

The Spikeball Rimshot Detector

Simplifying the Shot

This project aims to improve accuracy in determining illegal rimshots for all forms of Spikeball. Our best judge for what constitutes a rimshot:

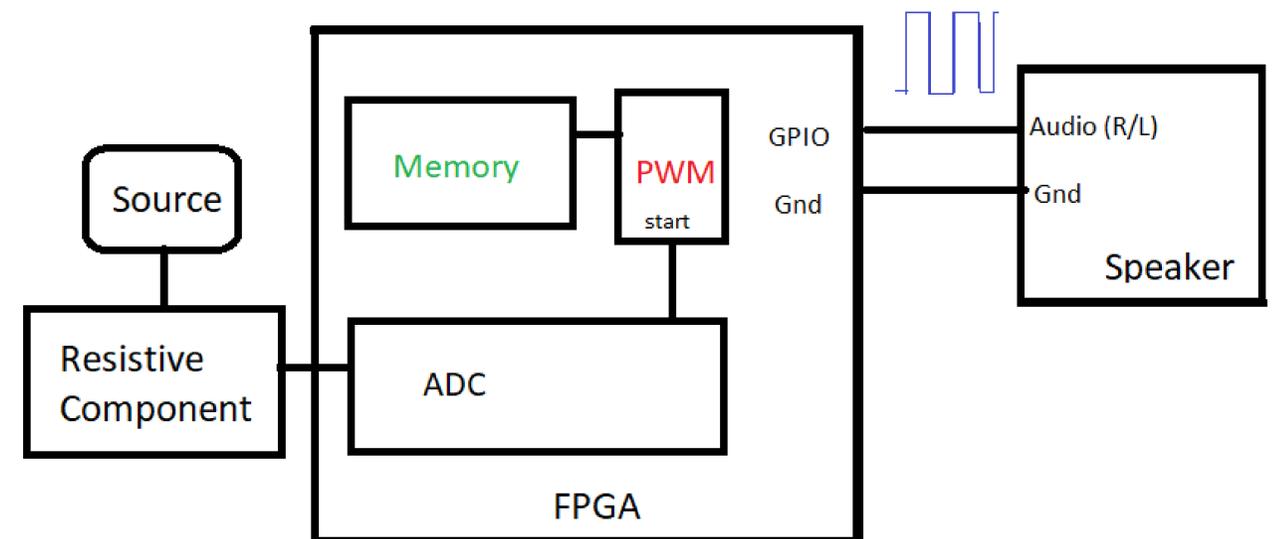
- “5.5.1.2. The ball’s initial contact with the set hits the rim, legs or underside of the net directly.” _2021 Spikeball Roundnet Association Rules.

This project’s purpose is to aid players in identifying when the ball strikes the rim at anytime. This is always an illegal shot, and often difficult to identify during heated play. The detector will allow an impartial judge to definitively call rimshots and reduce sideline disputes between players.

Methods

- x18 RP-L-170 Pressure Sensitive Resistivity Strips are secured around the rim to detect when a ball strikes.
- An ADC on the DE10-Lite FPGA is used to generate a trigger to play the audio warning. Once triggered, the on-board PWM reads memory and generates a digital audio frequency over a GPIO pin. This signal is modified into a pseudo-analog signal then played by an amplified speaker.
- Audacity was used to sample an audio file at 16 kHz. Then the audio data was converted into a text file to be stored in the FPGA.

System



Conclusion

- The system gives immediate feedback to players when the rim is hit. Storing data on the DE10-Lite is the most restrictive portion of the project as more than one short audio file could not be stored. The team learned about audio processing and drawbacks of low sampling rates and PWM signals versus true analog signaling. While the implementation resulted in a working system, the project was over budget.
- Further innovate steps to take:
 - Reducing the number of resistivity strips needed.
 - Increasing detection coverage along the inside of the rim.