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- Sarah M (mendaxsplendide)

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Star Realms Simulator!!(↪ </thread/1462398/star-realms-simulator>)

[Star Realms](#) – [Amazon.com](#) **\$13.97** ✓prime

John 

@icesphere

Dec 1, 2015

Simulator results for Base set + Year 1 Promos: (diff represents the change from the results with only Base set, so a diff of 5.45% means that the bot wins 5.45% more with Year 1 Promos than it did with just the Base set)

--VelocityBot--

VelocityBot v HareBot - 58.42% - 41.58% (Avg # turns: 27.49) (diff: 4.98%)

VelocityBot v AttackBot - 62.78% - 37.22% (Avg # turns: 26.91) (diff: 4.06%)

VelocityBot v DefenseBot - 64.32% - 35.68% (Avg # turns: 29.80) (diff: -5.21%)

VelocityBot v TortoiseBot - 54.22% - 45.78% (Avg # turns: 28.96) (diff: -3.32%)

VelocityBot v ExpensiveBot - 72.65% - 27.35% (Avg # turns: 28.09) (diff: -3.96%)

VelocityBot v VelocityBot - 1st player wins: 56.91% (Avg # turns: 28.23) (diff: -0.96%)

VelocityBot Overall wins: 62.48% (diff: -0.69%)

--TortoiseBot--

TortoiseBot v HareBot - 56.24% - 43.76% (Avg # turns: 28.79) (diff: 7.60%)

TortoiseBot v AttackBot - 61.83% - 38.17% (Avg # turns: 27.84) (diff: 7.61%)

TortoiseBot v DefenseBot - 59.84% - 40.16% (Avg # turns: 31.89) (diff: -3.50%)

TortoiseBot v VelocityBot - 45.94% - 54.06% (Avg # turns: 29.00) (diff: 3.21%)

TortoiseBot v ExpensiveBot - 69.20% - 30.80% (Avg # turns: 29.10) (diff: -2.92%)

TortoiseBot v TortoiseBot - 1st player wins: 57.27% (Avg # turns: 31.06) (diff: -0.17%)

TortoiseBot Overall wins: 58.61% (diff: 2.4%)

--HareBot--

HareBot v AttackBot - 57.83% - 42.17% (Avg # turns: 27.12) (diff: -1.46%)

HareBot v DefenseBot - 52.25% - 47.75% (Avg # turns: 30.32) (diff: -9.94%)

HareBot v VelocityBot - 41.26% - 58.74% (Avg # turns: 27.45) (diff: -5.18%)

HareBot v TortoiseBot - 44.90% - 55.10% (Avg # turns: 28.76) (diff: -7.50%)

HareBot v ExpensiveBot - 64.85% - 35.15% (Avg # turns: 28.62) (diff: -9.72%)

HareBot v HareBot - 1st player wins: 55.75% (Avg # turns: 27.36) (diff: -1.02%)

HareBot Overall wins: 52.22% (diff: -6.76%)

--DefenseBot--

DefenseBot v HareBot - 47.39% - 52.61% (Avg # turns: 30.40) (diff: 10.00%)

DefenseBot v AttackBot - 56.74% - 43.26% (Avg # turns: 30.49) (diff: 9.52%)

DefenseBot v VelocityBot - 36.30% - 63.70% (Avg # turns: 29.97) (diff: 5.01%)

DefenseBot v TortoiseBot - 39.48% - 60.52% (Avg # turns: 31.81) (diff: 2.76%)

DefenseBot v ExpensiveBot - 62.25% - 37.75% (Avg # turns: 31.12) (diff: -0.47%)

DefenseBot v DefenseBot - 1st player wins: 56.75% (Avg # turns: 35.93) (diff: -1.50%)

DefenseBot Overall wins: 48.43% (diff: 5.36%)

--AttackBot--

AttackBot v HareBot - 42.67% - 57.33% (Avg # turns: 27.09) (diff: 2.01%)

AttackBot v DefenseBot - 45.11% - 54.89% (Avg # turns: 30.66) (diff: -7.67%)

AttackBot v VelocityBot - 36.93% - 63.07% (Avg # turns: 26.75) (diff: -3.97%)

AttackBot v TortoiseBot - 39.64% - 60.36% (Avg # turns: 27.87) (diff: -5.14%)

AttackBot v ExpensiveBot - 55.17% - 44.83% (Avg # turns: 28.17) (diff: -10.88%)

AttackBot v AttackBot - 1st player wins: 54.58% (Avg # turns: 28.74) (diff: -0.89%)
AttackBot Overall wins: 43.90% (diff: -5.13%)

