

# Teaching Photovoltaics for Children

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## Abstract

*In recent years, there has been little interest from students in technical fields and the industrial sector thus suffers from a significant shortage. This shows the importance of motivating future students to study technical disciplines from an early age. Within the CTU in Prague, a very successful event is organized every year - the Children's University, where children spend a week at the university and get acquainted with the world of technology. One of the fields they come into contact with is photovoltaics. The form of teaching for children is described in the article.*

**Keywords:** photovoltaics teaching; children

## INTRODUCTION

Although it may seem that it may be early to educate students from primary school or kindergarten, it is precisely the primary school from which children go to fields according to their preferences. According to [1], the main motivator for choosing a future career is the family: *"Parents communicate to children their expectations and ideas about their professional future. Children learn from their parents' attitudes, behavior at work and how they talk about work. Career choice is then further significantly influenced by the socio-economic status of the family, its cultural capital, the profession pursued and the educational attainment of the parents."*

Therefore, it is very important to address the parents and children from early age to show them possibilities. As the university is well aware of that, it cooperates with kindergartens and basic schools on special events for them.

As part of pre-school education, the CTU operates its own kindergarten, which is then followed by a primary school, where children are in contact with technology from the beginning. For other children, CTU organizes a suburban camp called "Children's University", which is visited by about 150 children every year.

In the field of photovoltaics, other cooperation runs with Czech Solar Association, which organizes events focused on connection of photovoltaics with teaching physics on basic schools and other events. As an example, there were a few workshops in cooperation with National Technical Museum where basic principles of photovoltaics were

introduced to children. Similar programmes are organized by other CTU's employees in other technical sectors.

## CHILDREN'S UNIVERSITY & PHOTOVOLTAICS

This year, a photovoltaic group is also involved in the Children's University.

There are several issues to be faced when teaching young children:

- lack of knowledge
- the short time the child stays
- a short interval during which the child is educated in the field
- the need to capture and preserve in memories

Although the last point is well covered by the University in the form of matriculation and graduation ceremony (every child gets a graduate diploma), other points must be solved within the course.

In the field of photovoltaics, we decided to make a workshop, where every child can produce its own solar lamp. Children will get acquainted with the basic functions of photovoltaics and take home something they can be rightfully proud of. Since the teaching takes place as a production, there is no need to worry about lack of attention, because the child is automatically focused on doing his job to the best of his ability.

## PV LAMP DESCRIPTION

To produce solar lamp, standard circuit diagram utilizing commercially available circuit QX5252 is used [2]:

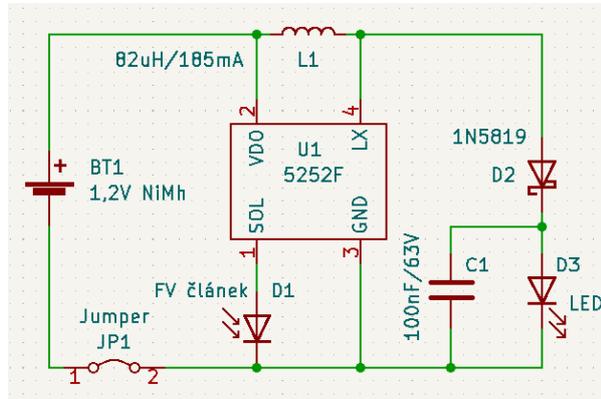


Fig. 1: Solar lamp circuit diagram

### List of Components

Component	Value
PV cell (sub-module)	2V, min. 150 mA @STC
Chip	QX5252
Secondary cell (battery)	NiMH/NiCd, min. capacity of 600 mAh
inductance	According to LED colour, we used 82 $\mu$ H
LED	High luminous white LED, bigger jacket, sufficient radiation angle, we used 10mm white LED with 100° angle and approx. 2000 mcd luminosity
Rectifier diode	e.g. 1N5819
Capacitor	Ceramic, 100 nF/63V (or 50V)
Single row PIN Header	V/T type, 2 used pins, 2.54 mm distance
Jumper as a switch	2pin switch

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Fig. 2: Prototype construction

The prototype (see Fig. 2) with a standard layout was tested by high school students. According experiences with these students, the design will be adapted for children:

- longer distances between component terminals,
- suitably bent component terminals,
- easy handling,
- sufficient time for production.

### CONCLUSION

This year the prototype of solar lamp for students was tested by high school students. In next month, children will produce same lamp with adjusted design.

Thanks to a useful product, the child sees the result of his work every day and will think about photovoltaics long after graduating from university which may help to motivate it to technical studies in the future.

### REFERENCES

- [1] HLAĐO, P. *Svět práce a volba povolání: studijní text pro učitele*, Brno: Masarykova univerzita, 2008.
- [2] <http://jirky.webz.cz/index.php?page=led-solarni-svetylko>