

## University of Groningen

### Energy adaptive buildings

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# Stellingen

behorende bij het proefschrift

## Energy adaptive buildings From sensor data to being aware of users

van

Tuan Anh Nguyen

1. Energy adaptive buildings are equipped with technology that allows them to be aware of the occupants and facilities designed to automate and optimise control. Lights, heating, ventilation, air conditioning, and other electric appliances can be optimised to save energy while the occupant comfort and productivity are preserved.
2. For substantial savings in building energy consumption, one should make no assumptions about its static use. Considering the dynamicity is essential to achieve energy efficiency.
3. While conceptual benefits of occupant-related building control approaches have shown energy saving benefits, their feasibility must be confirmed in real-life installations.
4. In parallel to optimising energy consumption and performing adaptations automatically, user comfort continues to be an essential success criteria for ICT-based solutions.
5. Combining neighbourhood voting with the lightweight ARMA time series forecasting model significantly enhances the accuracy of fault detection for sensor data.
6. Energy adaptive buildings mostly benefit from occupancy information. Fresh occupancy data is well suited to lighting control, while thermostat control has long response times and demands predictive occupancy information.
7. Ontology-based algorithms overcome the disadvantage of other symbolic learning techniques. Without any training data, it is still possible to obtain accurate classification of performed user activities.
8. For every building, there should be and will be a building automation system that is both affordable and easy to use.
9. The success of the whole depends on its planning capability as much as on its execution capability.