--ExpensiveBot--
ExpensiveBot v HareBot - 34.50% - 65.50% (Avg # turns: 28.39) (diff: 10.47%)
ExpensiveBot v AttackBot - 44.26% - 55.74% (Avg # turns: 28.15) (diff: 9.34%)
ExpensiveBot v DefenseBot - 37.54% - 62.46% (Avg # turns: 31.03) (diff: 0.19%)
ExpensiveBot v VelocityBot - 26.87% - 73.13% (Avg # turns: 28.14) (diff: 4.23%)
ExpensiveBot v TortoiseBot - 30.44% - 69.56% (Avg # turns: 29.21) (diff: 3.02%)
ExpensiveBot v ExpensiveBot - 1st player wins: 54.51% (Avg # turns: 30.18) (diff: -0.48%)
ExpensiveBot Overall wins: 34.72% (diff: 5.45%)

Defense based strategies do better and attack based strategies do worse. Interestingly ExpensiveBot is most improved (best guess is due to the strength of high cost cards like The Ark and the Megahauler)

John  [@icesphere](#) [Dec 5, 2015](#)

I created Java versions of the main bots to make it easier to reuse things across bots. So currently the bots use the same rules for everything except buying cards. I've also added in the Bases & Battleships cards.

I've added in a "RandomBot" that considers all cards the same value, so it just buys random cards. This really highlights how much better just buying the most expensive card is.

Here are the overall results for the different sets. Obviously these results depend on how well the bots were created, and I honestly haven't spent a lot of time on them, so I'm sure the results could easily be different if the bots were smarter. If you are interested in the detailed matchup results - they have been added to the simulator_results.txt file in github.

--HareBot--
Base set - 63.89%
Base set + Year 1 Promos - 56.98%
Base set + Bases & Battleships - 62.02%
Base set + Year 1 Promos + Bases & Battleships - 56.27%

--AttackBot--
Base set - 53.74%
Base set + Year 1 Promos - 49.27%
Base set + Bases & Battleships - 53.44%
Base set + Year 1 Promos + Bases & Battleships - 50.01%

--DefenseBot--
Base set - 51.45%
Base set + Year 1 Promos - 54.25%
Base set + Bases & Battleships - 52.07%
Base set + Year 1 Promos + Bases & Battleships - 54.82%


--VelocityBot--
Base set - 67.95%
Base set + Year 1 Promos - 64.65%
Base set + Bases & Battleships - 67.77%
Base set + Year 1 Promos + Bases & Battleships - 64.71%

--TortoiseBot--
Base set - 63.12%
Base set + Year 1 Promos - 63.10%
Base set + Bases & Battleships - 63.08%
Base set + Year 1 Promos + Bases & Battleships - 62.63%

--ExpensiveBot--
Base set - 40.00%
Base set + Year 1 Promos - 48.13%
Base set + Bases & Battleships - 42.10%
Base set + Year 1 Promos + Bases & Battleships - 48.53%

--RandomBot--
Base set - 9.59%
Base set + Year 1 Promos - 13.52%

Base set + Bases & Battleships - 8.91%
Base set + Year 1 Promos + Bases & Battleships - 12.74%

John  @icesphere Dec 22, 2015 (edited)

Simulator is now online!!

You can simulate a game from the beginning, or enter an existing game state and simulate it from there.

<http://smartreaction.duckdns.org/star-realms-simulator/simul...>

Matt Schoonmaker-Ga... @railbaron Dec 22, 2015 (edited)

Woah, this is awesome!! Thanks for sharing this with everyone, and for all your hard work.

Unfortunately I think it's not working quite right.

I input a position in one of my games, and it says I have 100% chance of winning. Although I have a very good chance of winning I think, it's not 100%. Here were my inputs:

It's not my turn, don't use year 1 promos, or bases and battleships, or gambits.

Turn 15

My Info
Bot End Game Bot
Authority 36
My hand blob wheel, v, s, s, patrol mech
Deck battle pod, blob fighter, ram, trade bot, explorer*2, s*5, v

Opponent Info
Bot End game bot
Authority 17
Hand and Deck blob destroyer, patrol mech, supply bot, survey ship, s*5, v
Discard imperial fighter, cutter, trade pod, blob carrier, s*3

Times to simulate 2000

It says the average number of turns is 18.0, so it thinks I am guaranteed to win on my 2nd turn. I know I can deal 7 damage on my first turn to bring my opponent down to 10. Then I have 12 cards in my deck, with 17 non-allied damage in my deck, or 21 allied damage in my deck. There's a good chance I'll draw lethal damage within 1 or 2 turns, but worst case scenario is my battle pod and ram are on the bottom of my deck, and over the next 2 turns I only draw 8 damage. This would give my opponent 4 turns, and he could kill me in that time.

