

SUMMARY OF THE PROJECT PROPOSAL

DEVELOPMENT OF ENERGY EFFICIENT INTELLIGENT BUILDING ARCHITECTURE BASED ON USER ACTIVITY

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Occupant presence and behavior in buildings has been shown to have large impact on heating, cooling and ventilation demand, energy consumption of lighting and appliances, and building controls. Energy unaware behavior can add one-third to a building's designed energy performance. Consequently, user activity and behavior is considered as a key element and has long been used for control of various devices such as artificial light, heating, ventilation, and air conditioning throughout the world. However, it is critical to assess how the user activity and behavior taken into account, the most valuable activities or behaviors and their impact on energy saving potential.

Current situations show that building control is mainly done manually, from switching lights and appliances to control cooling systems seasonally. Building automations are typically limited, such as lighting control with simple motion detection and a fix timeout or indoor climate control based on temperature and CO₂ level. However, user activities and behaviors have large impact on energy consumed in all sectors of buildings (i.e. residential, offices and retail sectors). Significant amount of energy spent for these buildings can be saved by regulating installations and appliance according to actual needs of the current occupants. In order to realize this approach, user activities and behaviors are required as the most important input for building automation systems.

In this research scheme, we propose a novel architecture for energy efficient intelligent building with the theme of energy saving following user activity recognition. We have utilized the metrics, reported widely in literature, to compare the proposed scheme with the existing relevant studies in this research arena. In this proposed research scheme, we would like to determine the most valuable activities and behaviors of the occupant employing a novel occupant activity recognition algorithm. A proposed multi-agent control algorithm will then act in a cooperative manner to coordinate different home appliances to achieve an energy savings along with user comfort. The impact of the user activity on energy saving potential for each of the three main sub-domains, namely, ventilation, and air conditioning, light, and plug loads, will be studied in Indian context.