UNIVERSAL PROGRAMMABLE LOGIC

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ABSTRACT
This paper presents an overview of possible new concept for modern teaching tool, Universal Programmable Logic Controller (UPLC). UPLC with the PM module and robo-platform represents an excellent experimental basis in the study of robotics. The proposed solutions are based on two years work and research.
Keywords: programmable controller, robotic platform

1. INTRODUCTION

Universal design programmable logic controller was a big challenge for our team. The challenge was even greater when we decided that the cost of such devices is below the price of competing products. We have opted for a version that uses infrared communication system with robotized platform. For the purposes of this paper, we designed an additional receiver module (PM), which was developed for the autonomous individual work robotized platform [1], [2]. Entry module was developed as a triangle function in terms of communication (Figure 1).
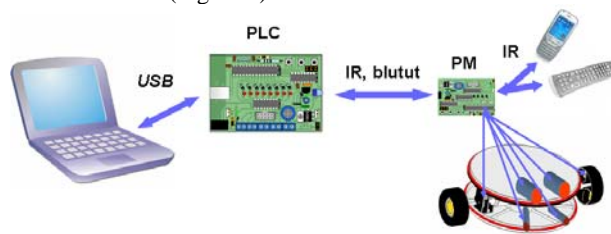

Figure 1. Linking UPLC and communication features PM

Robotic platform can be controlled with the TV remote control, regardless of the controller, software defined or USB controller with a computer.

Used programming languages range from Microsoft such as RVS, C + +, Visual Basic. Robotic "toy" computer-controlled or programmable logic controller represent a good experimental basis which can be used as a modern teaching tool (Figure 2).

UPLC is designed universal applications in teaching robotics, digital electronics, computer science and technical education. It is designed for school experiments, and modular systems. Because of its purpose, UPLC and PM module are subject to RoHS recommendations [3] European Agency for Electronics. Special attention is focused on finishing.

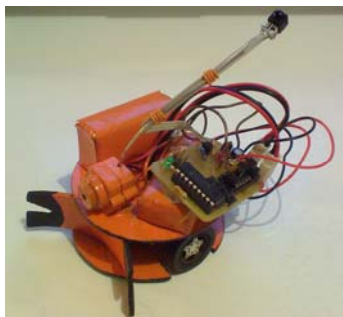Connecting external sensor UPLC becomes a powerful tool in any educational office.

Figure 2. The appearance of robotized platform equipped with a wireless camera module and PM

To work with UPLC-om are prepared applications, exercises and instructions on the installation CD that is an integral part of the set to the controller, in which even includes cables and battery connectors.
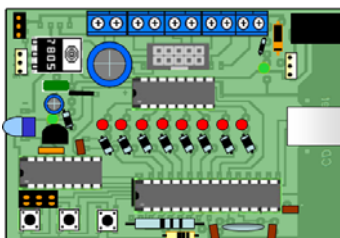

Figure 3. Block scheme of a UPLC

UPLC is based on the 18F2550 microcontroller [2]. On the board there are eight LEDs used for status indication output. The controller is connected to the USB port of your computer and the size of a credit card. IR system is integrated on the board.
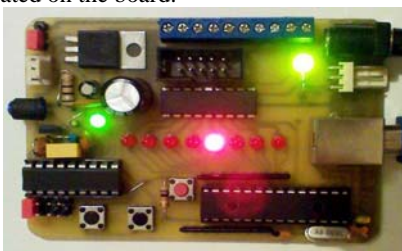

Figure 4. Prototype 1-2, IR controller version V03

Characteristics of UPLC-a:
- 4 digital inputs (1 = 1 = open ground)
- 8 digital outputs (max 5V/100mA)
- 8 LED indicators on the board,
- source: bateriski 3V-9V DC adapter or 3-9V,
- Diagnostic software with DLL-attached om
- Dimensions: 90 x 60 x 14mm

