SA
—STINT ANALYZER—

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Disclaimer

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Stint Analyzer

What is Stint Analyzer? I developed Stint Analyzer mostly as a tool to be used for practice sessions to compare different setups as well as compare other drivers lap times against our team. Our team likes to work more on long run setups vs. short run and wanted to compare against others in sessions. Stint Analyzer will show different buckets (averages) of lap times for a Stint. I consider a Stint the time from when you leave pit road until you either pit and leave pit road again or reset your car. This application developed around oval asphalt racing so it might not be suitable for other forms of racing although should function either way. Some of the screen shots were done with AI racing. So, for example you cannot add an AI driver as a friend but used for screen shot purposes only.

About Me

I'm not a Windows Software Developer so there are probably some bugs in the application. Although I try to make sure this software is bug free very hard to account for every situation this software will be used or every computer system that the software will be used on especially internationally.

Donations

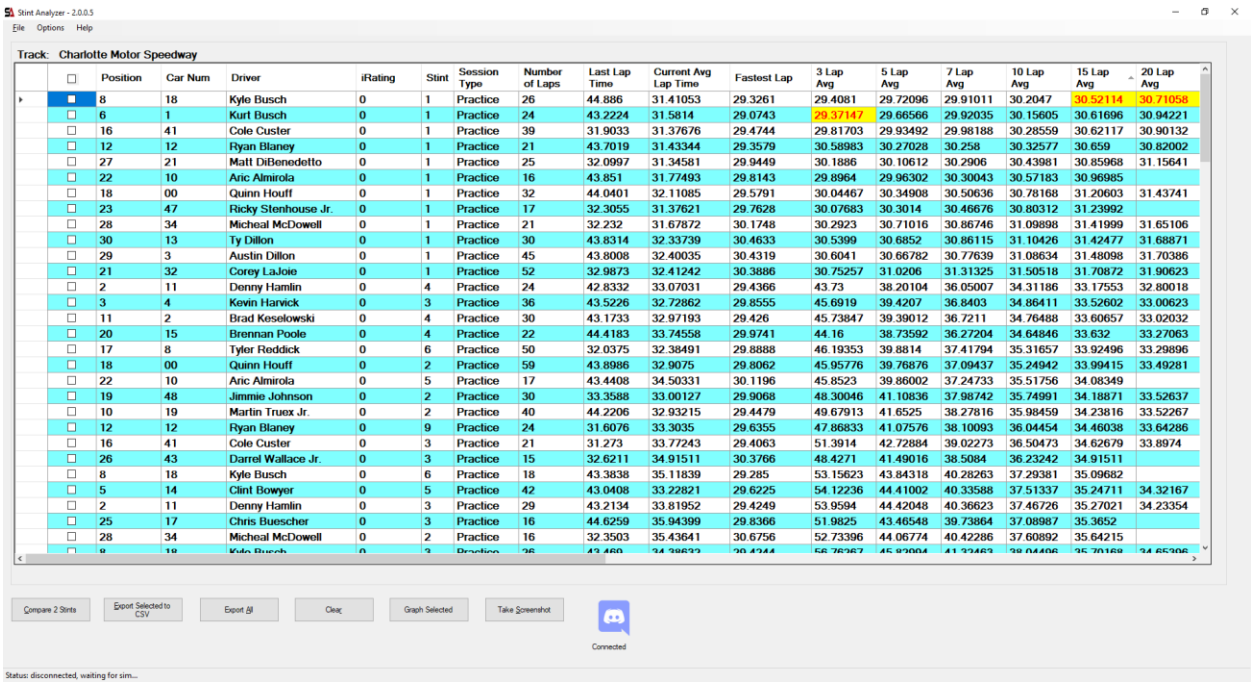
First of all, not looking to make money off of this, but if you would like to support the effort you can make a Paypal Donation at https://www.paypal.com/paypalme/ImRickyT. Also, you can follow or subscribe to my Twitch channel at http://twitch.tv/imrickyt. I really do not want to make this a paid application because I'm not a professional windows programmer, it probably has bugs in the application like all programs do, and if you are paying for a product then you expect excellent service and this is not a full-time job for me. Even if you don't donate, a follow on Twitch would be appreciated. Also, I have a YouTube channel which will have some how-to videos. https://www.youtube.com/playlist?list=PLLpAgIryinSo6AfwFo7t95zvPNx-0ZTw9

Special Thanks

Special thank you to all the guys over at Team Crixus for testing, making suggestions, and using this tool. Also had a few other testers as well thank you guys as well for the feedback and testing.

Stint Analyzer Main Screen

The main screen will show all the drivers in your run group and update as they are making laps. It will only show drivers that make laps while you are in the practice session and will start counting once you get into the session. It cannot go back and look at previous laps before you joined the session. If you double click on a row it will show a summary screen for that stint with some basic information. Your laps will show more information on the summary than others remote drivers.



	Position	Car Num	Driver	iRating	Stint	Session Type	Number of Laps	Last Lap Time	Current Avg Lap Time	Fastest Lap	3 Lap Avg	5 Lap Avg	7 Lap Avg	10 Lap Avg	15 Lap Avg	20 Lap Avg
	8	18	Kyle Busch	0	1	Practice	26	44.886	31.41053	29.3261	29.4081	29.72096	29.91011	30.2047	30.52114	30.71058
	6	1	Kurt Busch	0	1	Practice	24	43.2224	31.5814	29.0743	29.37147	29.66566	29.92035	30.15605	30.61696	30.94221
	16	41	Cole Custer	0	1	Practice	39	31.9033	31.37676	29.4744	29.81703	29.93492	29.98188	30.28559	30.62117	30.90132
	12	12	Ryan Blaney	0	1	Practice	21	43.7019	31.43344	29.3579	30.58983	30.27028	30.258	30.32577	30.659	30.82002
	27	21	Matt DiBenedetto	0	1	Practice	25	32.0997	31.34581	29.9449	30.1886	30.10612	30.2906	30.43981	30.85968	31.15641
	22	10	Aric Almirola	0	1	Practice	16	43.851	31.77493	29.8143	29.8964	29.96302	30.30043	30.57183	30.96985	
	18	00	Quinn Houff	0	1	Practice	32	44.0401	32.11085	29.5791	30.04467	30.34908	30.50636	30.78168	31.20603	31.43741
	23	47	Ricky Stenhouse Jr.	0	1	Practice	17	32.3055	31.37621	29.7628	30.07683	30.3014	30.46676	30.80312	31.23992	
	28	34	Micheal McDowell	0	1	Practice	21	32.232	31.67872	30.1748	30.2923	30.71016	30.86746	31.09898	31.41999	31.65106
	30	13	Ty Dillon	0	1	Practice	30	43.8314	32.33739	30.4633	30.5399	30.6852	30.86115	31.10426	31.42477	31.68871
	29	3	Austin Dillon	0	1	Practice	45	43.8008	32.40035	30.4319	30.6041	30.66782	30.77639	31.08634	31.48098	31.70386
	21	32	Corey LaJoie	0	1	Practice	52	32.9873	32.41242	30.3886	30.75257	31.0206	31.31325	31.50518	31.70872	31.90623
	2	11	Denny Hamlin	0	4	Practice	24	42.8332	33.07031	29.4366	43.73	38.20104	36.05007	34.31186	33.17553	32.80018
	3	4	Kevin Harvick	0	3	Practice	36	43.5226	32.72862	29.8555	45.6919	39.4207	36.8403	34.86411	33.52602	33.00623
	11	2	Brad Keselowski	0	4	Practice	30	43.1733	32.97193	29.426	45.73847	39.39012	36.7211	34.76488	33.60657	33.02032
	20	15	Brennan Poole	0	4	Practice	22	44.4183	33.74558	29.9741	44.16	38.73592	36.27204	34.64846	33.632	33.27063
	17	8	Tyler Reddick	0	6	Practice	50	32.0375	32.38491	29.8888	46.19353	39.8814	37.41794	35.31657	33.92496	33.29896
	18	00	Quinn Houff	0	2	Practice	59	43.8986	32.9075	29.8062	45.95776	39.76876	37.09437	35.24942	33.99415	33.49281
	22	10	Aric Almirola	0	5	Practice	17	43.4408	34.50331	30.1196	45.8523	39.86002	37.24733	35.51756	34.08349	
	19	48	Jimmie Johnson	0	2	Practice	30	33.3588	33.00127	29.9068	48.30046	41.10836	37.98742	35.74991	34.18871	33.52637
	10	19	Martin Truex Jr.	0	2	Practice	40	44.2206	32.93215	29.4479	49.67913	41.6525	38.27816	35.98459	34.23816	33.52267
	12	12	Ryan Blaney	0	9	Practice	24	31.6076	33.3035	29.6355	47.86833	41.07576	38.10093	36.04454	34.46038	33.64286
	16	41	Cole Custer	0	3	Practice	21	31.273	33.77243	29.4063	51.3914	42.72884	39.02273	36.50473	34.62679	33.8974
	26	43	Darrel Wallace Jr.	0	3	Practice	15	32.6211	34.91511	30.3766	48.4271	41.49016	38.5084	36.23242	34.91511	
	8	18	Kyle Busch	0	6	Practice	18	43.3838	35.11839	29.285	53.15623	43.84318	40.28263	37.29381	35.09682	
	5	14	Clint Bowyer	0	5	Practice	42	43.0408	33.22821	29.6225	54.12236	44.41002	40.33588	37.51337	35.24711	34.32167
	2	11	Denny Hamlin	0	3	Practice	29	43.2134	33.81952	29.4249	53.9594	44.42048	40.36623	37.46726	35.27021	34.23354
	25	17	Chris Buescher	0	3	Practice	16	44.6259	35.94399	29.8366	51.9825	43.46548	39.73864	37.08987	35.3652	
	28	34	Micheal McDowell	0	2	Practice	16	32.3503	35.43641	30.6756	52.73396	44.06774	40.42286	37.60892	35.64215	

