

# Milan Bernat

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## Creating Projects (Highlighting the Practical Application of the Subject Matter) for Teaching Technical Subjects

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Artykuł został opracowany do udostępnienia w internecie przez Muzeum Historii Polski w ramach prac podejmowanych na rzecz zapewnienia otwartego, powszechnego i trwałego dostępu do polskiego dorobku naukowego i kulturalnego. Artykuł jest umieszczony w kolekcji cyfrowej [bazhum.muzhp.pl](http://bazhum.muzhp.pl), gromadzącej zawartość polskich czasopism humanistycznych i społecznych.

Tekst jest udostępniony do wykorzystania w ramach dozwolonego użytku.

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## Creating Projects (Highlighting the Practical Application of the Subject Matter) for Teaching Technical Subjects

### Introduction

The contribution is a selected example of instruction sheets for implementation of visualization of electro-magnetic processes.

According to our experience in teaching at various educational levels we suggest a hypothesis that in the youngest category of learners it is best to explain the theory of electrical (and electronic) circuits in a simplified manner, i.e. according to didactic procedures of acquiring knowledge, which, in the first phase of their application, are based on known and specific phenomena that gradually transfer learning to abstract and generalizing level, thus, explaining unknown, not understood yet, through known, already understood.

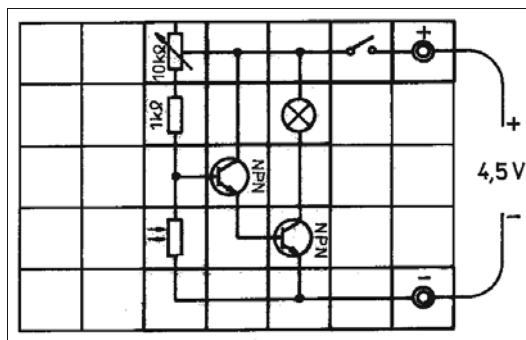
### 1. Title: SEM circuit of automatic door opener

*Thematic group of electro-physical models: The models for teaching basics of transistor technology I – (transistor in the switching mode).*

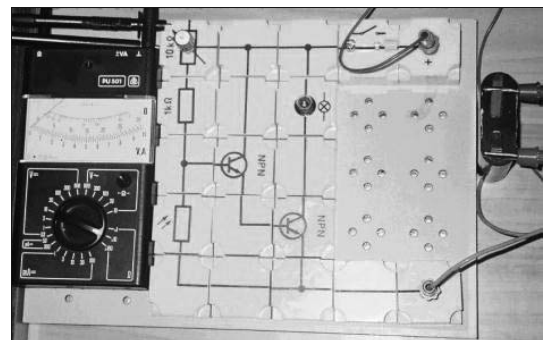
*Task: Implement visualization of electro-magnetic processes based on SEM according to the following instructions:*

**A. Traditional visualization methods and techniques of visualization processes running in electro-physical systems (characteristic for the traditional educational system), and at the following visualization levels:**

**A1. Visualization of processes running in electro-physical systems through the connection scheme including description (manual for the construction kit):**



