

Chosen: Time Series Models (ARIMA & SARIMA)

- How they work: Time series models like ARIMA and SARIMA are specifically designed for forecasting future values based on past observations. They model the temporal structure of the data, including trends, seasonality, and noise.

ARIMA vs SARIMA:

- Components:

- ARIMA is a model made up of 3 main components, AutoRegressive (AR), Integrated (I), and Moving Average (MA). These components together capture autocorrelation, differences, and moving averages of the data coming in.
- SARIMA, on the other hand, is ARIMA but with SAR—or Seasonal Auto Regression—rather than simply AR. This added variable means SARIMA is more equipped to handle clear trends regarding seasons, which can mean weather, usage, or anything else, really.
- The reason these models easily beat out just auto-regression (AR) or just moving-average (MA) is because they combine the results of each. AR relies on past data, and MA relies on measured data vs. predictive, so combining them creates more accurate predictions.

- Complexity and use cases

- ARIMA is a moderately complex model, but can be easily leveraged by beginners. Specific to our project, it can be easily fit into a Python project via 2 *pip install* commands. ARIMA has a lot of [documentation online](#), and could definitely be fit into our project. Its typical use case is for business models like stocks, but can also be used in essentially any case that uses time-relevant data.
- SARIMA is more complex than ARIMA, but still has plenty of [documentation online](#) to assist the implementation. Once again, it can be pretty easily installed by a few *pip install* commands; however, adding seasonality to the data analysis will be tougher to implement. Some typical use cases of SARIMA are quarterly sales data and monthly website traffic.

- Chosen: SARIMA model

- Overall, SARIMA is the better choice for our project. By adding in seasonality, the model's predictions will be even more accurate than by using ARIMA, as wireless connectivity fluctuates given weather conditions like a snowstorm or heavy wind.
- SARIMA will also allow the capture of irregular vehicle movements, and apply seasonal conditions to that data. So, our implementation of the SARIMA model will be able to both predict connectivity through all seasons, and factor in seasonality for possible data-capturing errors.