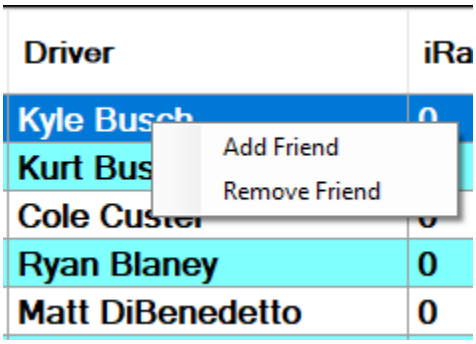
You can see the different lap average columns. These are a fixed number of averages and not customizable. You can sort on each of the column headings as well. The fastest laps in each column will be highlighted in yellow. As you scroll over to the right you will see for your stint the setup that was used during this run.

More information about Discord later but also from this screen you can click the Discord Icon to go into the Discord Setup Screen.

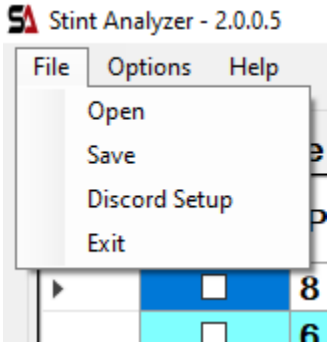
There are action buttons at the bottom that will be covered later in this document.

Add/Remove Friends

If you right click on any line in the grid you can Add/Remove someone as a friend. This will sort your friends to the top of the grid.



File Menu

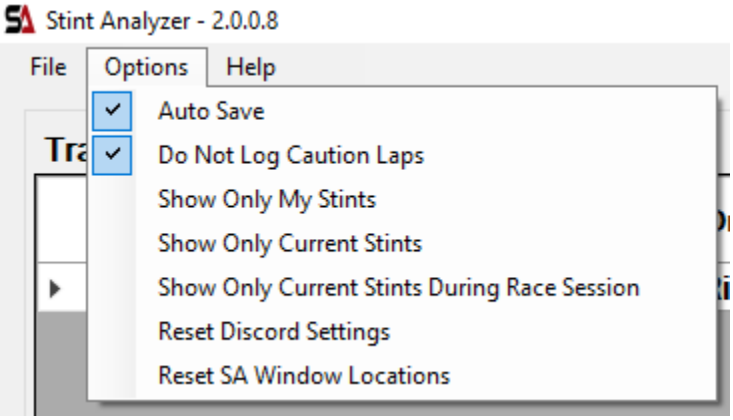


From the File menu, you can Open/Save a session so that you can re-open it later. When you click Save it will show you a File Dialog box to let you choose where to save the file. The file will be saved in a JSON (text file) format. The default folder is you Documents folder \StintAnalyzer. If you change to a different folder this will become your new Default Folder as it remembers the last place you save files. This file names start with the track name, car name, and either a small description of the file and/or timestamp from the session to help you track the files a little easier.

You can click Discord Setup to setup the Discord Integration. More on this later in this document.

Exit will close the program.

Options Menu



Autosave will automatically save the session to your Default Folder when the program closes or when a new session starts (ie going from practice/qualify/race). This file will be saved in your Documents Folder/StintAnalyzer be default.

Do Not Log Caution Laps will not log the lap times under caution. This will help not skew the lap averages while pacing. Although this tool is mostly meant for practice this will help no have large swings in lap times.

You have 3 different view filters you can set.

Show Only My Stints will just show the laps you are running. All other lap times for other drivers will still be recorded but only yours will be shown.

Show Only Current Stints will show just the last stint a driver is currently on. When a new stint is started that stint will be replaced with a new stint.

Show Only Current Stints During Race Session is same as Show Only Current Stints but will automatically be set on when the session turns to race. This is so during practice you might want to leave all stints showing but during the race maybe only show the current stint to make the screen less cluttered.

