Several factors need to be considered when executing a trade. To simplify the strategy, this analysis focuses on three key points:

1. Should the position be long or short?
2. When should the trade be executed?
3. At what price should a winning trade be exited?

The AUD/USD currency pair is used for the analysis. The strategy is designed for intraday trading, where positions are opened and closed within the same trading day.

Timing the Execution (Point 2)

Trades are best executed at or near the day's high or low to fully capture the intraday price movement. The table below presents the distribution of daily highs and lows across different time intervals.

	Day High and Day Low Occurrences						
Time Interval	**0000-0400**	**0400-0800**	**0800-1200**	**1200-1600**	**1600-2000**	**2000-0000**	**Total**
Observed	643	339	328	273	532	449	2564
Expected	427.3333	427.3333	427.3333	427.3333	427.3333	427.3333	2563.9998

The hypothesis is

H_0: Day high and day low occurrences do not differ across time intervals

H_1: Day high and day low occurrences differ across time intervals

A chi-squared goodness-of-fit test yields a p-value=0. The null hypothesis is rejected at the 5% significance level. This indicates that daily highs and lows are not evenly distributed and differ across time intervals.

The results show that 0000-0400 has a high probability of containing the day's high or low compared to other intervals. However, the trading rule is to enter trades after 0400 instead of during 0000-0400 (refer to point 1 for rationale).

Trade Position (Point 1)

Since the 0000-0400 window is more likely to contain the day's high or low, it is assumed after 0400 that these levels will remain as the day's extremes. The strategy executes a buy

order if the price breaks the high made between 0000-0400, or a sell order if it breaks the low from that period.

Take-Profit Level (Point 3)

One stylised fact of asset returns is volatility clustering – large price changes tend to be followed by large changes. Here, day range is used to represent volatility.

$$DayRange = DayHigh - DayLow$$

If yesterday's range is large, today's range is likely to be large. To test this, a first-order autocorrelation regression is run:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \varepsilon_t$$

The hypothesis is

$$H_0: \beta_1 = 0$$
$$H_a: \beta_1 \neq 0$$

Most asset returns exhibit heteroscedasticity, resulting in wrong estimation of standard errors and hence invalidity of tests. It is assumed that there is presence of heteroscedasticity in day ranges. To overcome the problems of heteroscedasticity, a robust test is conducted using Newey-West standard errors.

OLS Regression Results

Dep. Variable:	range	R-squared:	0.199
Model:	OLS	Adj. R-squared:	0.198
Method:	Least Squares	F-statistic:	47.56
Date:	Fri, 15 Oct 2021	Prob (F-statistic):	8.33e-12
Time:	21:11:54	Log-Likelihood:	5543.3
No. Observations:	1294	AIC:	-1.108e+04
Df Residuals:	1292	BIC:	-1.107e+04
Df Model:	1		
Covariance Type:	HAC		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	0.0037	0.000	9.192	0.000	0.003	0.005
range_n1	0.4450	0.065	6.896	0.000	0.318	0.572

Omnibus:	847.541	Durbin-Watson:	2.175
Prob(Omnibus):	0.000	Jarque-Bera (JB):	16186.683
Skew:	2.733	Prob(JB):	0.00
Kurtosis:	19.442	Cond. No.	268.

Notes:
[1] Standard Errors are heteroscedasticity and autocorrelation robust (HAC) using 1 lags and without small sample correction

The p-value=0; the 95% confidence interval for the sample 1st order autocorrelation coefficient does not include 0. The null hypothesis is rejected at the 5% significance level. It is concluded that the 1st order autocorrelation coefficient is significantly different from 0 and day ranges exhibit persistence over one period.

Descriptive Statistics of Day Ranges

	Day Range	Day Range given Yesterday Range >= 70% Quantile
Count	1294	388
Mean	0.00672	0.00820
Standard Deviation	0.00373	0.00467
Min.	0.00165	0.00183
25%	0.00444	0.00528
50%	0.00589	0.00715
75%	0.00793	0.00984
Max.	0.04576	0.04576

If yesterday's range >= 0.0074 (70% quantile), today's range is expected to be >= 0.0057 (30% quantile). These figures are chosen because:

- 0.0074 (70% quantile) represents a large range that offers good trade opportunities while reducing noise
- 0.0057 (30% quantile) is a conservative yet sufficient take-profit target

The take-profit price is calculated as:

- Buy Order: 0.0057 – (EntryPrice – CurrentDayLow) above entry price
- Sell Order: 0.0057 – (CurrentDayHigh – EntryPrice) below entry price

Trading Rules

Entry Conditions:

1. Yesterday's range >= 0.0074
2. Time is past 0400
3. Price breaks the high/low made between 0000-0400

Order Inputs:

1. Buy/sell if price breaks the 0000-0400 high/low
2. Fixed lot size
3. Stop-loss at opening price
4. Take-profit at calculated level based on 0.0057 range target