01.=== Tuning XGBoost ===

Best Params: {'learning\_rate': 0.1, 'max\_depth': 6, 'n\_estimators': 200}

MSE: 0.4879

Training Time: 7.53s

02.=== Tuning LightGBM ===

Best Params: {'learning\_rate': 0.1, 'max\_depth': 6, 'n\_estimators': 200}

MSE: 0.4889

Training Time: 30.63s

03.=== Tuning Random Forest ===

Best Params: {'max\_depth': 6, 'n\_estimators': 200}

MSE: 0.5131

Training Time: 730.55s

04.=== Tuning HistGradientBoosting ===

Best Params: {'learning\_rate': 0.1, 'max\_depth': 6, 'max\_iter': 200}

MSE: 0.4890

Training Time: 9.21s

05.=== Tuning CatBoost ===

Best Params: {'depth': 6, 'iterations': 200, 'learning\_rate': 0.1}

MSE: 0.4937

Training Time: 42.94s

00.=== Model Performance Summary ===

MSE Time (s)

XGBoost 0.487929 7.53

LightGBM 0.488878 30.63

HistGradientBoosting 0.489034 9.21

CatBoost 0.493722 42.94

Random Forest 0.513141 730.55