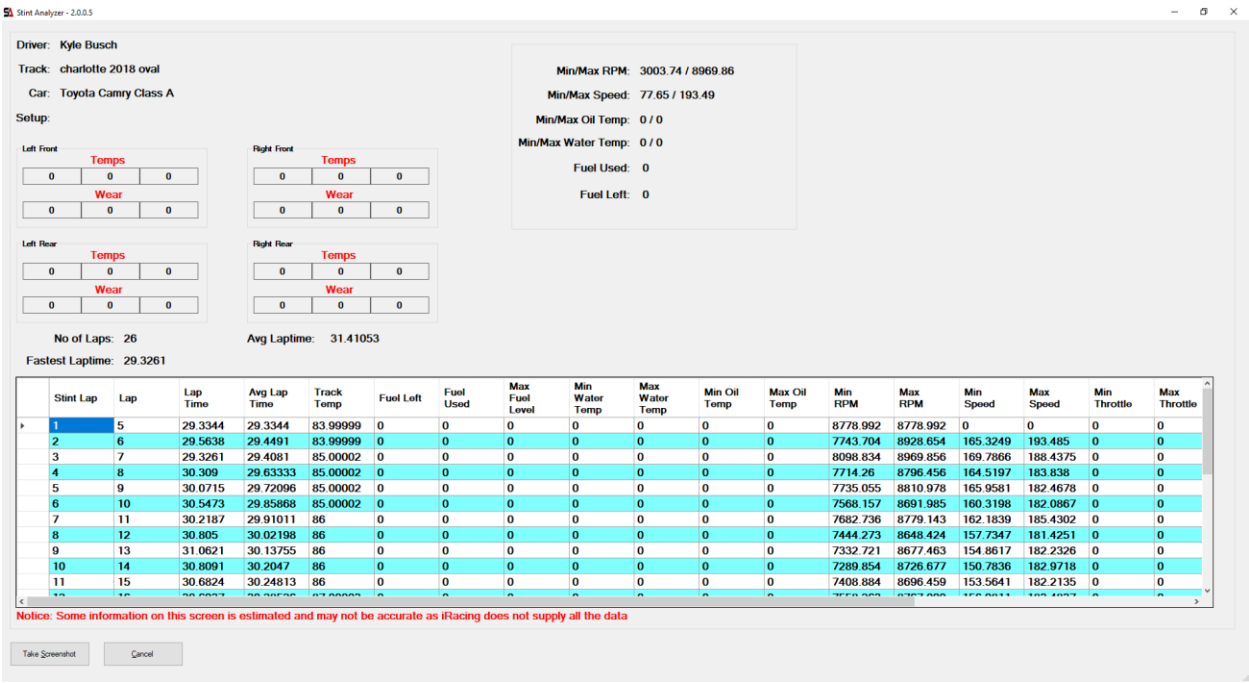
You can also reset the Discord Settings. This is a fail-safe in case something gets messed up this will set everything back to default.

And Reset the Windows Locations. This might come in handy if you move the Windows off the screen. The program remembers where you place the windows and should set them back to the defaults

You will notice a Stint Analyzer Icon in your system tray while the application is running. You can right click on this icon to reset your windows locations as well.

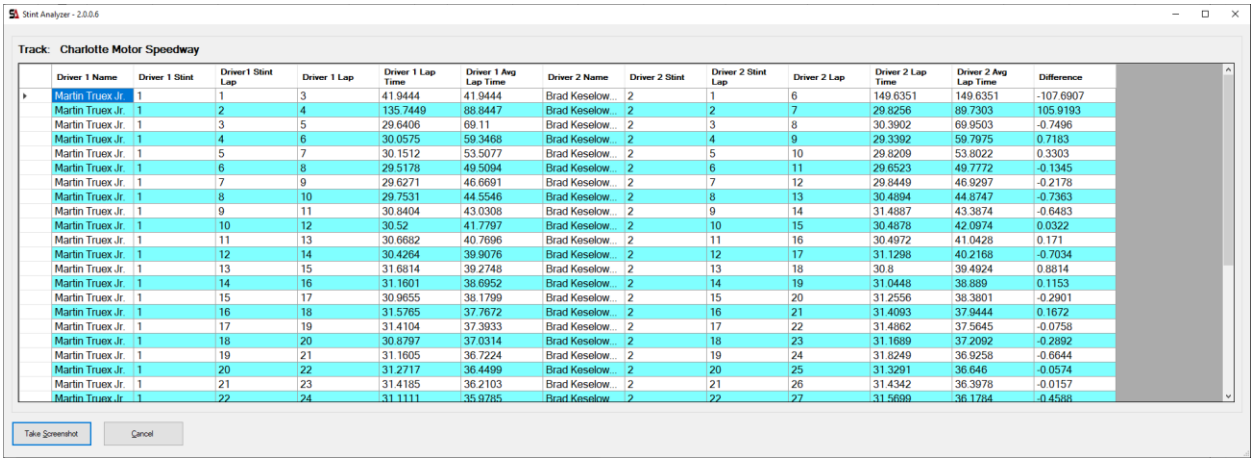
Stint Summary

Double clicking on a line in the grid will bring up a Stint Summary. This stint summary shows more information for the players car than it does others. For example, Tire Wear/Temps/Water Temps/Oil Temps/Fuel are not shown for other drivers. RPM is provided by iRacing. Speed for other drivers is calculated based on time/distance traveled so it might be a little different than what you might see on the replay screen but should be fairly close. The players car speed is provided by iRacing. Also a grid showing the individual laps and information for that stint. Remember your car provides more information line Water Temp, Oil Temp, Fuel Used, Tire Temps. iRacing does not provide certain information for other players cars.



Stint Lap	Lap	Lap Time	Avg Lap Time	Track Temp	Fuel Left	Fuel Used	Max Fuel Level	Min Water Temp	Max Water Temp	Min Oil Temp	Max Oil Temp	Min RPM	Max RPM	Min Speed	Max Speed	Min Throttle	Max Throttle
1	5	29.3344	29.3344	83.99999	0	0	0	0	0	0	0	8778.992	8778.992	0	0	0	0
2	6	29.5638	29.4491	83.99999	0	0	0	0	0	0	0	7743.704	8928.654	165.3249	193.485	0	0
3	7	29.3261	29.4081	85.00002	0	0	0	0	0	0	0	8098.834	8969.856	169.7866	188.4375	0	0
4	8	30.309	29.63333	85.00002	0	0	0	0	0	0	0	7714.26	8796.456	164.5197	183.838	0	0
5	9	30.0715	29.72096	85.00002	0	0	0	0	0	0	0	7735.055	8810.978	165.9581	182.4678	0	0
6	10	30.5473	29.85868	85.00002	0	0	0	0	0	0	0	7568.157	8691.985	160.3198	182.0867	0	0
7	11	30.2187	29.91011	86	0	0	0	0	0	0	0	7682.736	8779.143	162.1839	185.4302	0	0
8	12	30.805	30.02198	86	0	0	0	0	0	0	0	7444.273	8648.424	157.7347	181.4251	0	0
9	13	31.0621	30.13755	86	0	0	0	0	0	0	0	7332.721	8677.463	154.8617	182.2326	0	0
10	14	30.8091	30.2047	86	0	0	0	0	0	0	0	7289.854	8726.677	150.7836	182.9718	0	0
11	15	30.6824	30.24813	86	0	0	0	0	0	0	0	7408.884	8696.459	153.5641	182.2135	0	0

