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## Model of Production Environment Controlled With Intelligent Systems

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### Abstract

For safe, reliable and convenient facility operation, it is eligible to install a control system with ambient intelligence. Building automation with its functions as keeping building climate within a specified range, lighting rooms based on an occupancy schedule, monitoring performance and device failures in all systems, providing malfunction alarms (usually via email and/or sms text notifications) to building engineering/maintenance staff, has become more affordable and simple through smartphone, tablet connectivity, evolved touch control panels. Building automation systems reduce operation energy and maintenance costs comparing to non-controlled building systems; advantage embodies pre-emptive maintenance and quick detection of breakdowns. The paper deals with new features in designing ambient intelligence in monitoring and control processes for tangible manufacturing operations.

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*Keywords:* building automation; model of production environment; intelligent system

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### 1. Intelligent building systems

A continual process of managed change, constant adaptation of internal practices and external relationships to new customer opportunities, that is according to Goldman [1] expression of agility. Evolution results in a phenomenon that markets of all kinds are fragmenting at an accelerating pace. Advances in automation, technology

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cannot be neglected; in fact company in the struggle of competitive advantage shall adopt the latest progress and install it in the everyday operation, and such a way increasing its position in the global market. Automation systems and electronics have evolved into a broad range of lightweight, wireless personal communication devices with constantly expanding computing and information exchange and display capabilities, ranging from uploading and downloading data remotely to and from on-line data services over the world.

Building Automation System (BAS) is a computer-based control system installed in buildings that controls and monitors the building's mechanical and electrical equipment such as heating, ventilation, air-conditioning (HVAC), lighting and illumination, power systems, fire systems, electric power and control systems, observation and magnetic card access and security systems, lift, escalator and elevator control, entertainment and building management control. According to Kurt Kartnatz [6], president of Environmental Systems Design, Inc., *“An intelligent building will take all of the information from its smart building components and analyze, package, and distribute the data automatically with the goal of continuous and automatic improvement. This will make the building an adaptive, “living” organism, able to react and change gears automatically as needed without human intervention. This will promote content-driven behavioral change by optimizing the building in an integrated way”*.

A BAS consists of software and hardware; the software program, usually configured in a hierarchical manner, can be proprietary, using such protocols as C-bus, Profibus, ModBus, LonTalk, OPC, X10, UPB, Z-wave, Insteon and so on. Vendors are also producing BASs that integrate using Internet protocols and open standards such as DeviceNet, SOAP, XML, BACnet, DNP, NTP, LonWorks and Modbus.

BAS systems provide efficient control of internal comfort conditions, individual room control, increased staff productivity, effective use of energy, improved building reliability and life, quick and effective responses to HVAC problems, and save time and money. The systems also provide information on problems in the building, allow for computerized maintenance scheduling, are easy and effective for employees to use, and easily detect problems. [4]

New trends in the world market are focused on greening of existing buildings and solar power use, instead of new buildings. It is expected that BAS market will reach \$ 50 billion in year 2018. The highest growth is reflected in the components for HVAC, comprising 30% of the total market, and security and access controls, at between 40%-50% of the market to 2018, assumes D. Schilling. [4]

#### Nomenclature

BAS	building automation system
SME	Small Medium Enterprise
PC	personal computer
LonWorks	Local Operation Network
HVAC	heating, ventilation, air-conditioning
PLC	programmable logic controller
IOS	iPhone Operation System
HTTPS	Hypertext Transfer Protocol Secure
SOAP	Simple Object Access Protocol
REST	representational state transfer
MAC	Media Access Control
PWM	Pulse-width modulation
V/ DC	Voltage Converter
CAN	Controller Area Network
KNX	standardized, OSI-based network communications protocol for intelligent building
DALI	Digital Addressable Lighting Interface
X10	protocol for communication among electronic devices

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