**Fig. 1. Electrical connection circuit scheme of automatic door opener**

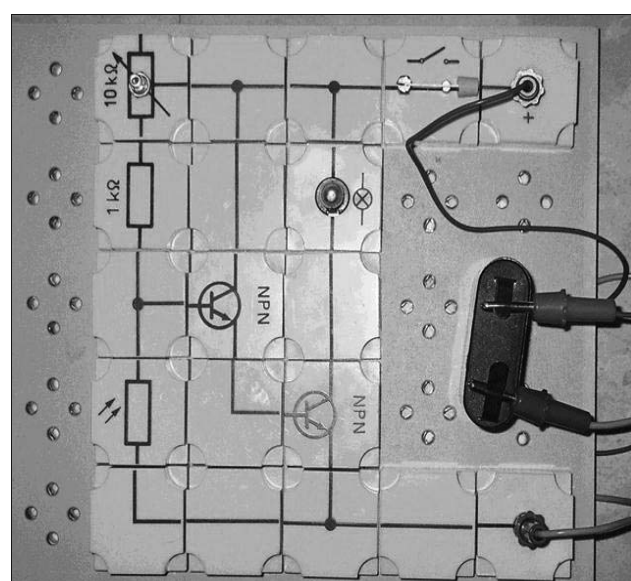
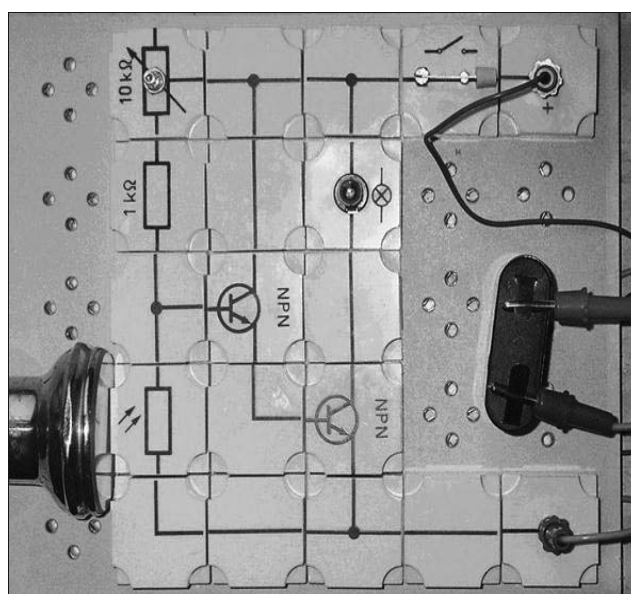


**Fig. 2. Electro-physical model of automatic door opener**

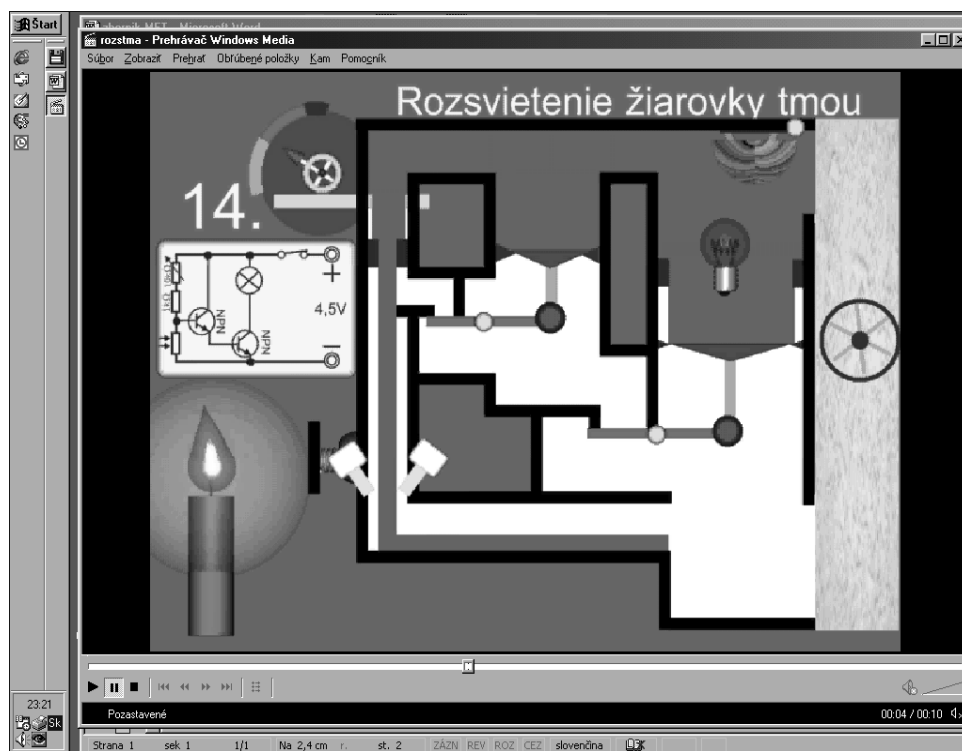
**A2.** Visualization of dynamics of the course of electro-magnetic processes running in a real model of electro-physical system through electro-physical measuring (based on the construction kit Elektronika):

