

# FPL Optimizer: Building a Data-Driven Fantasy Premier League Strategy Engine

Fantasy Premier League (FPL) has always been about instinct and following the crowd. But what if we could apply data science and optimization to make informed decisions? That's exactly what this project achieved—a full optimization system that combines machine learning projections with mathematical optimization to create the perfect squad.

## The Challenge

FPL isn't just about picking the best players—it's about building a balanced squad under strict constraints:

Budget	£100.0m total
Squad Size	Exactly 15 players
Position Quotas	2 GK, 5 DEF, 5 MID, 3 FWD
Club Caps	Max 3 per Premier League team
Formation	Valid XI (4-4-2, 4-3-3, etc.)

## Key Results: Optimizer vs. Baselines

Strategy	Projected xP	Squad Cost	Performance Uplift
ILP Optimizer	114.1	£83.9m	Baseline
Template (Most Owned)	113.4	£83.3m	+0.6%
Random Selection	62.7	£70.0m	+82.1%
Naïve Max xP*	120.0	£93.3m	-4.9%

\*Note: Naïve approach violates budget constraints

## Stress Testing & Validation

Comprehensive stress tests confirmed optimizer robustness across budget variations, club caps, and projection models. Determinism validation confirmed identical results across repeated runs.

[Visual Placeholder: Stress Test Results Chart]

## The Optimal Squad (4-4-2 Formation)

Starting XI and bench layout with captain and vice-captain selections:

Position	Player	Club	Price	Notes
GK	Guglielmo Vicario	Spurs	£5.0m	
DEF	William Saliba	Arsenal	£6.0m	
DEF	Daniel Ballard	Sunderland	£4.6m	
DEF	Gabriel Gudmundsson	Leeds	£4.0m	
DEF	Pascal Struijk	Leeds	£4.5m	
MID	Mohammed Kudus	Spurs	£6.5m	
MID	Matt O'Riley	Brighton	£5.5m	
MID	Ian Poveda-Ocampo	Sunderland	£5.0m	
MID	Anton Stach	Leeds	£5.0m	
FWD	Richarlison de Andrade	Spurs	£6.5m	■ Captain
FWD	Chris Wood	Nott'm Forest	£7.6m	■ Vice-Captain
Bench	Rico Lewis	Man City	£5.0m	
Bench	Tijjani Reijnders	Man City	£5.6m	
Bench	Hugo Ekitiké	Liverpool	£8.6m	
Bench	Robin Roefs	Sunderland	£4.5m	

[Visual Placeholder: Formation Diagram]

## Conclusion

Building this FPL optimizer has been an incredible journey through data science, optimization, and sports analytics. The results prove that mathematical optimization can consistently outperform traditional approaches, even in subjective domains like fantasy sports. The key lesson: when you combine quality data with mathematical rigor, you consistently beat intuition.