Looking at it another way, I know I can't win in 1 turns, so the earliest I could win is 2 turns. However it could take me 3, or even 4 turns to win. So my turns to win should be between 2-4 (probably something like 2.2 turns). The model says 1.5 turns (I think) which isn't possible.


Perhaps the issue is that you are averaging the ending authority? Since after 2 turns, my opponents authority could be anywhere from 10 to -8, so on average the authority could be below 0. But we don't care how far below 0 it is, we just want it to be less than or equal to 0 :-).

I just realized that perhaps my opponent is not attacking my blob wheel. If my blob wheel is left out, I'm guaranteed to draw lethal damage within 3 turns instead of 4. Still, the average turns to win would be between 2-3.

This is still really cool. I even misspelled survey ship as "supply ship" my first time, and it gave me an error telling me "no such card as supply ship". Nice job :-).

Thanks!

Edit: I just re-ordered how I listed the cards in my deck so the scouts and vipers were first, and it dramatically changed the results. Perhaps the simulator isn't randomizing the deck? I tried rearranging my deck and it again made a big difference.

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Authority 17
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Discard imperial fighter, cutter, trade pod, blob carrier, s*3

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Thanks for the feedback! I'll have to check when I get home, but you're probably right about it not randomizing the cards you put in, which hopefully explains the unexpected results. I'll post here once that is fixed.

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It's not my turn, don't use year 1 promos, or bases and battleships, or gambits.

Turn 15

My Info
Bot End Game Bot
Authority 36

Authority 30

My hand blob wheel, v, s, s, patrol mech
Deck battle pod, blob fighter, ram, trade bot, explorer*2, s*5, v

Opponent Info
Bot End game bot
Authority 17
Hand and Deck blob destroyer, patrol mech, supply bot, survey ship, s*5, v
Discard imperial fighter, cutter, trade pod, blob carrier, s*3

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Thanks for the feedback! I'll have to check when I get home, but you're probably right about it not randomizing the cards you put in, which hopefully explains the unexpected results. I'll post here once that is fixed.

Should be fixed now. I ran your scenario and I got a win % of 96.90% and avg # turns of 19.75

Matt Schoonmaker-Ga... [@railbaron](#) [Dec 23, 2015](#)

Thanks! This is awesome.

John  [@icesphere](#) [Dec 29, 2015](#)

The online simulator (<http://smartreaction.duckdns.org/star-realms-simulator/simul...>) now includes game logs, so now you can see how the bots are playing out the games.

The bots still have a lot of room for improvement, so let me know if you see ways to improve the decisions the bots are making.

John  [@icesphere](#) [Dec 31, 2015](#)

The online simulator now includes Crisis Events

John  [@icesphere](#) [Dec 31, 2015](#)

The online simulator now includes Crisis - Fleets and Fortresses

John  [@icesphere](#) [Jan 4, 2016](#)

The online simulator now includes Crisis - Heroes

gnu barci [@barci](#) [Jan 5, 2016](#)



Tanks for This Simulator ans Thanks for making it Open source !
Awesome



Matt Schoonmaker-Ga... @railbaron Jan 5, 2016

So I used the simulator yesterday in a game to help me make a decision. It was near the end of the game, and I was about to shuffle my discard for the last time. My question was: should I buy anything? I only had four options, so it was easy to run each to see the outcomes: buy an explorer, buy a blob wheel, buy a survey ship, buy nothing.

You can obviously ignore this request, but it could be cool to have the simulator run through buying each card and see the results so you know how buying each card changes your potential outcome. I think this was one suggestion about how to improve the bots, although it would greatly increase the length of simulating.

Just an idea :-).

John 🗨️ @icesphere Jan 5, 2016

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Just an idea :-).

Interesting idea, like you said it would significantly increase the simulation time, but that would be nice to be able to easily see those results. I'll add it to my list of things to consider.

John 🗨️ @icesphere Jan 15, 2016

The online simulator now includes Colony Wars!

John 🗨️ @icesphere Jan 20, 2016 (edited)

John @icesphere wrote:

Matt Schoonmaker-Ga... @railbaron wrote:

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You can now simulate win percentages for buys using the online simulator!