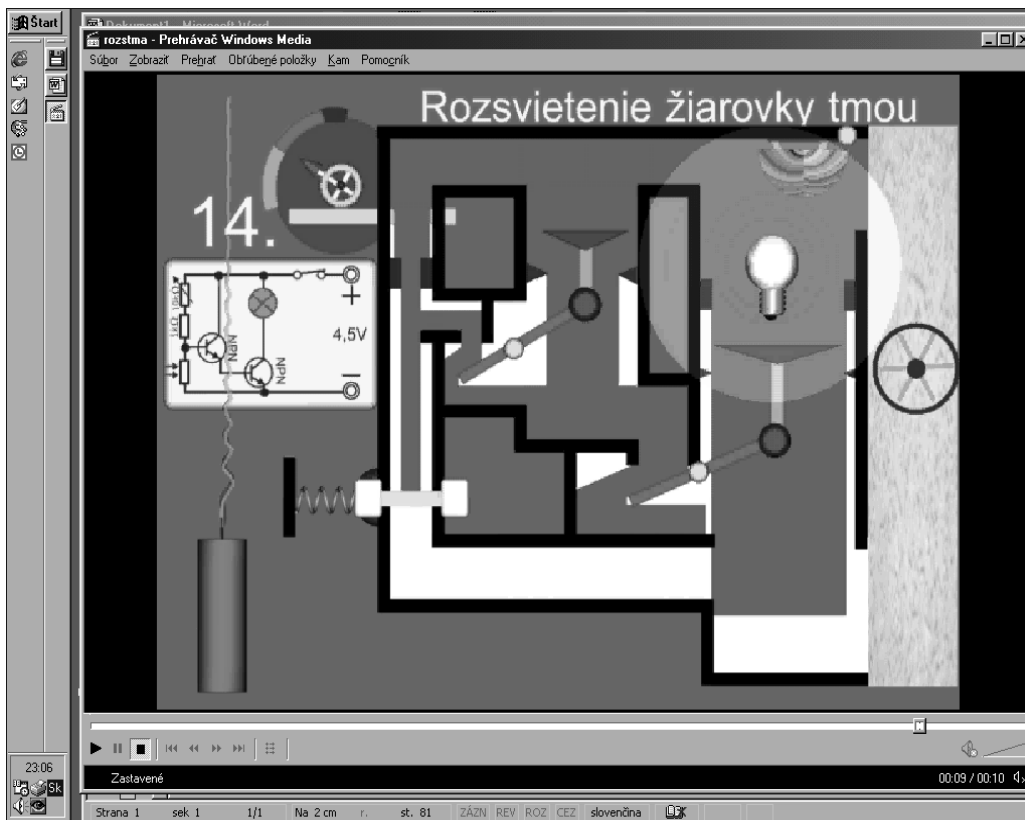
**B. Innovative experimental visualization methods and techniques** (characteristic for experimental system of NIESVE teaching) - symbiosis of visualization on the real model (traditional visualization methods and techniques) and on the computer model of the same electro-physical system (created on the basis of interactive graphical animation and simulation computer models and, furthermore, supported by analogy between “electro-physics and hydro-physics”. See details (p. 37) From the animation process – PR1).

