IBPSA Project 1

International Building Performance Simulation Association

New and upcoming developments BuildingSystems library

Christoph Nytsch-Geusen, Kushagra Mathur UdK Berlin

Web Meeting, 28/29 March 2022

# Present development for the BuildingSystem library

Compatibility

- Switch to Modelica 4.0.0

Tools and functions

- CoTeTo-code generator for spatial discretized air flow model
  - 3D air elements, air path openings
- New geometric view factor function
  - is used for detailed long-wave radiation exchange calculations
  - e.g. time dependent change of the geometry can be considered
 - obstacles in the zone can be considered

Models

- Photovoltaic and battery models:
  - Ongoing cooperation with RWTH Aachen
    for a common implementation for the IBPSA library
  - Complex and simplified PV module models
    → eg. one-diode, two diodes models, MPP non MPP control
  - Detailed battery model
    → more realistic charging and discharging processes
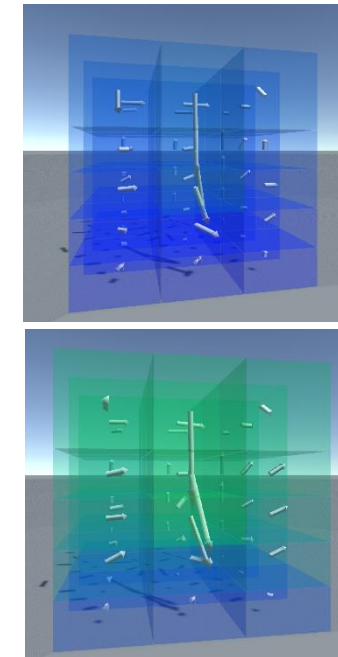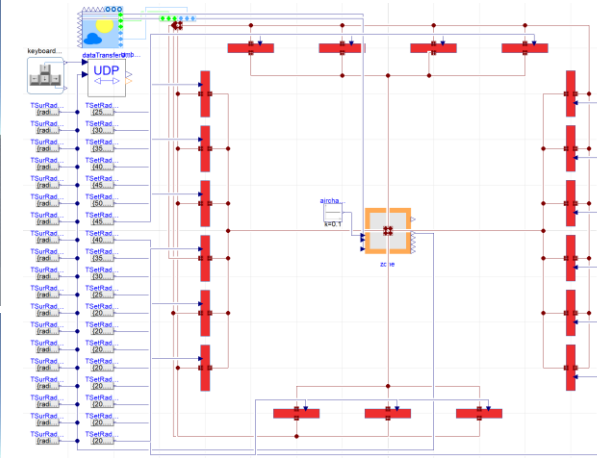
Long-wave radiation exchange model based on new view factor function

3D Air flow model
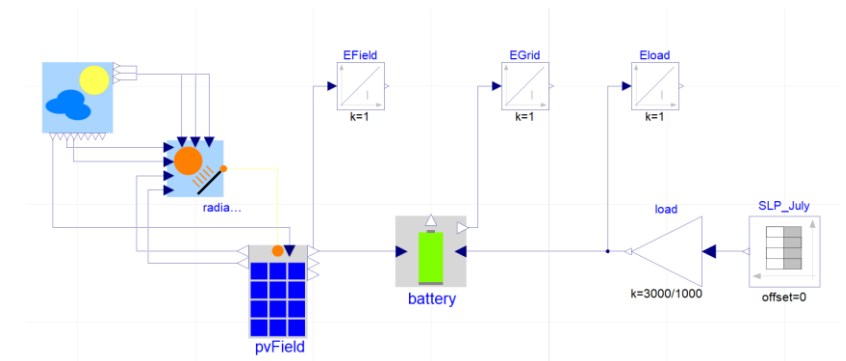
Photovoltaic and electric battery models

