

Approximately 40% of all U.S. energy usage and carbon emissions are attributed to buildings. Energy audits of buildings are an effective way to identify significant energy savings, but the extensive training required by auditors and cost of the labour intensive audits result in only a small fraction of buildings receiving an audit. Automation of the audit process using robots can offer more detailed information for better recommendations, greater consistency in analysis and recommendations, and greatly reduce the cost of audits. One of the most common subsystems evaluated, especially in industrial and commercial settings, is lighting. This paper presents an automated process to collect and analyse data to make recommendations regarding lighting in a building. Image analysis and information from the robot navigation and exploration systems are used to quantify lighting and determine lighting location. Spectrometer data is used to classify lighting type, which, with lighting quantification, provides enough information to make common lighting recommendations. An example of the process of quantifying energy savings is presented in the paper. Using data collected by the system, light levels for both horizontal and vertical illuminance are simulated to enable other common recommendations.

