

ULTIMATE GUIDE TO BUILDING AUTOMATION SYSTEM (BAS)

Building Automation is monitoring and controlling a building's systems including: mechanical, security, fire and flood safety, lighting, heating, ventilation, and air conditioning.

SUCH SYSTEMS CAN:



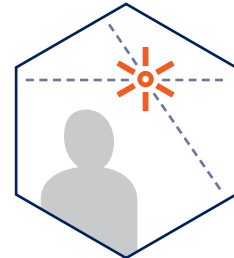
keep building climates within a specified range



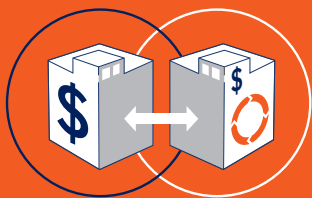
light rooms according to an occupancy schedule



monitor energy performance and device failures in all systems



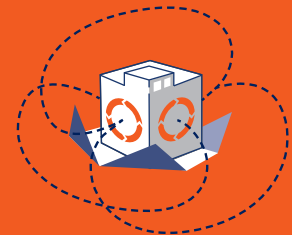
alarm facility managers in the event of a malfunction



A building with a building automation system (BAS) has up to 30% lower energy and maintenance costs.



The many benefits of a BAS may not be immediately clear until you understand the mechanisms driving these systems.



This guide explains BAS and includes links to topics that may be relevant to your own research.



WHAT IS BUILDING AUTOMATION?



A centralized, networked system of hardware and software that monitors and controls a building's facility systems (electricity, lighting, plumbing, HVAC, water supply, etc.).



When facilities are monitored and controlled in a seamless fashion, tenants enjoy a more comfortable working environment and facility management benefits from sustainable practices and reduced energy costs.

THE FOUR CORE FUNCTIONS OF A BUILDING AUTOMATION SYSTEM:



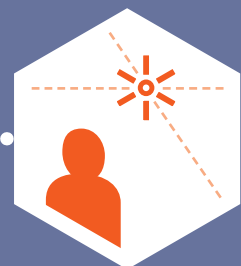
TO CONTROL
THE BUILDING'S
ENVIRONMENT



TO OPERATE
SYSTEMS ACCORDING
TO OCCUPANCY AND
ENERGY DEMAND



TO MONITOR AND
CORRECT SYSTEM
PERFORMANCE



TO ALERT OR
SOUND ALARMS
WHEN NEEDED



WHAT IS MEANT BY “CONTROLLED”?



The key component in a BAS is the controller—a small, specialized computer with various applications.



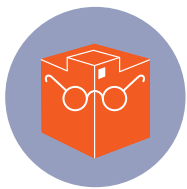
Rewind—the old way of control:

Imagine a rugged, manual wood-burning stove. It is impossible to precisely regulate temperature or smoke output by heating a building with pure woodfire.



Fast-forward 150 years:

Intelligent controllers regulate heating systems to set the temperature of a specific room to a precise degree; then automatically cool overnight.



Today's technology allows a building to learn from itself. A modern BAS monitors facility systems, optimizes for maximum efficiency, remembers who enters which rooms at what times, and adjusts to conserve energy. That's why automated buildings are called “smart buildings.”

And they're getting smarter all the time...

Controllers regulate the performance of various facilities within the building. Traditionally, this includes the following:



Electrical systems



Heating, ventilation and air-conditioning systems



Lighting systems



Mechanical systems



Plumbing systems



Security Systems



Surveillance Systems



THE EVOLUTION OF SMART BUILDINGS

[The origin of smart buildings points to the creation of the incubator thermostat that keeps chicken eggs warm and allow them to hatch. —Kevin Callahan, writing for Automation.com]



Building automation has advanced just within our lifetime at a baffling rate.

1950: Automated buildings rely on pneumatic controls with compressed air.

1980s: Microprocessors move the industry from compressed air to analog then digital controls (nothing short of a revolution).

1990s: Open protocols allow controlled facilities to actually communicate with one another.

2000: Wireless technology allows components to communicate without cable attachments.



TERMS TO UNDERSTAND

BMS BCS

Building Management System and Building Control System: General terms for systems that control a building's facilities (not necessarily automation systems).

Building automation can be like a big game of alphabet soup with acronyms everywhere. Lynxspring's VP of Marketing Marc Petock pointed out on LinkedIn that some people treat many of these terms as interchangeable.

LET'S CLARIFY THIS ISSUE NOW:

DDC

Direct Digital Control: Innovation in the '80s brought small, affordable microprocessors enabling a digital system's components to communicate.

BAS

Building Automation System: A subset that can be a part of the larger BMS or BCS. Building management and building automation have so thoroughly overlapped that the terms are used interchangeably.

EMS EMCS

Energy Management System and Energy Management Control System: Energy consumption, metering, etc. There's enough overlap between what a BAS and an EMS do that we consider these terms synonymous.

API

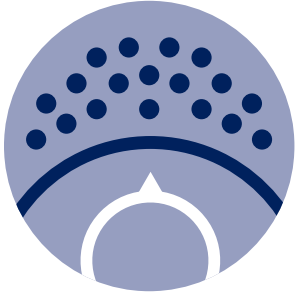
Application Programming Interface: The code that defines how two or more pieces of software communicate with one another.

With technology evolving so quickly and different countries using different terms, but still having to communicate with one another, the terminology is bound to be in a state of flux.