Compare 2 Stints



Driver 1 Name	Driver 1 Stint	Driver1 Stint Lap	Driver 1 Lap	Driver 1 Lap Time	Driver 1 Avg Lap Time	Driver 2 Name	Driver 2 Stint	Driver 2 Stint Lap	Driver 2 Lap	Driver 2 Lap Time	Driver 2 Avg Lap Time	Difference
Martin Truex Jr.	1	1	3	41.9444	41.9444	Brad Keselow...	2	1	6	149.6351	149.6351	-107.6907
Martin Truex Jr.	1	2	4	135.7449	88.8447	Brad Keselow...	2	2	7	29.8256	89.7303	105.9193
Martin Truex Jr.	1	3	5	29.6406	69.11	Brad Keselow...	2	3	8	30.3902	69.9503	-0.7496
Martin Truex Jr.	1	4	6	30.0575	59.3468	Brad Keselow...	2	4	9	29.3392	59.7975	0.7183
Martin Truex Jr.	1	5	7	30.1512	53.5077	Brad Keselow...	2	5	10	29.8209	53.8022	0.3303
Martin Truex Jr.	1	6	8	29.5178	49.5094	Brad Keselow...	2	6	11	29.6523	49.7772	-0.1345
Martin Truex Jr.	1	7	9	29.6271	46.6691	Brad Keselow...	2	7	12	29.8449	46.9297	-0.2178
Martin Truex Jr.	1	8	10	29.7531	44.5546	Brad Keselow...	2	8	13	30.4894	44.8747	-0.7363
Martin Truex Jr.	1	9	11	30.8404	43.0308	Brad Keselow...	2	9	14	31.4887	43.3874	-0.6483
Martin Truex Jr.	1	10	12	30.52	41.7797	Brad Keselow...	2	10	15	30.4878	42.0974	0.0322
Martin Truex Jr.	1	11	13	30.6682	40.7696	Brad Keselow...	2	11	16	30.4972	41.0428	0.171
Martin Truex Jr.	1	12	14	30.4264	39.9076	Brad Keselow...	2	12	17	31.1298	40.2168	-0.7034
Martin Truex Jr.	1	13	15	31.6814	39.2748	Brad Keselow...	2	13	18	30.8	39.4924	0.8814
Martin Truex Jr.	1	14	16	31.1601	38.6952	Brad Keselow...	2	14	19	31.0448	38.889	0.1153
Martin Truex Jr.	1	15	17	30.9655	38.1799	Brad Keselow...	2	15	20	31.2556	38.3801	-0.2901
Martin Truex Jr.	1	16	18	31.5765	37.7672	Brad Keselow...	2	16	21	31.4093	37.9444	0.1672
Martin Truex Jr.	1	17	19	31.4104	37.3933	Brad Keselow...	2	17	22	31.4862	37.5645	-0.0758
Martin Truex Jr.	1	18	20	30.8797	37.0314	Brad Keselow...	2	18	23	31.1689	37.2092	-0.2892
Martin Truex Jr.	1	19	21	31.1605	36.7224	Brad Keselow...	2	19	24	31.8249	36.9258	-0.6644
Martin Truex Jr.	1	20	22	31.2717	36.4499	Brad Keselow...	2	20	25	31.3291	36.646	-0.0574
Martin Truex Jr.	1	21	23	31.4185	36.2103	Brad Keselow...	2	21	26	31.4342	36.3978	-0.0157
Martin Truex Jr.	1	22	24	31.1111	35.9785	Brad Keselow...	2	22	27	31.5699	36.1784	-0.4588

From the main screen you can select 2 stint by placing a check mark in the check box and clicking Compare 2 Stints. It will just choose the first 2 stints it comes to. If you select more than 2 it will just use the first 2 it comes to. It will show you the difference between the first stint to the second stint with a lap time difference.

Export Selected to CSV and Export All

Export Selected to CSV and Export All will write out a CSV file for all the stints that have a check mark beside them or all stints. This will include lap times by each lap. This also shows more detail than the stint Summary.

I attempt to show tire temps at the end of each stint and also show max/min speed/water temp/oil temp/rpm/brake/throttle/steering angles information for each lap. Some of this is experimental so take it with a grain of salt if you see something wrong (i.e. 5000 mph or steering angle that is upside down).

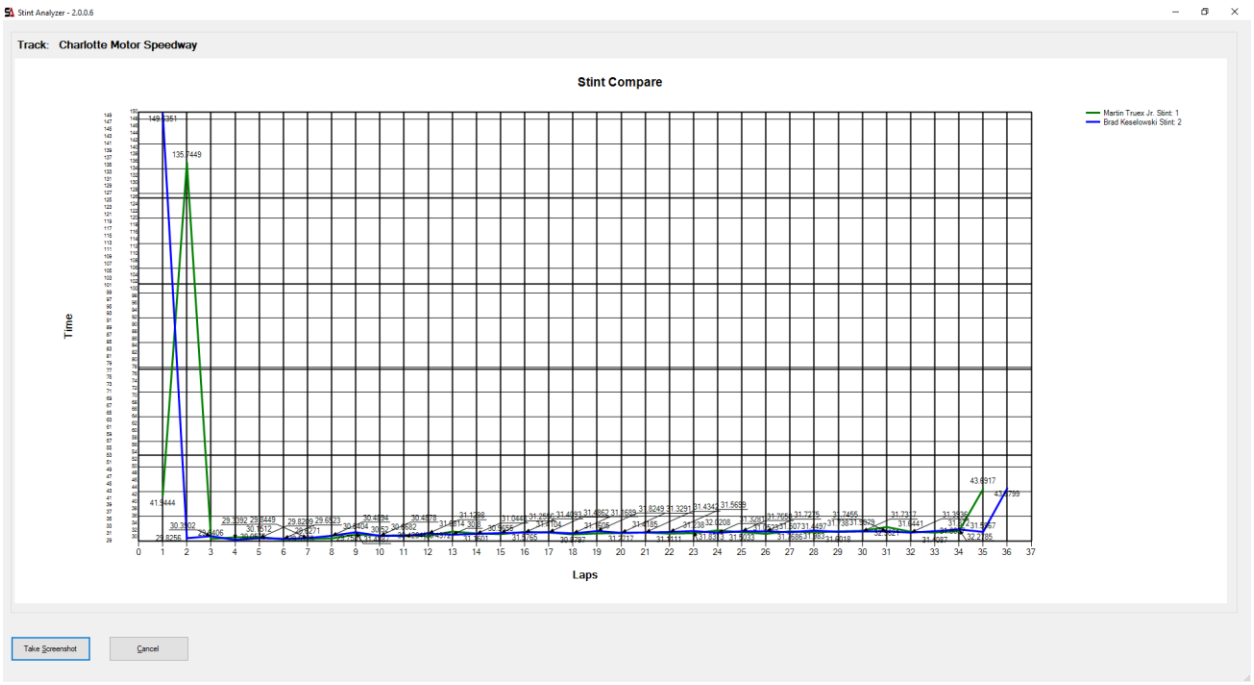
This can be used to open in Excel or Google Sheets and do your own graphing or calculations on. Once you click the Export Selected a File Dialog box will open asking you to save the CSV File. The following columns will be exported to the CSV file.

Driver
Stint
Stint Lap
Lap
Lap Time
Avg Lap Time
Track Temp
Session Type
Tire Wear
Tire Temp
Fuel Left
Fuel Used
Max Fuel Level
Min Water Temp
Max Water Temp
Min Oil Temp
Max Oil Temp
Min Rpm
Max Rpm
Min Speed
Max Speed
Min Throttle
Max Throttle
Min Brake
Max Brake
Min Steering
Max Steering
Setup Name

Clear

Clear will clear all the data to let you start collecting data again.

Graph Selected



Graph Selected will graph the laps you place a check mark by. And display in a nice tidy graph. Excel might have some better graphing options but this will allow you to visually see if a stint was faster than another. You can select several laps on the graph by placing you mouse on a lap and left clicking and dragging to the right like you would a selection. Also you can use your mouse wheel to zoom in and out on sections of the graph.

