# "Intelligent Building" safety using the microprocessor UPS emergency power system

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***Abstract*** **This paper presents Teletask system composed of components for IB safety laboratory. The study also shows types of grid disturbances in the city and their impact on the work of energy devices in intelligent buildings. Nine basic types of interference encountered in the grid are described. It also provides a block diagram of the UPS and performs functions that are presented.**

***Keywords*** **Intelligent Building, Teletask system, UPS, grid disturbances.**

## I. Introduction

The system is a complete Teletask system bus made up: of the power and data bus, allowing all elements to communicate with the installation. All system components are connected parallelly to energy bus and data bus. Each element of the intelligent network (eg.: lamp, solenoid valve, control panel) is assigned to a unique address, allowing easy localization. It's powerful and free, because light switch does not need to be in the same site of the building as lighting, which is controlled. The Teletask system does not only provide comfort, safety and prestige, it also protects the environment (studies show that home automation can save 15-20% of heating costs and 10-15% of electricity cost).

## II. Key safety systems in "Intelligent Buildings"

### A. *Building Security Control System consists of:*

- Fire alarm system – SSP
- Smoke exhaust systems
- Fire fighting systems
- The burglary and robbery system - SSWN
- The access control system - SKD
- CCTV System - STVD
- Public address system evacuation – PAS

### B. *There are three basic management systems, automatic control systems in an intelligent building:*

1) BMS (Building Management System) - a system that manages all the technical functions of the building, such as the power system and control of electrical energy and comfort control subsystem.
2) SMS (Security Management System) - a system that manages all security systems of the building.
3) BMCS (Building Management and Control System) - a global management and control in the building, managing both BMS and SMS.

The task of BMCS system is to collect and analyze current information from the entire facility or group of objects and to enable communication and data exchange between all cooperating systems and subsystems.

In the global system, BMCS can distinguish four levels of management: the level of administration, the level of information management, automation and execution level[1].

## III. "Intelligent Building" safety laboratory

Components of the IB safety laboratory are presented in the table I below.

TABLE I
COMPONENTS OF THE IB SAFETY LABORATORY[2]

| | |
|---|---|
| 1 | Central Unit + Micros with 24 relays available 8 outputs 0-10V dimmable, 32 digital inputs, 2 analog inputs, USB port and RJ45. |
| 2 | Access control: proximity pendants + 2 proximity reader. |
| 3 | Water Sensor - protecting your home from flooding in case of leakage. We will control the water solenoid valve (without reservoir). |
| 4 | Electrical sockets - control power supply to the socket at using relays. |
| 5 | Alarm-keyboard, switchboard panel, sounder module extensions. Along with the binary inputs of the system Teletask will facilitate the integration of the security system and smart home system. |
| 6 | We will control the switches using classical and keychains proximity (access control). |
| 7 | Technical modules will be placed in a cupboard along with security. |
| 8 | Components: halogens, LEDs, switches will be placed on a thick PVC plate with saucers. Additionally, the board can apply the tape LED and LED lighting control. |

This position will be created for the use of the system smart homes to improve safety at home. The following elements will be used to contribute to this and features presented below will be taken into account.

- Function slots controlled, the current to flow control through the relay sockets;
- Water leakage detection;
- Integration with Satel alarm system;
- The access control function through the use of the reader proximity and keychains.

Technical elements: security, the CPU modules, extensions will be installed in a small cabinet, while elements of the final type of lights, LEDs, switches, or depending on the position of the touch panel, sensors, motors, etc. will be mounted on PVC plate with dimensions of 90x50 cm[2].

## IV. "INTELLIGENT BUILDING" GRID DISTURBANCES

The grid formed short-term disruption due to sudden off large loads during peak hours, short circuits or overloads in the system of exemptions for high-voltage lines. Therefore, in order to guarantee the flawless operation of the equipment and information systems in the event of disturbance in the flow of electricity between the public electricity network and the powered devices emergency systems for AC power are installed. The following systems are used: static or dynamic. The static system is a UPS (Uninterruptible Power Supply) that can operate in any mode: online, off-line and line-interactive. The currently used dynamic systems use power generators.

Long-term or short power outage to the power grid are the main threat to the load in intelligent buildings. There are also other serious disturbances which may be caused by lightning, or operation of power equipment in the municipal or state.

There are nine basic types of interference encountered in the grid:

1) Failure of power - zero-voltage condition that lasts longer than 0.01 s.
2) Momentary voltage fluctuations in the amplitude - states falling voltage or increase above 110% of its effective value.
3) Shock voltage - high power short pulses with the duration of less than 0.01 s. but with amplitudes exceeding several times the amplitude of voltage in normal conditions.
4) Long-term reduction in RMS voltage – RMS voltage reduction below 95% rms, while more than half the supply voltage, i.e. for times longer than 0.01 s.
5) Noise - random voltage fluctuations superimposed on the basic course.
6) Pulse noise - are characterized by short-term displacement voltage change relative to the value set.
7) Overvoltages - sudden surges caused primarily by the disconnection of inductive loads.
8) Harmonic distortion - additional waveforms (harmonics) that are superimposed on the fundamental harmonic voltage. The frequencies of these additional runs are equal to multiples of the fundamental frequency of 50 Hz. Higher harmonics are generated by equipment operating in the electricity grid. Main voltage with higher harmonics can reach to the receiver from hundreds of kilometers.
9) Frequency voltage fluctuations in power – the power grid are a rarity. These conditions appear on emergency power systems that use direct power generators.

These disturbances execute a particularly strong impact on the sensitive digital and electronic devices, causing them to shut down or distort data in computer systems and networks. To guard against interference mentioned, we use UPS, which are protective buffer between the fragile power grid and sensitive devices. UPS technical solutions allow selective protection from interference specified. UPS meets in the protected power system a dual role, being a source of electricity during a power failure and providing protection against interference of energy received from the network[1].

Figure 1 shows the general block diagram of the UPS construction.

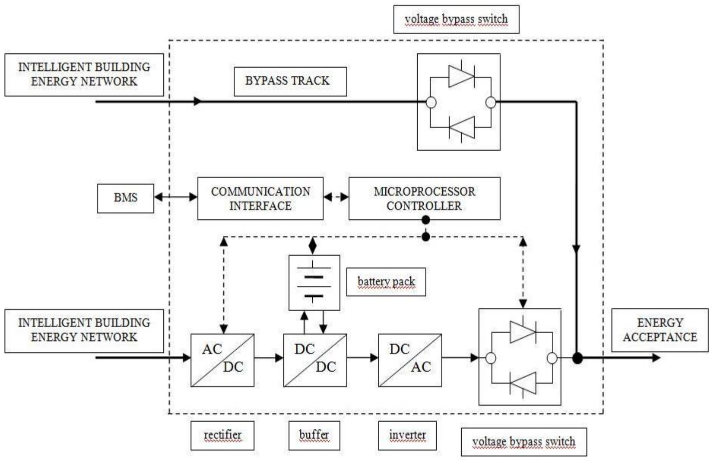


Fig. 1. The UPS block diagram[1].

## V. CONCLUSION

1) The microprocessor UPS emergency power system ensures continuity of supply in intelligent buildings.
2) Time power outage power load can range from a few to several seconds.
3) UPS performs two tasks: it ensures to a connected energy receivers the main voltage with the required parameters during normal operation and protects the power supply when the main voltage is not or is of poor quality and does not guarantee correct operation of the connected devices.
4) The networks should be used in parallel operation of UPS because of the potential damage to a single UPS.
5) In extended networks, UPS should be used to monitor their performance using the capabilities of the BMS.

## VI. ACKNOWLEDGEMENTS

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