**B1.** Visualization on the real physical model



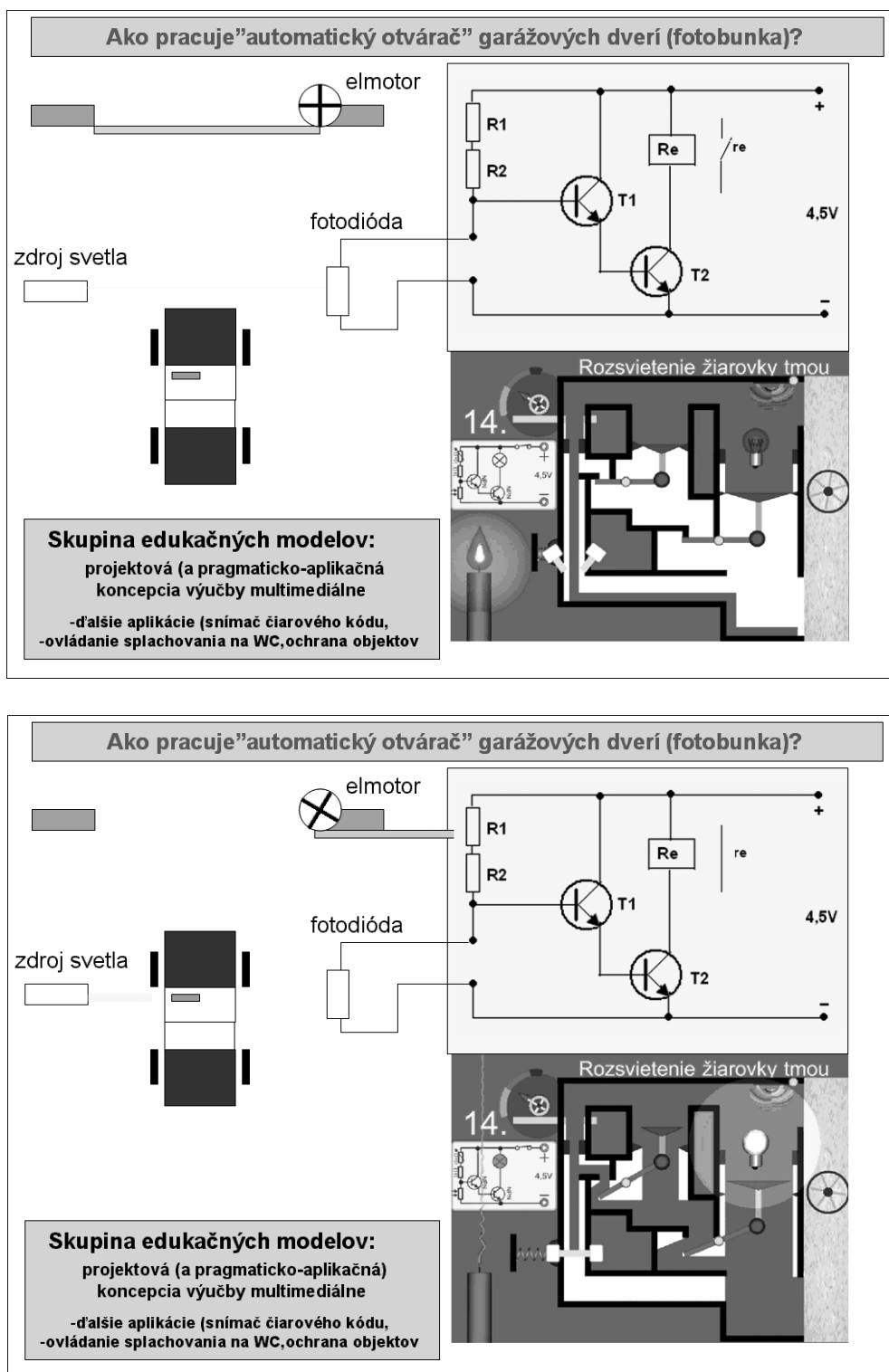
## B2. Visualization on the virtual computer educational model





**Fig. 3. Educational computer model of the automatic door opener circuit (from the process of “slowed” animation)**

**B3.** Visualization on the pragmatic application model using the project conception of teaching



**Fig. 4. Pragmatic application multimedia model (from the process of "slowed" animation)**

## **Literatúra**

- Bernát M. (2000): *Dynamics of Space Charges in Highly Non-homogeneous DC and AC Fields*, PhD. thesis, Košice.
- Bernát M. (2005): *Visualization of Some Electro-Physical Processes through Computer for Didactic Purposes and its Application in Teaching Electrotechnical Subjects*. PhD. thesis, Nitra.
- Melezinek A. (1986): *Ingenieurpädagogik: Praxis der Vermittlung technische Wissens techn. Wissens*, Wien–New York 1986.

## **Abstract**

The contribution is a selected example of instruction sheets for implementation of visualization of electro-magnetic processes

**Keywords:** creating projects, computer model, teaching technical subjects.