Take Screenshot

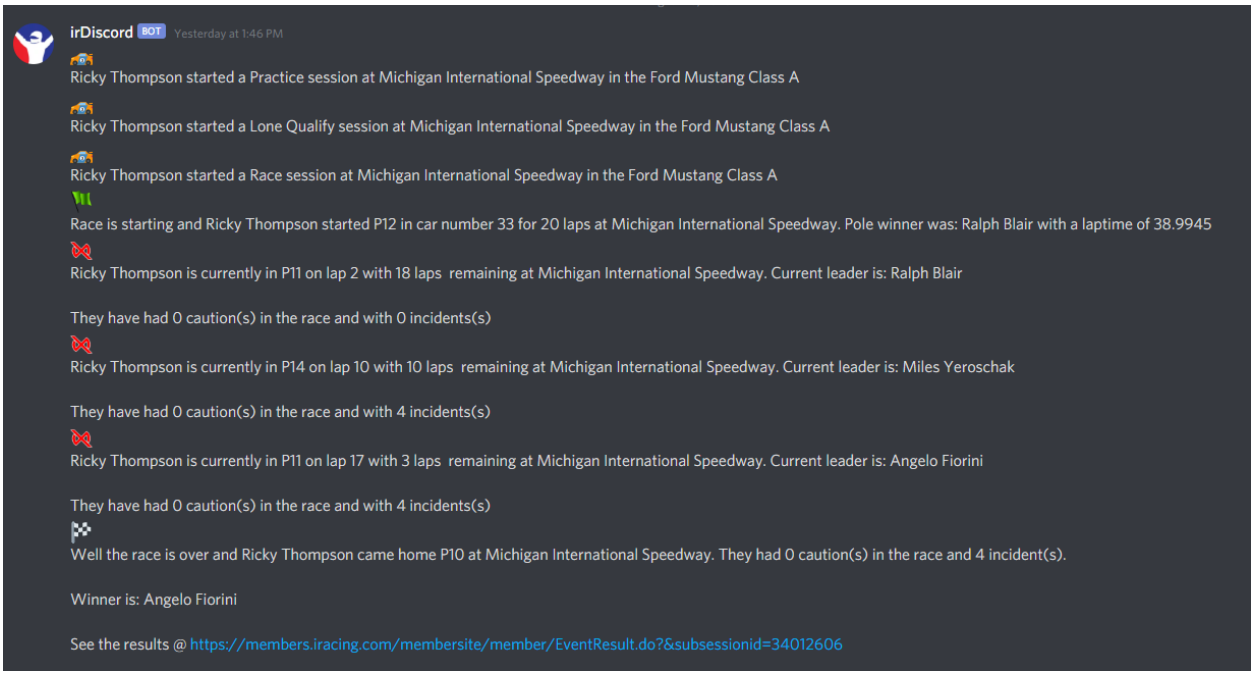
You will notice the Take Screenshot button on most of the screens. This will allow you to create a PNG file of the current screen. This will open a file dialog box and allow you to save to any folder or the default folder /Documents/StintAnalyzer. If you enable Discord Integration it can automatically upload to Discord.

Discord Integration

Before continuing, if you do not want to integrate Stint Analyzer with Discord then you do not need to do anything on the Discord Setup screen.

Discord Integration allows the user to setup a Discord Bot on a Server they own to upload attachments and race updates.

Race updates are sent periodically while you are in a session. For example, at the start of a session a message goes out and each time that session changes. You can set up an interval in minutes to give in race updates to your progress. Messages like below might be sent to your Discord Status Update Channel.

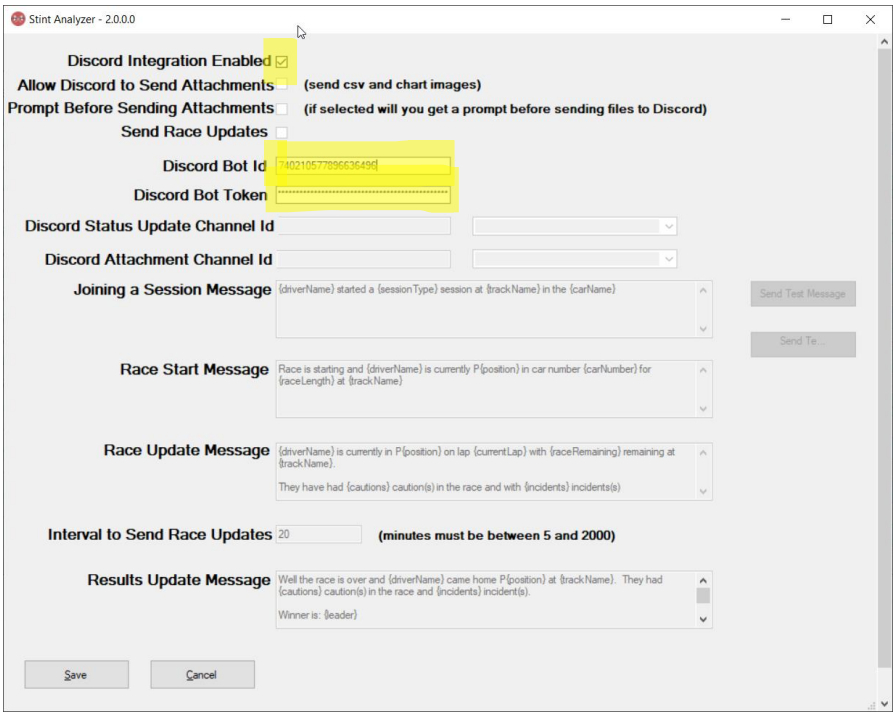


The way our team uses the data attachment is after we run practice sessions, we upload the CSV files to our Discord Server and analyze the data. They can use Excel or Google Sheets to open the CSV and manipulate the data however they need to.

When you first go into the Discord Setup everything will be disabled but Discord Integration Enabled, Discord Bot Id and Discord Bot Token. The documentation below will show you how to obtain the Discord Bot Id and Discord Bot Token. Remember to only share this information with people you trust. If for example a team member leaves you can always regenerate the Bot Token and then you will need to hand out this Token to the team again.

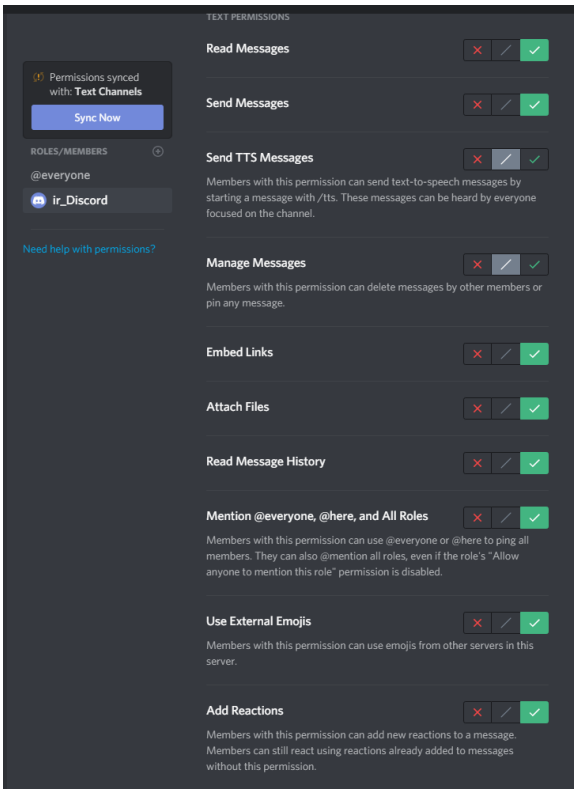
If you are going to use Discord Integration you must first create your Bot.

Continue to the Creating Discord Bot Section to create your Bot and fill in the required fields and return to the section to finish the Discord Integration Setup.



After getting the required fields press Save. Then open back up the Discord Setup Page again.

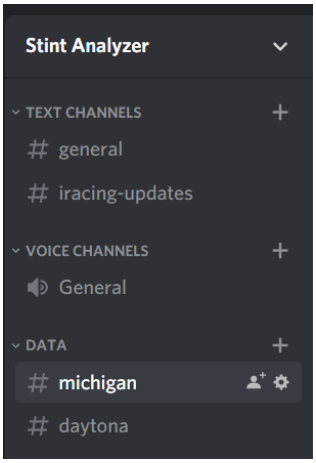
A couple of items to cover about Discord. Discord Users are setup with permissions. I am not going into this a lot because there is documentation about the User Permissions on the internet. Whatever permissions you setup on each Channel for the Bot User is the permissions this application will use. So, if you only want the Bot to have access to certain channels give the Bot permissions to those channels. If a Bot does not have permission to a channel it will not be able to send messages or attachments. The bot will need at least the Read Messages/Send Message/Embed Links/Attach Files Permissions. The following is how I have ours setup because I do use some emojis. The below screen shot is the only ones I allow the bot to use for myself.



