Abstract— **This study delves into an investigation of the temperature and humidity variations influenced by different altitudes within the Telkom University Landmark Tower (TULT) Building. With its 19 floors encompassing varying heights, the TULT building serves as a pertinent case study. The authors have developed an innovative tool or system specifically tailored for predicting temperature and humidity levels within this building. By leveraging the Gaussian Process Regression (GPR) and Internet of Things (IoT) methodologies, the authors aim to achieve precise forecasts of these environmental factors. The selection of these methodologies aligns well with the study's objectives, as they enable effective analysis even with limited data while providing valuable insights into the uncertainty surrounding the predictions. The evaluation of the GPR model exhibits impressive performance, as indicated by the Mean Absolute Percentage Error (MAPE) values of 0.0026 for temperature and 0.0025 for humidity. These low MAPE values underscore the accuracy of the GPR model in capturing temperature and humidity variations within the TULT building. The results of this study offer significant implications for building management and design, shedding light on the impact of altitude on temperature and humidity. The developed tool, employing GPR and IoT methodologies, serves as a valuable asset for decision-making, enabling precise climate control strategies and resource optimization. By accurately predicting temperature and humidity levels, this study facilitates enhanced comfort and energy efficiency within the TULT building.**

Keywords— Gaussian Process Regression, Internet of Things, TULT, Temperature, Humidity