# Sports Arbitrage Bettor Proposal

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## 1 Introduction 🏀

Ever lost $1000 on DraftKings? Want to game the system, guaranteeing that you make money on *every* Nets game (a tough sell...)? Well, look no further – the Sports Arbitrage Bettor will truly make your life better.

Arbitrage involves the simultaneous buying and selling of some commodity in order to take advantage of differing prices for the same asset. In practice, arbitrage means that a bettor places bets on every outcome and generates profit in every case. Sports arbitrage betting is arbitrage that occurs in sports betting markets; if conditions allow, differing opinions on the outcome of a sports event from different bookmakers (e.g. Fanatics, DraftKings, BetMGM) will allow the bettor to make profit.

The core of this project is a high-speed arbitrage algorithm, that will utilize the DE1-SoC board's hardware to efficiently determine arbitrage opportunities in real time.

## 2 Implementation 🔨

The project will be implemented on the De1-SoC running Linux on an SD card. On boot, the user can use a keyboard to run a program that will scrape betting data from an online source and perform the necessary calculations to see if it will be optimal to make a bet. The FPGA will then display the results of the calculations on a VGA monitor, formatted to be readable by the user. On subsequent key presses, the FPGA will run the same program, updating the calculations based on real-time data.

### 2.1 Hardware-Software Interface

The hardware will be responsible for reading a collection of betting odds data, applying an arbitrage algorithm to identify opportunities for guaranteed $$$, and either displaying the results on the VGA monitor or delivering the results back to software. The software will be responsible for collecting and formatting the betting data, then sending it to the hardware. The exact protocol they will use is still to be determined but will probably use the hardware as a peripheral and communicate to it over the Avalon bus.

## 3 Major Tasks ✔️

### 3.1 Input/Output

The input will be a stream of betting data from various sports betting sites retrieved over Ethernet. The output will be displayed on the VGA monitor, and will consist of the bets for which there are arbitrage possibilities and the stakes at which to place them for maximum profit.

### 3.2 Processing

The data from the various sites will need to be compiled together and processed into a form decipherable by the betting algorithm.

### 3.3 Algorithm

After connecting to the FPGA with our laptop over ethernet, we will have a parser module that will forward the information from our sportsbooks into a order module which will contain all possible bets for a sport. The parser module will then make its comparisons across books, and forward any potential arbitrage bets to the betting module. It will periodically send a snapshot of the order module to the laptop so we can display it.

### 3.4 Optimization

Our basic target is to keep track of best bets and aggregate orders by team and sport. From here, we will take advantage of the parallelism of the FPGA to reduce latency in accessing and modifying the order book. Our challenge will be to make sure the order module is deeply pipelined and making sure it doesn't bottleneck our system.