The only channels that you can send updates of attachments to are Text Channels.

Discord has a folder structure called Categories. You can create a category and have currently up to 50 Text Channels under that Category.

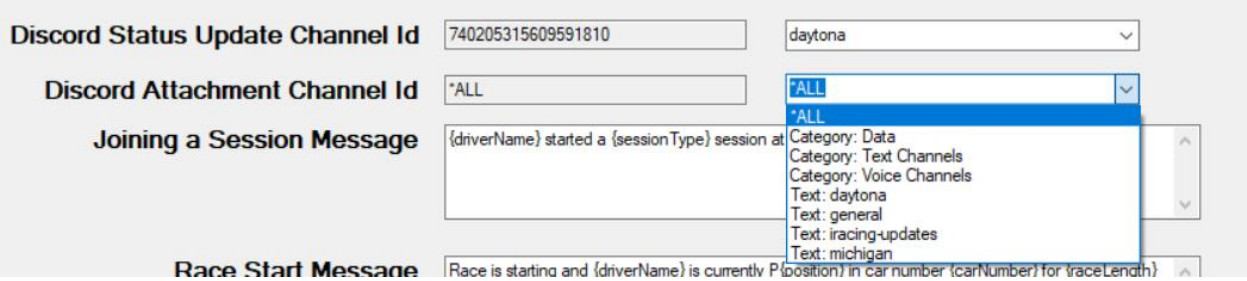
Notice I have a category setup as Data with all the tracks we go to underneath it. In the Stint Analyzer Discord Setup this allows me to set Discord Attachment Channel to a Category (Data). Then only the Channels under that Category are shown in a drop-down box when uploading data. You can also set it to *ALL and show all text channels the bot has access to.



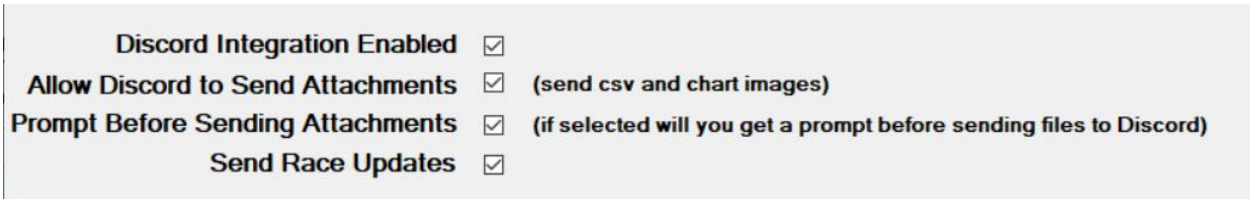
After opening up the Discord Setup screen again, if everything is entered correctly, you should now see drop down boxes for Discord Status Update Channel Id and Discord Attachment Channel Id filled with specific channels the bot has access to.

Now try the test buttons. Send Test Message and Sent Test Attachment and make sure you server is setup correctly. If not, you should get an error message at the bottom of the screen.

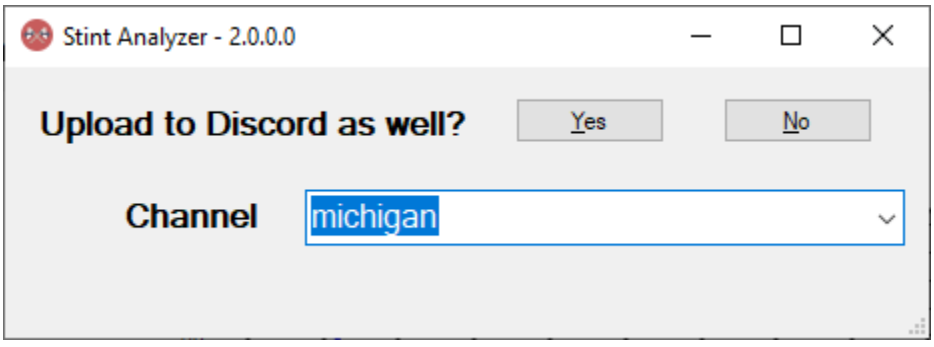
On the Setup Screen Discord Status Update Channel Id is locked to be only 1 text channel because you will never be prompted for these during a race session.

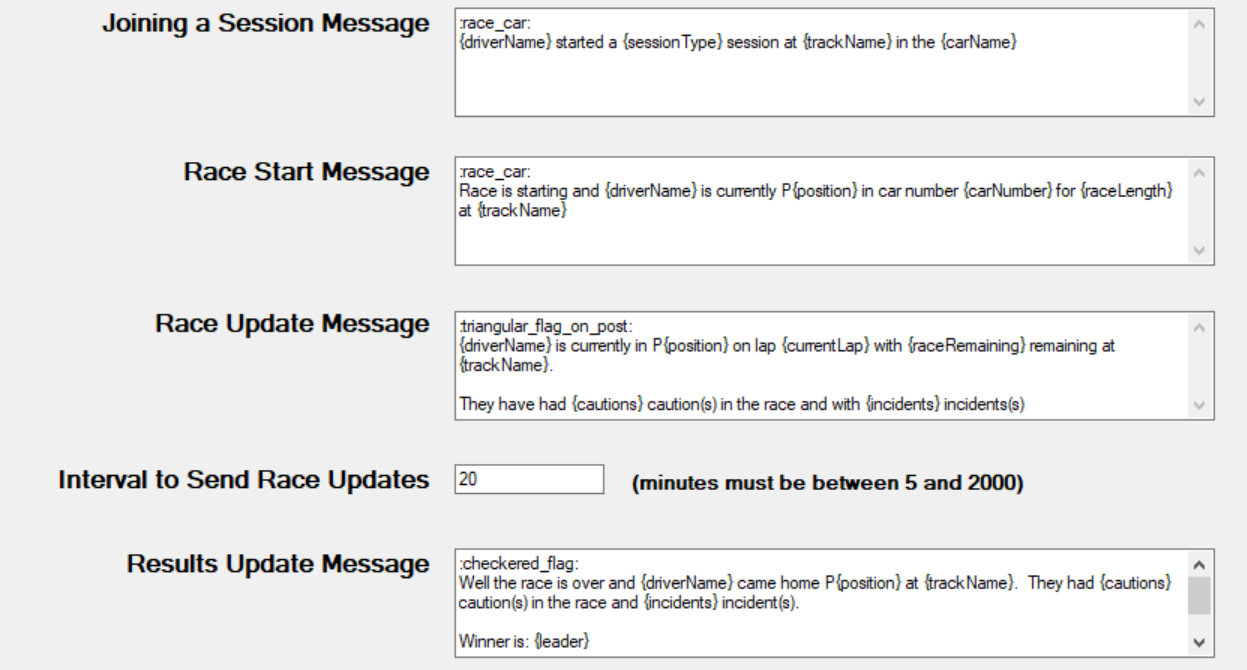


On the attachment channel remember if you select a category it will only show the text channels underneath that Category.



