APPLICATION OF REMOTE EXPERIMENTS IN EDUCATION

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CONTENT OF PRESENTATION

- Selected didactic aspects of the use of remote experiments in learning process.
- Selected technical aspects of construction remote experiments.
- Our experience with design, construction and using our own remote experiment.

SELECTED DIDACTIC ASPECTS OF THE USE OF REMOTE (REAL) EXPERIMENTS IN LEARNING PROCESS.

Mgr. Peter Kuna, PhD.

When you were a student, did you like the experiments in learning process?

And why ?

Experiments were:

- **something other than the normal lesson**
- **interesting**
- **not just the boring theory**
- **visual and easier to understand the curriculum of study**

… and etc.

Experiments are extremely important part of the educational process !

Because the experiments are “a window” to real life for students.

How many experiments did you prepare for your students in last year?

Reasons, why we did not prepare more experiments for our students.

- expensive equipment,
- lack of time to prepare,
- demotivating salary of teachers,
- dangerous for the health of students, (e.g. chemical experiments)
- … Etc.

Statistics of percentage

Approximately 40 % of my own experiments were not successful. (I didn't reach expected results)

What are the reasons?

REASONS

1. I am not very successful experimental scientist. ☺
2. Measurement error.
3. Repeating of experiment with another group of students influences the results of experiment.
4. External influences on process of experiment.

… etc

Experiment is very uncomfortable part of teaching process.

Because we never know, if the experiment is successful. !

Let us not forget, that experiment is “a window” to real life for our students.

Let me ask you, how many things in your life are the same than in your dreams?

Honest experiments with all danger for teachers are the best preparation for our students to real life.

The use of experiments in education requires teacher which is:

- personality in his field
- prepared to improvise
- depends on preparing his students for real life

This is difficult, but it is not mission impossible.

The use of remote experiments in education solves a lot of mentioned problems with real experiments.

- We don’t need a lot of time to prepare them.
(from the user's perspective, of course)
- Remote experiment is cheaper than real experiment.
- Students can use it at home.
- Remote experiment is safe to use by students.
- Remote experiment is safe to use by teachers.
(It doesn’t create various surprises for the teachers)

RE doesn’t create various surprises for the teachers

Selected technical aspects of construction RE.

Hardware and software of remote experiment must ensure that it will be use only in specified dimensions.

Remote experiments are, unlike the real experiments, very comfortable part of education.

Experiment is “a window” to real life for our students.

Hardware and software of remote experiment must ensure that it will be use only in specified dimensions.

To be or not to be?

Hamlet

To use the real experiments in education or not to use.

Peter Kuna

What is material, personal and financial coverage of our schools (in your country) at present?

After reflecting the situation in Slovak republic, my answer is …. (thrilling silence ☺)

YES

Let us not forget, that experiment is “a window” to real life for our students.

and remote experiments are not the best solution as a “window” to real life for our students. (from didactics perspective)

OUR EXPERIENCE WITH DESIGN, CONSTRUCTION AND USING OUR OWN REMOTE EXPERIMENT.

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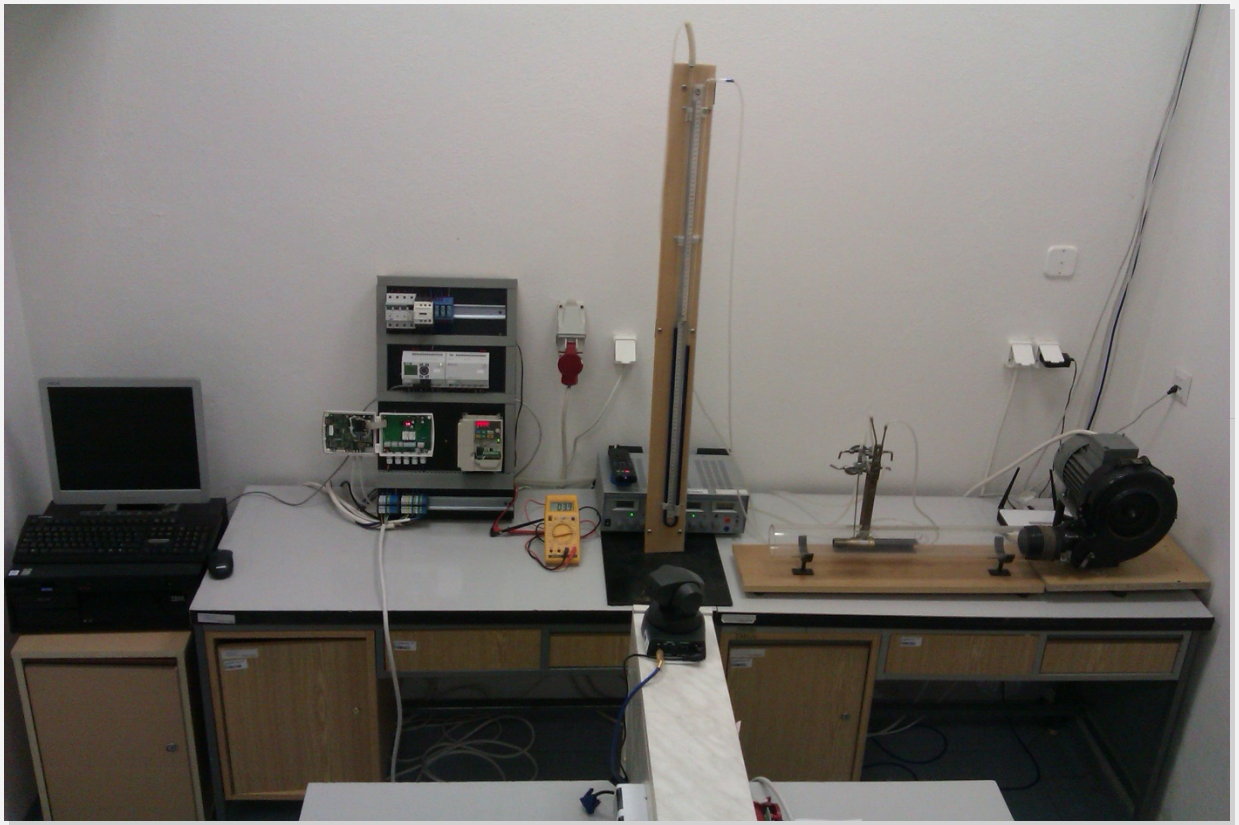
DESIGNED AND CONSTRUCTED THE REMOTE EXPERIMENT FOR TESTING OF THE BERNOULLI FORMULA