(On my todo list is to add in the win percentage when buying nothing)

Scott Heise Designer @HomerJr Jan 21, 2016

John @icesphere wrote:

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D'oh.... I just finished manually running dozens of opening buy cases manually to prepare for an upcoming strategy article. Why couldn't you have added this feature a few days earlier? Haha 😞

Seriously though, this sounds like a great feature. I'll have to compare my manual results with this. Keep up the great work!

John 🦋 @icesphere Jan 22, 2016

John @icesphere wrote:

You can now simulate win percentages for buys using the online simulator!

(On my todo list is to add in the win percentage when buying nothing)

Results now include not buying a card

Timo Aho @NoppaGames Jan 29, 2016

This is amazing stuff. Thanks!

@greylag Jan 29, 2016

John @icesphere wrote:

You can now simulate win percentages for buys using the online simulator!

This, I think, is the moment at which the simulator has become potentially compromising for league play! I only mean this as a compliment - like, it's amazing that you've been able to achieve this. But especially with EndGameBots, I think you've actually now created something which allows players to be tool-assisted in a new way. What individual leagues think of it is up to their commissioners of course! But for me - it's crossed the line where I'd feel morally compromised if I used this during a league game.

John 🦋 @icesphere Jan 29, 2016

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I agree that the simulator can give you extra information, which could be seen as an unfair advantage.

Personally I almost never use it in league games, but at the same time I could see an argument for allowing people to use it. First of all everyone has

access to it (although not everyone knows about it). I kind of see this as similar to strategy articles posted online - if you read those articles you have a potential advantage over someone who hasn't. In a way my simulator results are kind of like reading the simulator perspective on what is the best choice. It's important to remember that this is just a perspective, which is heavily influenced by my opinions on what cards are best, so if you trust the simulator results you are for the most part trusting my opinions on the best cards. Also the bots are pretty simple so they often make bad decisions which could actually make someone using the simulator have a disadvantage.

Anyways just some thoughts. I'm fine with whatever is decided for the league.

Matt Schoonmaker-Ga... [@railbaron](#) [Jan 30, 2016](#)

I don't think using the simulator is morally compromising. For end game, it just gives you probabilities, to help you make the best play. We all know you can make the best play and still lose.

Personally, I still wouldn't trust the simulator for recommendations on best plays before end-game. Although the number of options you have available to you on a turn is limited (only 6 cards available to buy, your order of playing cards only sometimes matters), the factors that influence which decision is best are many. So basically, I just think the simulator still has a lot of learning to do.

As I write this, I was wondering how well I would fare if I could play against the simulator. I guess that would be the ultimate test, to see how often the simulator could beat a real player. I think I remember Aweberman, the league commissioner, saying he could beat the hard AI about 90% of the time, which tells me that the hard AI isn't very good (and Aweberman is pretty good).

Anyway, just some of my opinions and thoughts :-).

John  [@icesphere](#) [Feb 1, 2016](#)

Online simulator can now simulate the best bot for a given game state.

John  [@icesphere](#) [Feb 2, 2016](#)

One of my favorite things to do with the simulator lately is to leave the trade row blank, and then simulate the best card to buy. It will randomly draw cards for the trade row, so you can then see different win percentages for starting buys. Then repeat over and over again to see the win percentages with different cards each time. Then tweak the bots to see how different strategies change the win percentages. Then tweak the starting cards to see how the win percentages change - for example when you start with 2 trade vs when you start with 3 trade. Then see what happens when your opponent starts with an explorer and you start with 4 trade. There are all kinds of interesting things to see. A lot of what I'm seeing matches what I've noticed through experience playing lots of games as to what works best as starting buys.

Some surprises so far (from just a few results, so it might just be situational):

Recycling Station is an amazing first buy and Stealth Needle is a good first buy. These are both awesome cards, but I don't usually consider them to be the best first buy. I sometimes buy Recycling Station as a first buy, but almost never buy Stealth Needle as a first buy.

Anyways, try it out, it's super easy to just keep clicking the Submit button over and over again and seeing different results every time.

If you do try it out - post here any interesting results that you find.

corum irsei [@jhaelen](#) [Feb 5, 2016](#)

John [@icesphere](#) wrote:
Recycling Station is an amazing first buy and Stealth Needle is a good first buy. These are both awesome cards, but I don't usually consider them to be the best first buy.

That's indeed a strange result. Interestingly it matches the AI preference on the 'easy' setting. However, since my success rate against Easy AI is about 85%, I remain unconvinced that these two are good first-buys.

Imho, the most awesome first-buy is Blob Destroyer. I can track uncountable wins (and losses) back to getting this card early/first.