Universität der Künste Berlin

VPT · IBPSA Project 1

Interactive Virtual Reality environment for indoor climate simulation

Objectives

- Immersive user integration in an interactive VR simulation environment
- Physical feedback for users of simulated model states
- Real-time coupling of Modelica models with Unity and openHAB

State of development

- First prototype with hardware and software integration is working
  → see explanation
- Model of a cylinder with radiation tiles
- Room model with geometrical view factors

Next steps

- Detailed room model with geometrical view factors and discretized air volume model
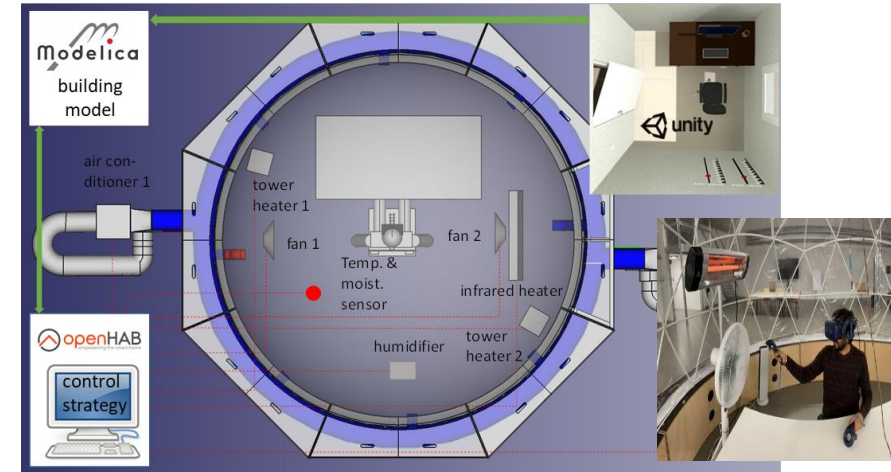
Test bed of a VR simulation environment with physical feedback for the user

Cylinder with radiation tiles

Universität der Künste Berlin

VPT   IBPSA Project 1
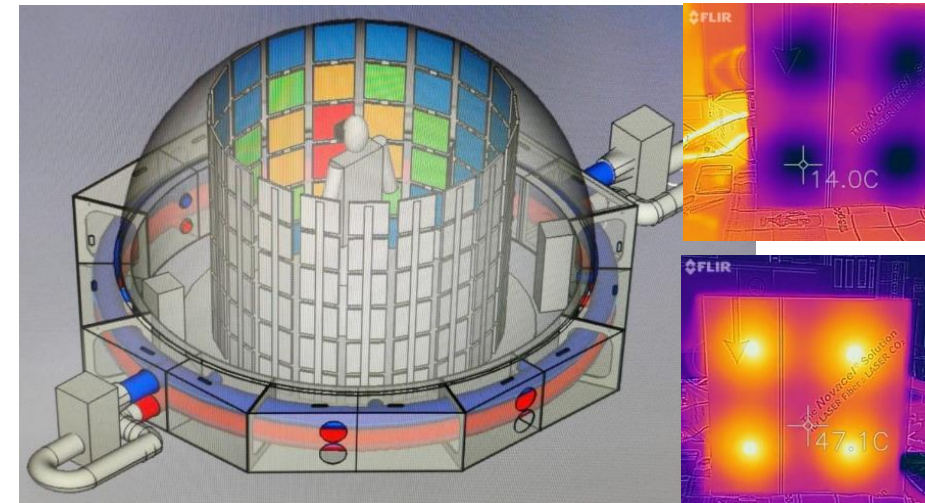
Contact

Prof. Dr.-Ing. Christoph Nytsch-Geusen (nytsch@udk-berlin.de)

Berlin University of the Arts (UdK Berlin)

Institute for Architecture and Urban Planning

Department Building Physics and Building Technology

Einsteinufer 43-53, 10587 Berlin, Germany

Web: http://www.arch.udk-berlin.de/vpt

Universität der Künste Berlin

VPT IBPSA Project 1