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Screaming Bird: A Sound-Controlled Flappy Bird

Modifications

- Extended Lab 6 Pong into an audio-controlled Flappy Bird game w/ gravity & obstacles.
- Integrated PDM mic to enable real-time audio interaction.
- Implemented bird physics using velocity & gravity.
- Added LFSR based pipe generation.

Process

1. **Audio Input:** PDM mic data deserialized into 16 bit audio samples.
2. **Loudness Detection:** audio samples are thresholded.
3. **Flap Pulse Generation:** loudness is edge detected and turned into single frame jump signal.
4. **Game Logic Update:** bird physics, pipe motion, scoring, and collisions update once/frame.
5. **Video & LED Output:** VGA displays the game graphics and the score is output to the 7-seg display.

Expected Behavior

- VGA displays the game at 800x600 resolution.
- Bird moves vertically w/ gravity and jumps up on detected audio peak.
- PDM mic input is converted to digital loudness in the hardware.
- Pipes scroll horizontally and collisions with pipes or screen boundaries end the game.
- The score increments when the bird successfully passes through a pipe; shown on 7-seg display.

How to Play!!

1. Press the **BTNC** button on the board.
2. **Make a loud(ish) noise** near the board's mic. The bird will **JUMP**!
3. **Keep making noises** to control the bird's jumps!
4. Navigate the bird through the gaps!