

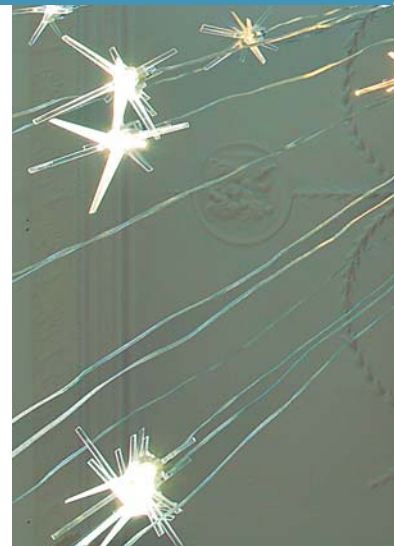
LightHive exhibition in London uses Beckhoff I/O system  
and EnOcean radio technology

## Light show or light reality?

LightHive is a unique light show that mimics all movements and processes within a building through light. It is a gigantic 'lighthouse', signaling the activity of the Architectural Association building in Bedford square, London through its windows to the world beyond. LightHive was realized by architect Alex Haw using EnOcean radio technology and control technology from Beckhoff.



The geometry of the original surroundings is represented by 2,054 unique shapes that are customized, scripted and then laser-cut especially for the show.



A Georgian building from the 1800s presented a challenge with numerous offices, workshops, studios and meeting places to be connected wirelessly – all with no maintenance, at low cost, and with a requirement where the installation and breakdown of the exhibition did not disrupt daily operations within the building. The entire Architectural Association building was modeled on a scale of 1:6 to fit into the exhibition space. The building was represented in space purely by the actual light sources present in the building itself.

Alex Haw decided to use EnOcean radio technology for realizing his light show. Each of the 160 cellular zones of the building is laced with a range of EnOcean sensors including door contacts, seat sensors, repeaters, pushbuttons, infrared detectors and IP cameras that monitor all movements inside the building.

The EnOcean sensors feed information to nodal receivers (KL6023 wireless adapters) located around the building, and then into a Beckhoff BC9000 Ethernet controller. The wireless adapters receive the signals from the EnOcean sensors and convert them to an RS485 signal that is directly processed further by KL6021-0023 serial Bus Terminals. The system is programmed via TwinCAT PLC. Communication with the Digital Multiplex (DMX) control system was also implemented with the aid of TwinCAT. DMX is a digital control protocol that is used in stage and show applications for controlling dimmers, intelligent spotlights and effect devices and is based on RS485.



The LightHive exhibition is controlled by a BC9000 Bus Terminal Controller. The EnOcean signals are processed via a KL6023 EnOcean adapter and KL6021-0023 serial Bus Terminals. TwinCAT PLC was used for programming.



The Beckhoff control system enables transfer of the EnOcean signals to the DMX controller, which in turn activates the LEDs representing the movement patterns within the building in the exhibition. "The decision to use the control solution from Beckhoff was primarily based on the complete openness and simple programming of the system. Of special significance was the integration of EnOcean technology into the Beckhoff system", said Stephen Hayes, managing director of Hayes Control Systems, Beckhoff partner in Great Britain.

The final result is impressive: The activity in any room of the building activates one, or a cluster, of the 1,027 previously mentioned LEDs, bringing light to the room in a dance of motion, mirroring the patterns of human movement. The space operates like a 3-D X-ray of the building's activity – a kind of constantly updating surround-light CCTV, a spatial model of the entire Architectural Association's activities fluctuating over the course of hours, days and weeks.

→ Hayes Control Systems Ltd [www.hayescontrols.co.uk](http://www.hayescontrols.co.uk)