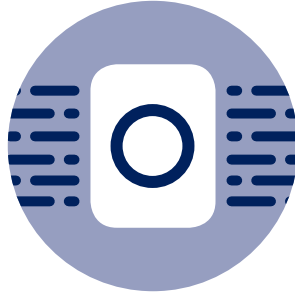
HOW DO BUILDING AUTOMATION SYSTEMS WORK?

BASIC BAS HAS FIVE ESSENTIAL COMPONENTS:



SENSORS

Devices that measure values such as CO2 output, temperature, humidity, daylight or room occupancy.



CONTROLLERS

The brains of the systems that take data from sensors and decide how the system will respond.



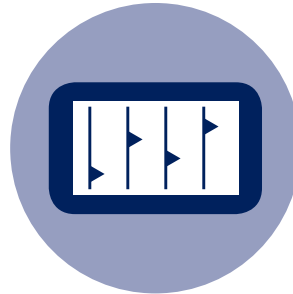
OUTPUT DEVICES

These carry out the commands from the controller. Examples: relays and actuators.



COMMUNICATIONS PROTOCOLS

The language spoken among the components of the BAS.
Example: BACnet.



DASHBOARD OR USER INTERFACE

Screens or interfaces humans use to interact with the BAS where building data are reported.

Most BAS activity takes place out of sight with controllers and output devices hidden from view, just as wiring and plumbing.

WHAT BAS CAN DO



Sets up lighting and HVAC systems to operate on an intelligent/efficient schedule.



Tells when HVAC is running both heating and cooling, to reduce utility costs.



Identifies who and when someone is entering and leaving a building.



Coordinates components and facilities to work together for greater efficiency.



Senses emergencies and turns off facilities that could endanger occupants.



Alerts cameras, records activity, sends alarm and data to a security team.



Optimizes incoming air flow to regulate air quality, temperature and comfort.



Detects problems (elevator stuck with people inside) and sends an alert.





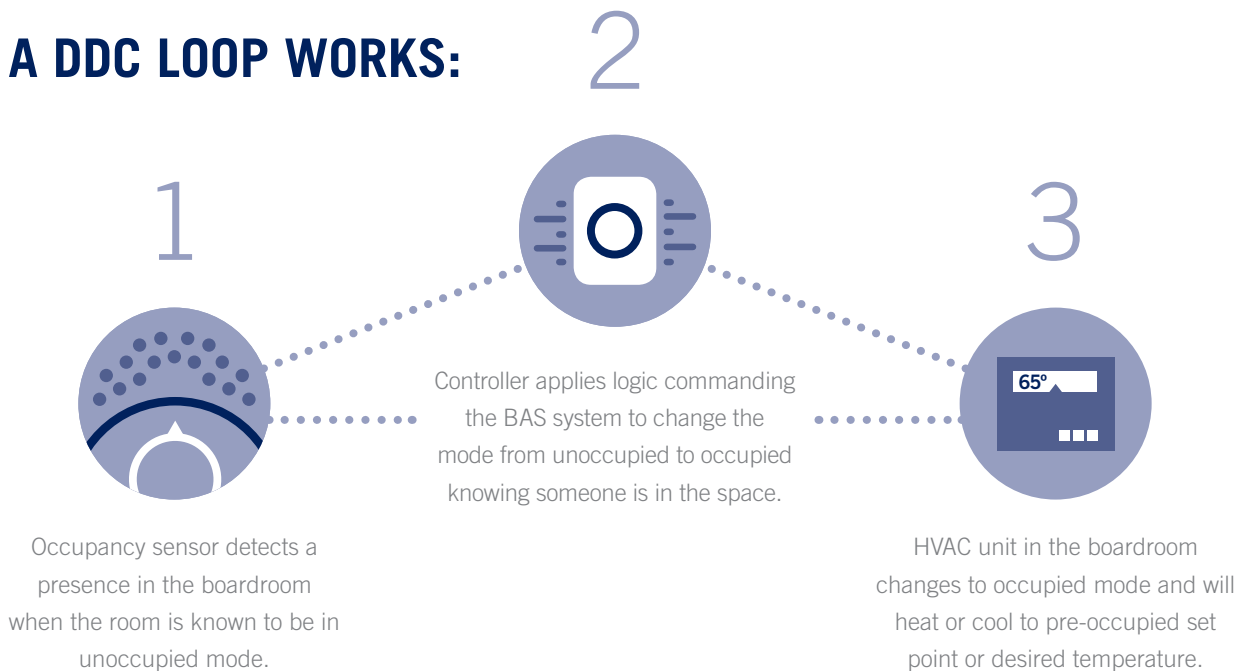
THE ROLE OF CONTROLLERS



The brains of the BAS, digital controllers receive input data, apply logic (an algorithm, just as Google does with search data) to that information, then send out a command based on what information was processed.

This is best illustrated through the following basic three-part DDC loop...

HOW A DDC LOOP WORKS:



**Note: Actual algorithm is far more complex than depicted in this example.*



WHY ARE BUILDING AUTOMATION SYSTEMS USEFUL?

COMFORT AND PRODUCTIVITY



Smarter control of the building's environment keep occupants happier. It also reduces complaints and resolution time.

SAVING MONEY



A BAS can save a building owner a significant amount of money on utility bills, since a more energy-efficient building simply costs less to run.

ENVIRONMENTALLY FRIENDLY



BAS efficiencies equate to a reduced environmental impact which means better air quality for everyone.

Let us tell you more about Building Automation Systems can how they be useful to you. Visit us at controlyourbuilding.com or call us today at **616-247-9422**



**Informational sources available upon request.*