2. CONNECTING ELEMENTS OPTIONAL
External connection and control of motors, relays or optional elements in the form of Traffic signals can be achieved through the terminal (Figure 5).
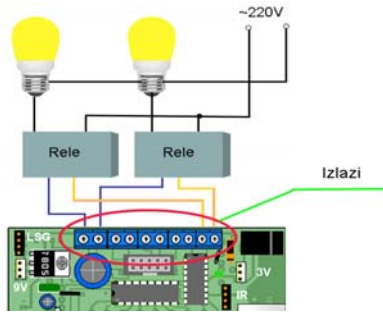
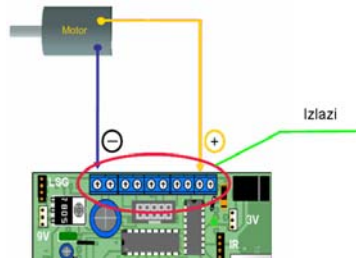*Figure 5. Example for connecting relays*

Figure 5a. Connecting the DC motor output to a UPLC

In Figure 5 and 5a gives an overview of connecting relays and DC motors as well as optional elements. Figure 6 shows the scheme for connecting lighting Traffic signals (traffic light model).
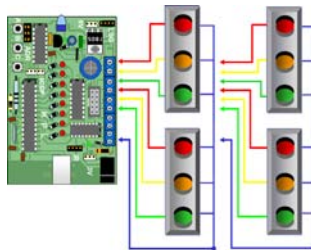

Figure 6. Connecting the Traffic light regulation of the output UPLC

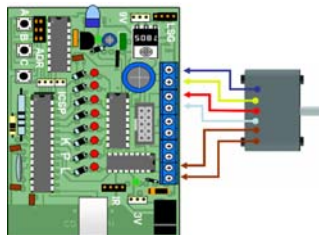Connect stepper motor with six terminals is shown in Figure 7.

Figure 7. Connecting the stepper motor output UPLC

3. SIDE ENTRANCE MODULE

Following the control module PM is an additional element that extends the range of use options and the UPLC-enabling control of robotized platform. PM as a control element robo platform enables:
- independently functioning robo platform
- communication with the computer via UPLC-a,

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- functioning of the sensor group
- motor control group.

Self-motion means that the mobile robotic platform avoiding obstacles in its path. Solutions for this kind of movement are the most simple to very complicated and expensive. We have opted for the simplest solution that consists of IR LEDs and IR sensors. Signal processing and detection logic takes place obstacles in the microcontroller.

Communicate am a computer takes place over a UPLC. We use infrared wireless communication system. Operation of the sensor and logical processing are performed in the microcontroller.
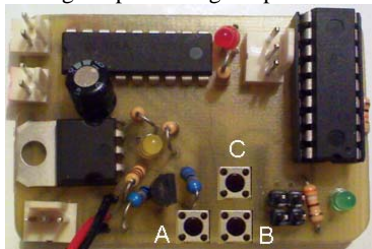

Figure 8. A prototype version of the module supporting 03

4. PROGRAM INTERFACE

We did a basic program that controls the movement of robo platform. The interface is done in a simple form, Figure 9 The user has the ability to control movement of the platform over the IR link. Optionally, control of movement of the platform was made possible with the joystick.
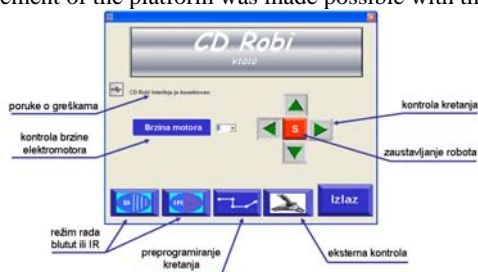

Figure 9. The program interface to control the movement of a robot

5. CONCLUSION

UPLC with additional PM module and robotized platform can be used for a wide range of teaching modules in the field of technical education, mechatronics, electronics and information technology. Whether you want to solve design tasks robo-platform and its motion sensor discuss the topic with their students with practical examples, or want to develop a new program for this simple and cost-effective platform in a robo of programming languages, a set of proposed UPLC is the ideal starting point for a wide range of challenges and tasks. More on the UPLC kit can be found on the web site www.cdrobi.com.

6. REFERENCES

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[2] IEEE CIRCUITS AND SISTEMS SOCIETY NEWSLETTER, Small Autonomous Robots Designed for EE Undergraduate Training, volume 3, issue 1, february 2009,
[3] http://www.microchip.com
[4] http://www.rohs.gov.uk