# Project ATTEND
## AdapTive scenario recogniTion for Emergency and Need Detection

**TU WIEN**

AAL AMBIENT ASSISTED LIVING — FORUM 09 Vienna

FFG

## Project ATTEND Abstract:

Within the scope of the project ATTEND a system will be developed that increases the time frame of independent living of elderly persons in their used living environment. The system comprises an intelligent, adaptive network of sensors, which are to be installed in the living environment of the user in order to thoroughly observe his behavior. An important aspect is that the sensors shall work independent and in a preferably invisible fashion.

ATTEND learns about normal behavior of the user. In case of unusual behavior an alarm plan can be worked out (e. g. enquiring the user, calling a neighbor, calling an external organization). The system is intended to increase comfort, security and social inclusion of the customer and ideally also help with the early detection of upcoming medical problems. In case of an emergency the system can contact primary and secondary users (family, neighbor, care giver) via external interfaces.

An important point in the development will be the requirement of minimal installation and maintenance effort. In later stages of development the system should act like a butler in the background and start acting – depending on how good the butler is – in various situations on its own.

ATTEND is based on tested and trustworthy technology in building automation and sensors to ensure economizing in developing a product-close prototype. This will help having a fast and economic development and later distributing the product over established channels. The project is focused on the target group of elderly persons; criteria for the operation of the system are acquired together with them. Already produced results of studies will be considered to be optimal prepared and able to start focused developing.

## Project ATTEND Features:

- Intelligent, Adaptive Network of Sensors
- 3 Times Non-Invasive:
- No Camaras, Microphones
- No Sensors to be Worn On the Body
- Nothing should be Activated by the User
- Observation of Elderly Persons' Daily Routine
- Situation and Scenario Recognition
- Sending Alarm to Caregiver in Case of Emergency
- Protection of Privacy
- Increasing Comfort and Security

## Project ATTEND Contents:

- **Sensor Fsion:** process the sensor data and use the data to build the behavior model of elderly people. The data should be as complete as possible with a few selected sensors.
- **Situation and Scenario Recognition:** based on hierarchic symbolic abstraction and detection methods to detect the most important situations of elderly persons' daily routine in a robust way.
- **Machine Learning:** develop a fast and reliable learning algorithm, modeling the "normal" behavior of the elderly person with several typical daily routines.
- **Combine the Rule and Learning System:** for situation and scenario recognition with different behavior the rule should be defined in advance but the build behavior model through unsupervised machine unsupervised learning from different persons will be difficult to define in advance, the same situation happened in sensor fusion: rules for model building conflict with learning. To solve these issues is a great challenge.

## Particular Research Challenges :

The various sensors of the system perceive "views" from the environment and merge them into a robust, multi-model world representation. We propose the use of hierarchical, symbolic sensor data, as illustrated here. This picture shows how to abstract the meaning of a symbolic data from various sensors and how to combination the meaning with "semantics". The subscribed links are predefined.
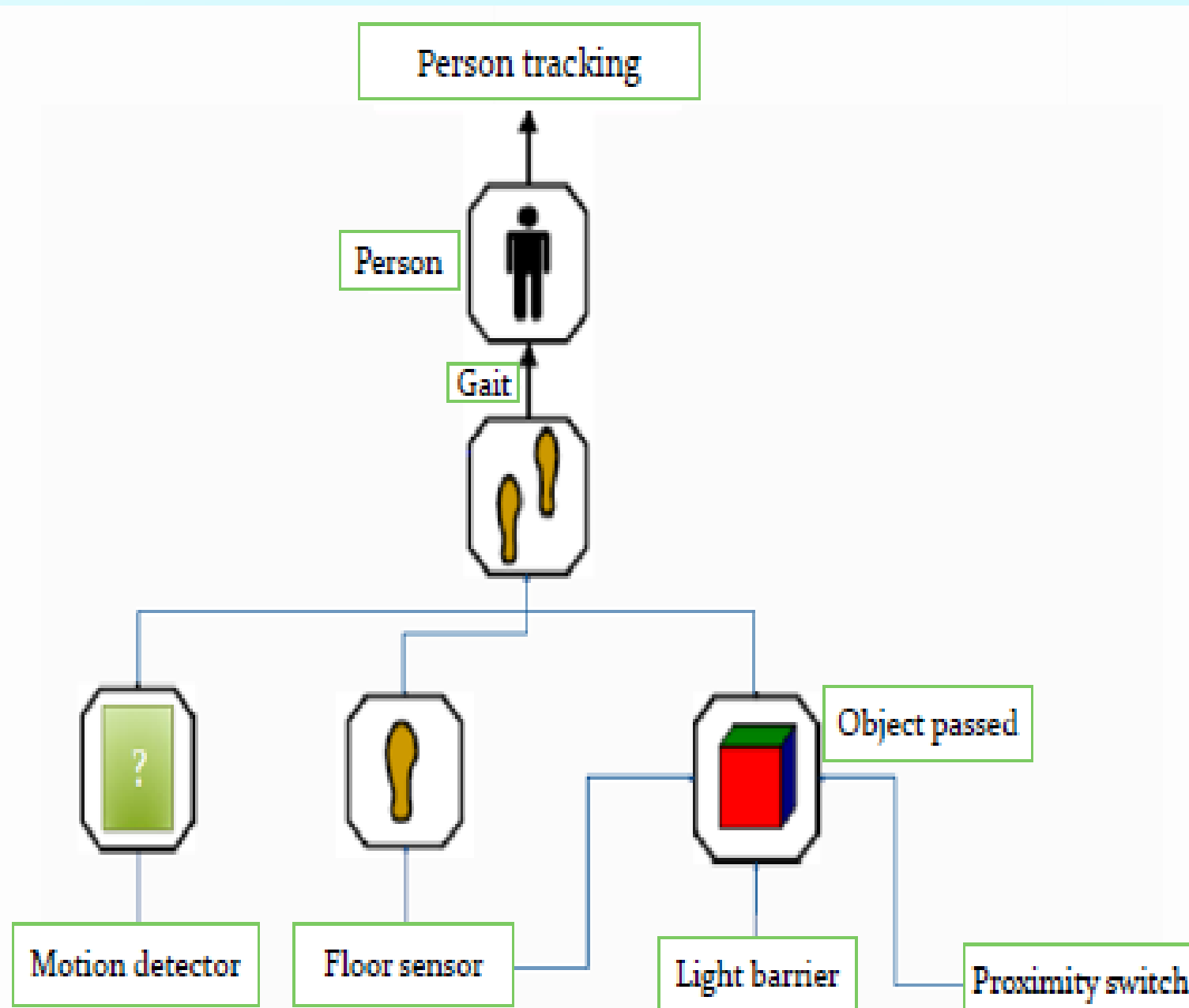


