



Multipurpose Educational System based on Raspberry Pi

Galyna TABUNSHCHYK Prof. Software Tools Department Zaporizhzhia National Technical University

Nitra 11-15 September, 2016 <u>D</u>evelopment of <u>E</u>mbedded <u>System</u> Courses with implementation of <u>I</u>nnovative Virtual approaches for integration of <u>R</u>esearch, Education and Production in UA, GE, AM





Plan

- 1. About ISRT
- 2. What we can do with Raspberry Pi
- 3. ISRT CMS









Software Tools Department

Specialties

Engineering of Software;
Computer science and Information technologies.

Education levels

- •Bachelor;
- Master;
- •PhD.



Zaporizhzhya National Technical University







About Myself

- Professor of Software Tools Department of Zaporizhzhya National Technical University, Institute of RadioElectronics and Informatics, Faculty Computer Sciences and Technologies
- supervising work of PhD students;
- Courses: Object Oriented Programming, Designing and Modelling of Software in Embedded Systems, Requirements Analysis, Quality of Informational Systems, Software Project Management, Software Quality and Testing;
- Local Project Manager in Tempus Project 544091-TEMPUS-1-2013-1-BE-TEMPUS-JPCR - Desire
- head of scientific research group of Reliability of Informational Systems at Software Tools Department









- Appear in 2011
- Work:
 - System Verification



- Planning and Monitoring of Software
 Development Process
- Risk Analysis for Industrial Application
- Reliability of Embedded Systems
- Smart Beacon Development







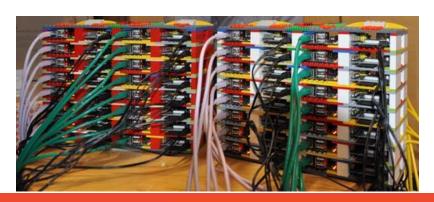




What you can do with Raspberry Pi???????

- Robotics
- https://www.youtube.com /watch?v=j_1JFnwOFwI
- Learn Programming
 - Scratch
 - C++
 - Python

- Web Server
- Media Server
- Cluster

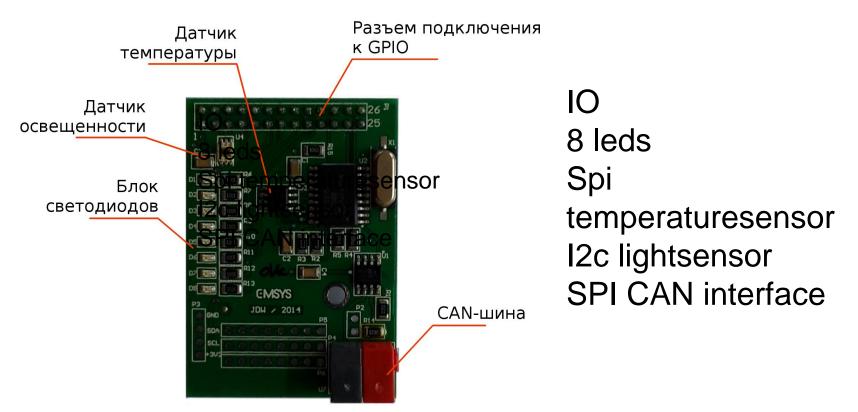








TMMA expansion board



github.com/bthange/Export-More.







Embedded Software Development

Galyna TABUNSHCHYK,

galina.tabunshchik@gmail.com

Lecturer

PhD, Prof.