If you have Allow Discord to Send Attachments each time you go to save a CSV file or Take a screenshot the file will attempt to be sent to Discord. If you have a text channel selected and you have Prompt Before Sending Attachment Clicked, you will get a warning message Asking do you want to send to Discord Yes/No. If you have a category selected no matter how you have Prompt Before Sending Attachments you will get a prompt so that we can figure out what channel to send it to. If you turn off Allow Discord to Send Attachment you will never see this screen.





You can also select whether or not to send Race Updates. These race updates are sent at the beginning of a session or each time a session changes, during the session an update is sent on the interval that you enter. The interval is in minutes. I purposely set the minimum to 5 mins as you don't want to spam your Discord server every couple of minutes. Be kind to the other users and set it to something reasonable. 20 minutes goes by faster than you think.

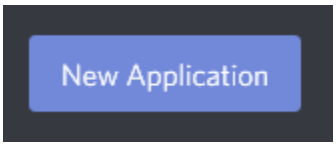
There are several place holder variables that can be replaced in the text to help make the discord messages unique and personalized to you. You could add a Twitch/YouTube link as well to the messages if you are a streamer. See a list below under the Variable Placeholders section.

Creating Discord Bot

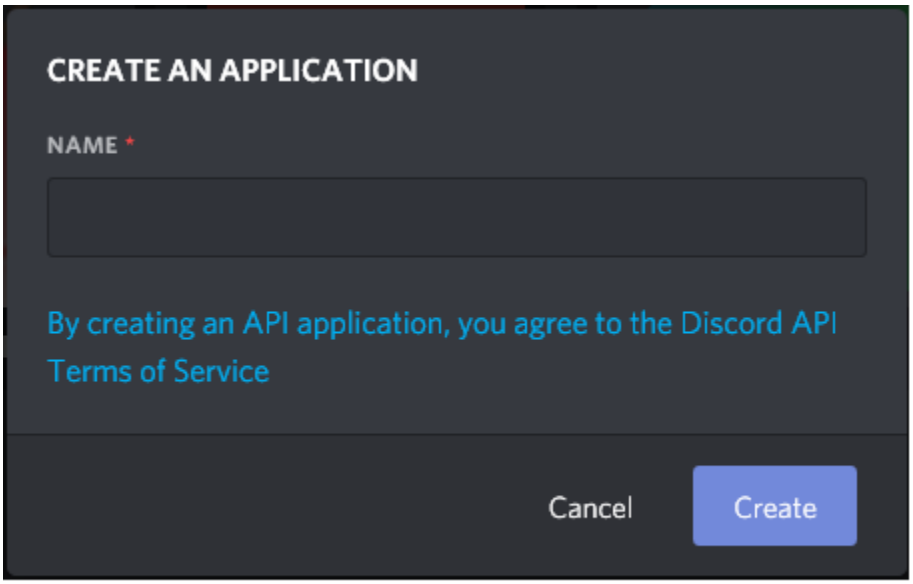
This will describe creating a bot for a Discord Server you own. Only the owner of a Discord Server can set this up.

1. Navigate to https://discord.com/developers/applications. You may be asked to sign into using your Discord Username/Password to setup the bot.

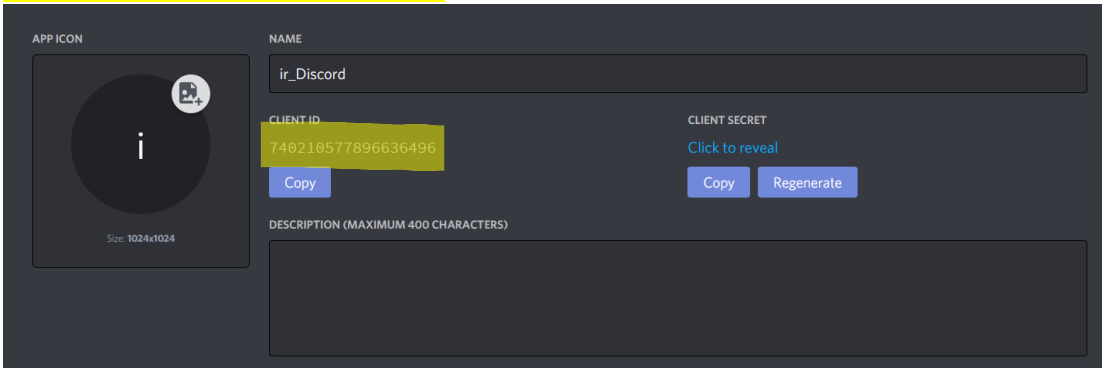
2. You will see a button at the top right for New Application



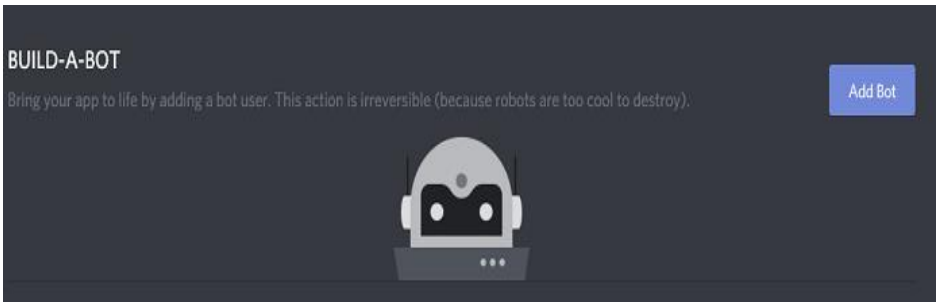
3. Give the application a name and click “Create”. I called mine StintAnalyzer but you can name it anything you like.



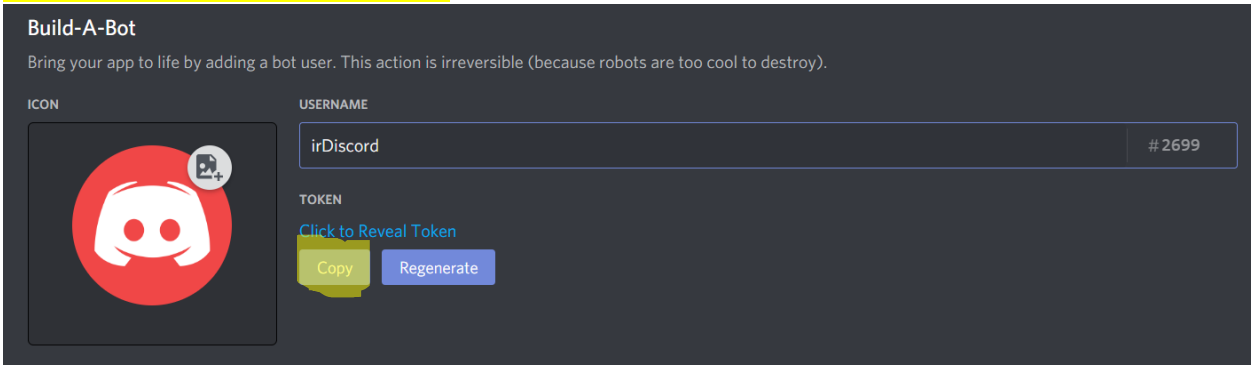
4. After you click create you will be at the General Information Tab. You will need the Client ID for the Discord Setup in Stint Analyzer. You can click the Copy button and put the Client ID in the Discord Bot Id.



