, grass)
 - Objects (cars, logs, frog)
- ROMs must store information on each color for every pixel
 - Would require 24 bits per pixel
 - We'll use the 4 most significant bits (still allows 64 colors)

Video RAMs

- 1 RAM for each color
- Each RAM has 640x480 pixels
- RAM control and addressing done synchronously by video FSM
- RAMs are updated during vertical blanking

Video Output Converter



- Uses ADV7125
- Inputs are color signals from RAMs, and blanking and synch signals from synch generator (part of Video Controller)
- Outputs analog color signals to color monitor

Questions?