Total hours 108h

- Lectures: 12 h
- Lab works: 24 h
- Self work 72 h

Teaching Assistant



Natali Myronova natali.myronova@gmail.com

Eygeniy Tverdokhleb junta.kristobal@gmail.com



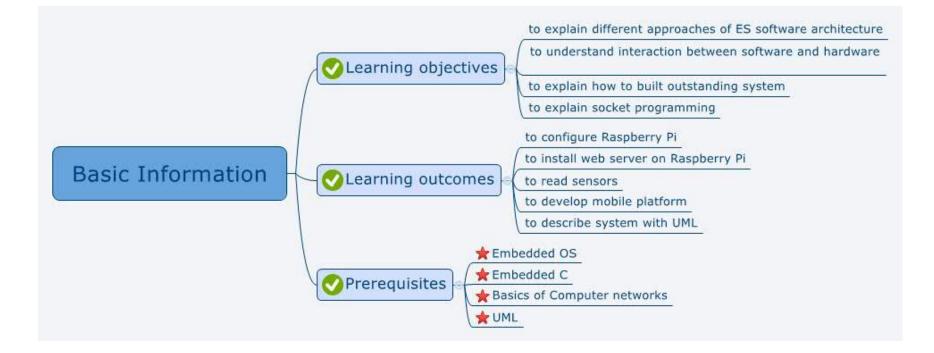


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Week	Subject				
1	Introduction				
2-3	Modelling of software for Embedded Systems				
3-4	Standard component models				
5-6	Architecture of the software for Embedded Systems				
6-8	Templates for Software Architecture for Embedded Systems				
9-10	Socket programming				
11-12	Programming Linux Socket				
Experiments, Projects,		Subject			
Lab Works					
Lab work 1		Configuring Raspberry Pi			
Lab work 2		Installing Web-server at Raspberry Pi			
Lab work 3		Developing QT application at Raspberry Pi			
Lab work 4		Reading sensors from extension board			
Lab work 5		Developing Project on Raspberry Pi			









Supported Operational Systems

- Raspbian
- OpenELEC Pidora
- Arch Linux ARM
- Kali Linux
- Windows 10

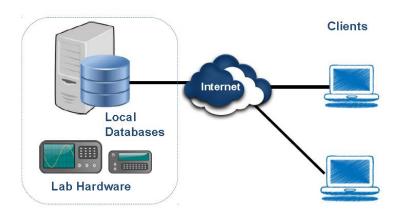


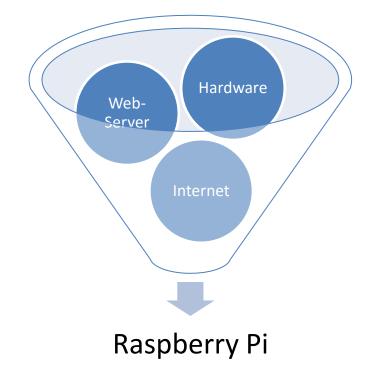






REMOTE EXPERIMENTS













Requirements for remote experiments

- availability 24/7
- should provide possibility for hardware and software testing
- no requirement for students HW
- should improve students skills in software development









Prerequisites for students

- Basic knowledge in Linux
- C++ skills
- Basic knowledge in Electronic Devices
- Software quality metrics
- Basics in computer systems and network









New remote experiments



Pilot usage: Master course: *Embedded Software Development* Bachelors course: *Design of Informational System*

Nitra 15 ¹¹⁻¹⁵ September, 2016 Hardware:

Raspberry Pi Model B Expansion board Wifi, BLE4 adapters, webcam

Software:

Raspbian Linux, Apache, MySql, C++, git, QT server for expansion board







Two demo Modes

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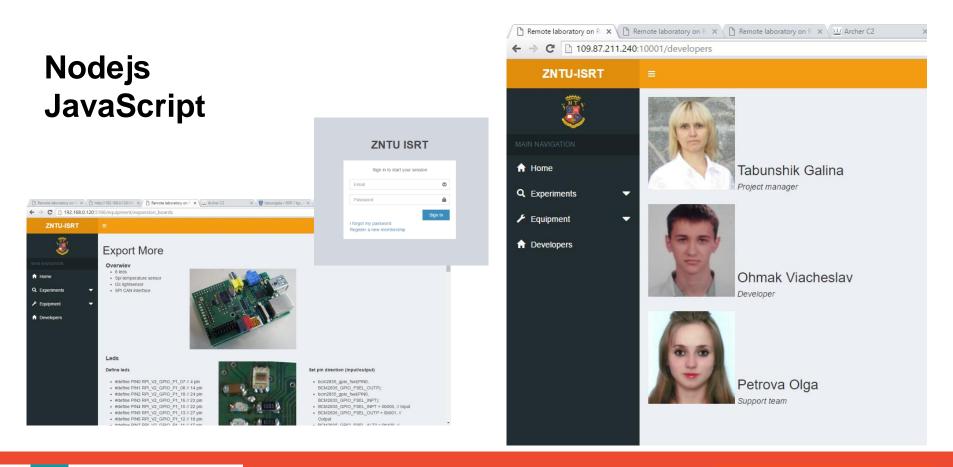
- Manipulating with leds on Thomas More expansion board with C++
- Manipulation with step
 engine and light sensors
 by Python and C++







Web-server











Programming with C++

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۲	Your prog	ams:				11 #define PIN7 RPI_V2_GPIO_P1_12 // 18 pin 12
	Name	Creation date	Last modify date	Edit Remove		<pre>13 - int getPinByIndex(unsigned short inx){ 14 int pin = 0;</pre>
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Programming on Python

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Future Work

- Development of Mechanical Construction for Lightening Measurements
- Increasing measurement system with measurement systems
- Development external Storage System
- Demo Experiments on reliability calculations
- Development of Data Protection System









Thank You for Your Attention

Nitra 11-15 September, 2016

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