5. Create a Bot User by navigating to the "Bot" tab and clicking "Add Bot".
   - Click "Yes, do it!" to continue.

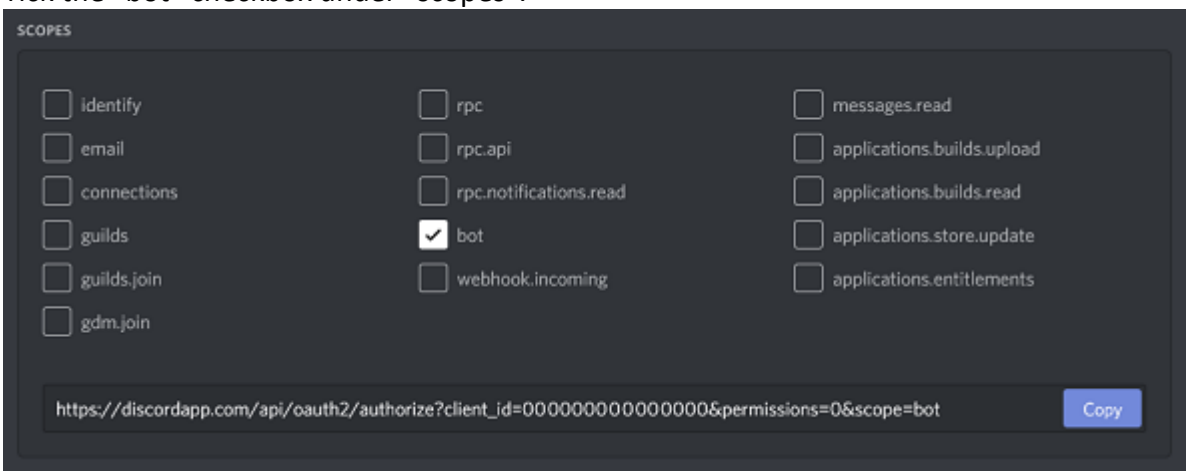


6. Copy the token using the "Copy" button. You will need to save this Token to enter the Stint Analyzer Discord Setup screen under Discord Bot Token. The token is a long string with random letters and numbers.

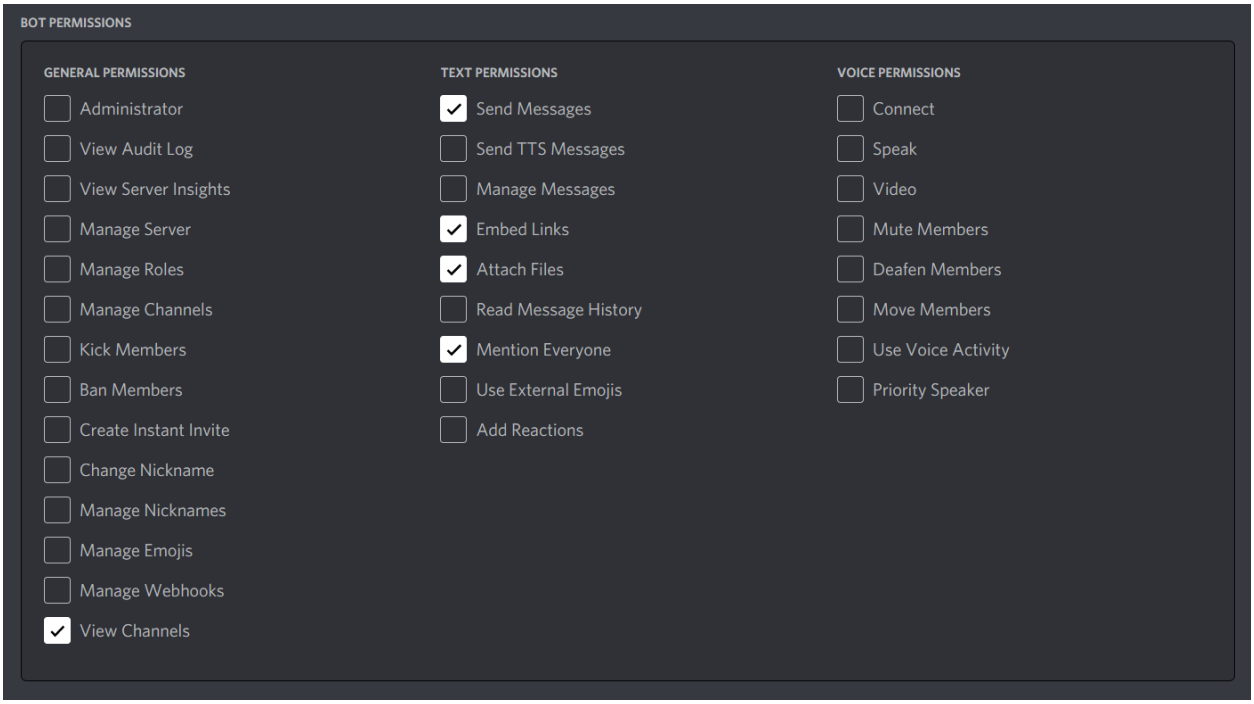


7. Now we need to invite your new bot to your Discord Server. Go to the OAuth2 Tab.

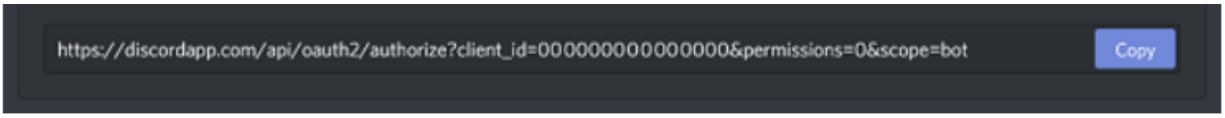
8. Tick the “bot” checkbox under “scopes”.



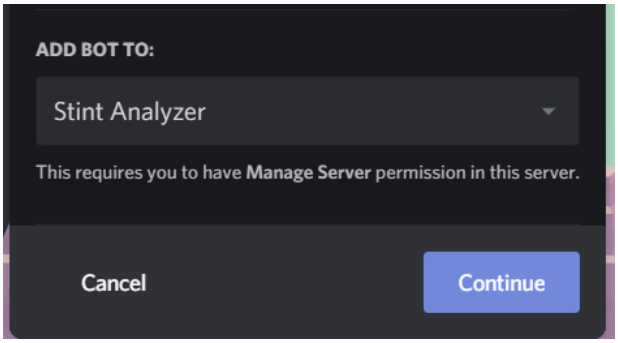
9. We need to give your bot certain permissions. Currently the only permissions needed are View Channels, Send Messages, Embed Links, Attach Files (optionally you can include Mention Everyone, Use External Emojis, Add Reactions, Read Message History)



10. After setting the permissions you will need to copy the URL link above in the scopes section and paste it into your web browser



11. You will now add the Bot to the Discord Server. The setup should be complete at this point and you can return to the [Discord Integration Setup].



Variable Placeholders

Variable place holders are so that you can make the race updates a little more customized to your liking. These are case sensitive and must be spelled correctly and surrounded by {}.

{carName} = Name iRacing supplies for the car name
{carNumber} = Your car number
{cautions} = Number of Cautions during the race
{currentLap} = Current Lap the leader is on
{finishPosition} = Race Finish Position
{driverName} = Your iRacing Name
{incidents} = The number of incidents you have gotten so far if team event it will show both the team and driver
{link} = Race result link to the iRacing Website
{leader} = Current leader
{poleWinner} = Pole Winner from Qualifying Session
{poleWinnerLapTime} = Pole Winners Lap Time from Qualifying Session if they qualify. If not, it will be -1
{position} = Your current position
{qualifyTime} = Your Lap Time form Qualifying Session if you qualify. If not, it will be -1
{raceLength} = Laps or time
{raceRemaining} = Laps or time remaining
{raceWinner} = Race Winner
{sessionType} = Session Type (practice, offline test, warmup qualifying, race)
{startPosition} = Start position from Qualifying
{trackName} = Name of the Track