Mgr. Peter Kuna, PhD.



View of realized remote experiment

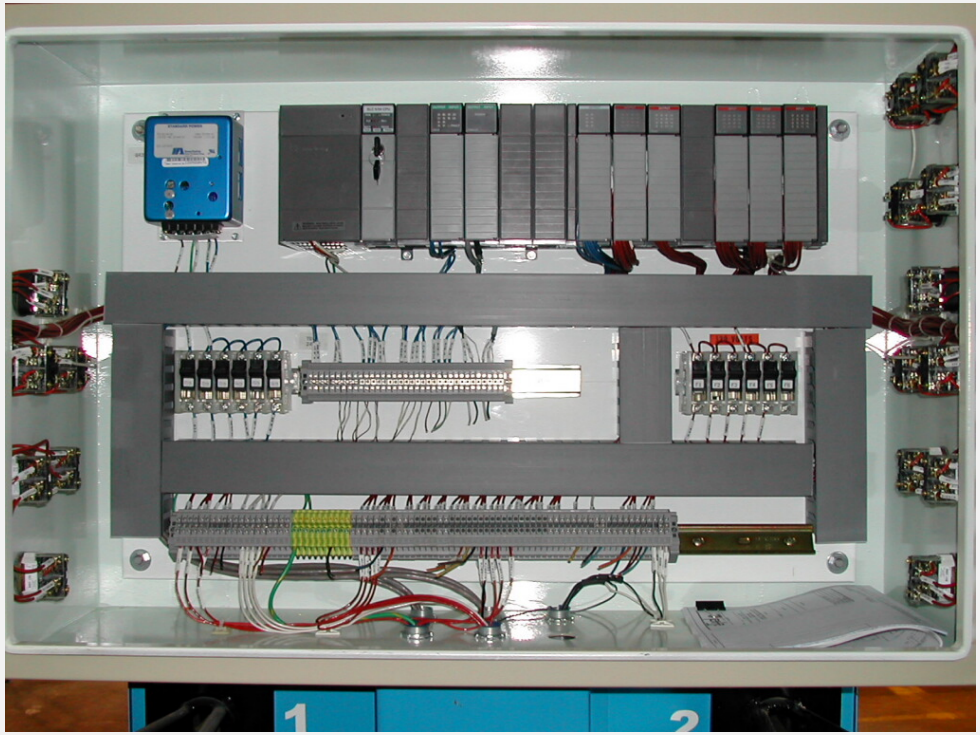
A few problems of design and construction of this RE.

1. Incompatible constructing frame with industrial measuring the flow rate of fluid.
2. Constructing frame, could not manage speed of three phases motor.
3. Construction frame, which was designed for use was inapplicable to our goals

Remote experiment is remote control industrial automatic system.

We can use a huge number of components developed for industrial automation

PLC – Programmable Logic Controller



PLC systems with sufficient requirements for remote experiment is very expensive.

Low cost PLC systems are not able to use in construction of remote experiments.

We have found the following solutions:

We prepared to use for RE constructing the low cost PLC system, only by our software upgrade.
(with nothing hardware parts)

Result

So far, the company in question materially supported our research approximately the amount of € 40,000

THIS RESULTS ARE RESULTS OF WORK OF OUR TEAM

BIG THANKS, THAT I AM ABLE TO WORK WITH SUCH EXPERTS AND AMAZING PEOPLE

Thank you for your attention