Combination of rule-based and learning systems, and integration of the users:
This part of the project provides the essential scientific and organizational challenges. Combining results from different domains (building automation, symbolic computing, statistics, gerontology) in a wide range to end user applicable system. The end-users represent a very heterogeneous group because they can originate from all social backgrounds.
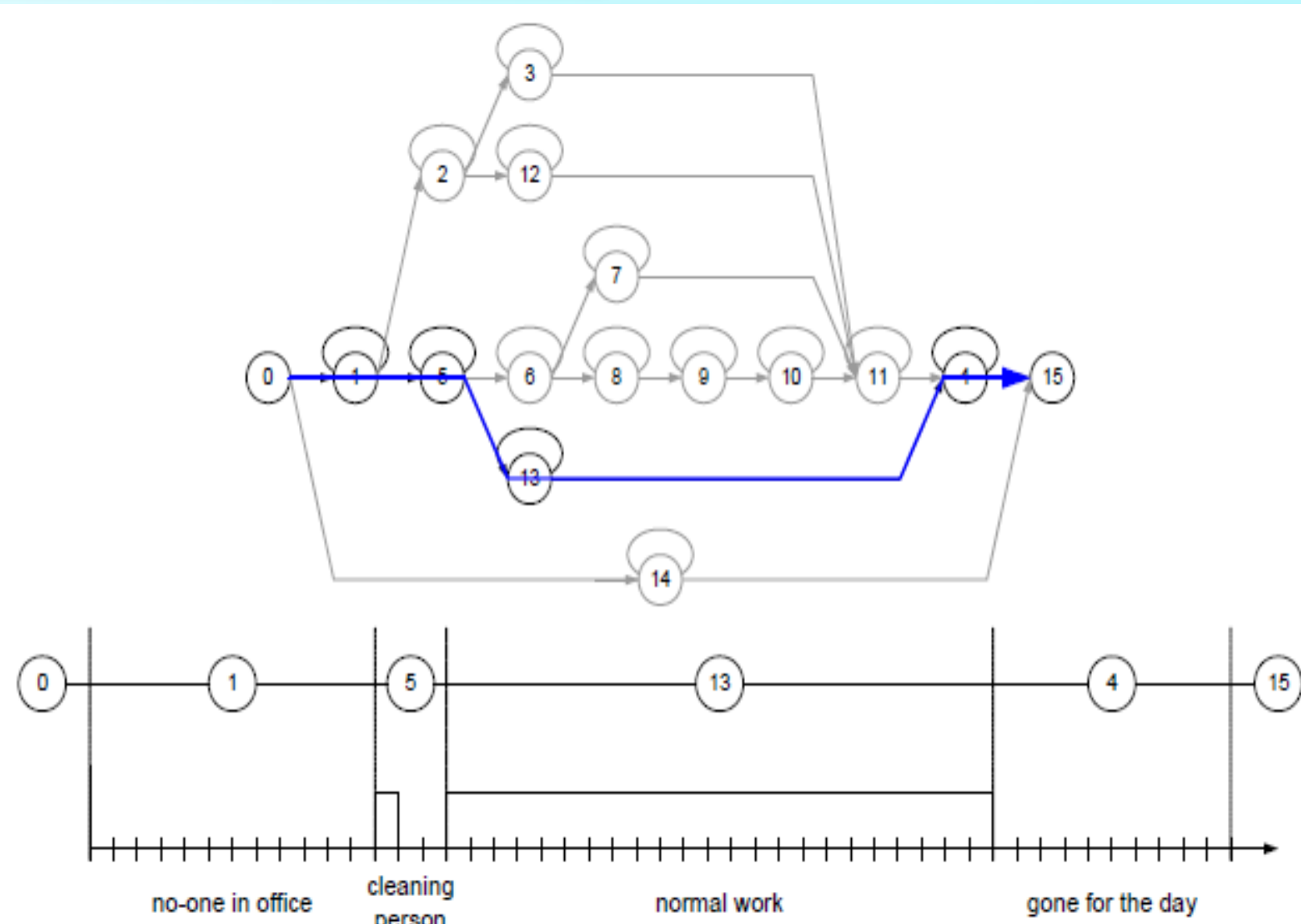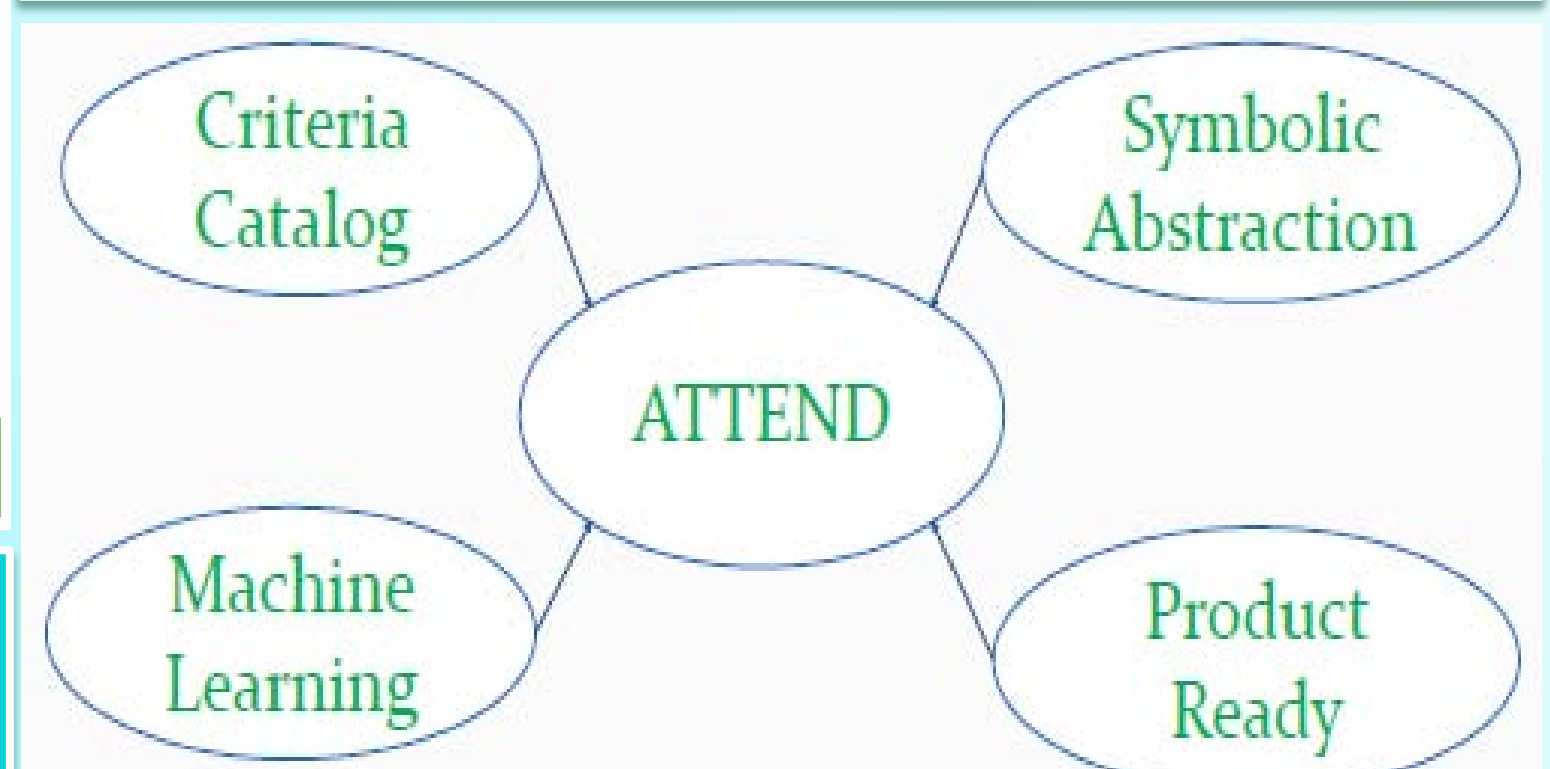


This figure shows a model of an office room, the model is learned from data that come from a simple motion detector.

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