



GUJARAT TECHNOLOGICAL UNIVERSITY

“Winter Camp 2016”

1ST - 11TH FEBRUARY, 2016



cic3

Community Innovation & Co-Creation Centre



Winter Camp 2016 Report

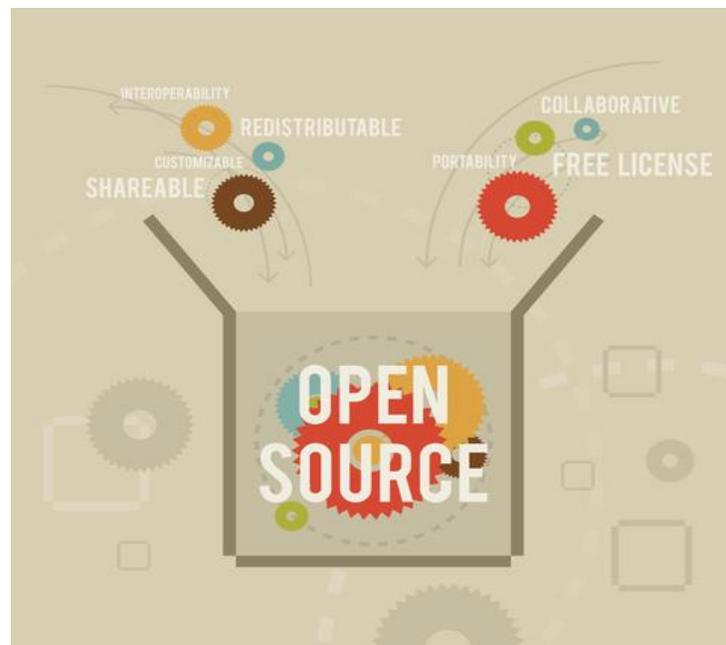
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Introduction

Gujarat Technological University (International Innovative University), commonly referred as GTU, is a state wide institution affiliating many engineering, pharmacy, and management colleges and varsities across the western Indian districts of Gujarat. GTU has been working jointly with industries through GTU Innovation Sankuls (Every college is a member of the Sankuls in its area). It has been working with the students through the GTU Innovation Clubs, Open Source Technology Clubs, IPR, CiC3, and S4 Extension Centers etc. To foster innovative ideas and to explore new horizons in the field of Engineering, Community Innovation & Co-Creation Centre organizes various workshops, hackathon's, challenges and Faculty Development Programs.

Community Innovation and Co-Creation Centre announces Winter Camp 2016 on Hardware (Arduino, Raspberry Pi & MSP430 Launchpad) & Software (Python, Octave, Scilab, Ngspice&KiCad). The main objective to organize this camp was to understand the basic concept of hardware and software with the help of various development board and open source software.



Hardware

Open source hardware is based on publishing all necessary data about the hardware. Openness of resources is a must to allow the community to reuse, develop and improve open designs. The application of open source to hardware brings new benefits to the hardware development process. Open source hardware would reduce development time and design cost.

Arduino

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

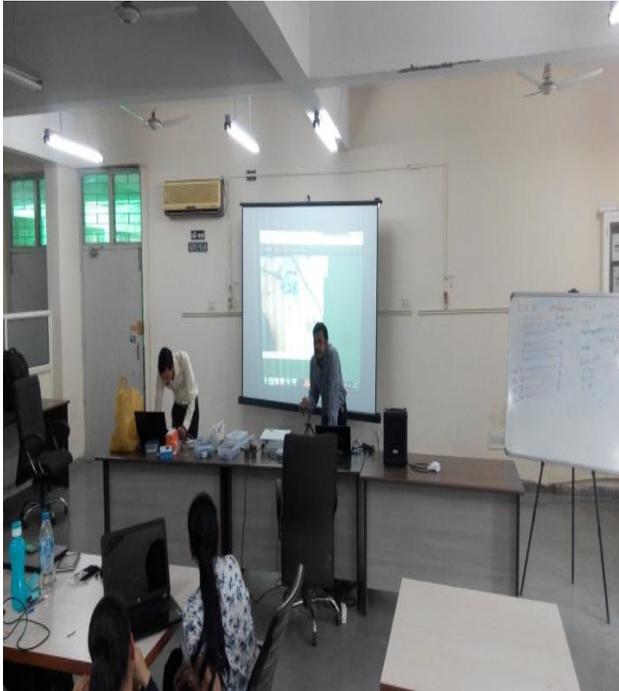
Day 1, first session started at 10:15 am and Prof. Raj Hakani & Prof. Hemal Nayak explained about the CiC3. Next explained basic of Arduino, interfacing LED, LED pattern such as (Simple, ON/OFF, ODD/EVEN, MOD-3 etc.), Seven Segment, LCD, Sensor Interfacing (IR, LM35 and Ultrasonic).



Day 2, first session started at 10:30 am and Prof. Raj Hakani explained about the sensor based application. Prof. Mitesh Solanki explained some demo on sensor based application such as MQ-135 sensor interfacing and Soil Moisture sensor interfacing. Next explained serial communication Bluetooth interface with Arduino Uno board & MATLAB and LED control.

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Next session was conducted by Prof. Raj Hakani, he explained ultrasonic sensor data on LCD, LM35 with Bluetooth interface, DC motor interfacing, concept of Robot Drive. More interesting topics project discussion was talked upon such as, Line follower, Wall follower, Obstacle Avoider, and Digital Clock.



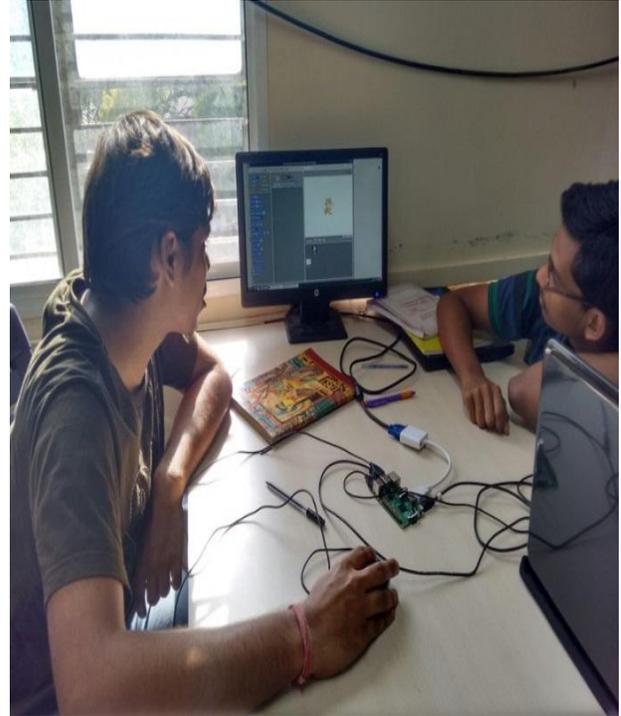
Raspberry Pi

The Raspberry Pi is open hardware, with the exception of the primary chip on the Raspberry Pi, the BroadcomSoC (System on a Chip), which runs many of the main components of the board—CPU, graphics, memory, the USB controller, etc. Many of the projects made with a Raspberry Pi are open and well-documented as well and are things you can build and modify.

Day 1, first session started at 10:15 am and Prof. Hemal Nayak explained about basic introduction of Raspberry Pi, Hardware Description & Interfacing Components, ARM 11 Controller, Introduction about Linux Operating System, Installing the Operating System on SD card, Logging in to Raspberry Pi Linux LX Terminal and Shell scripting.

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Day 2, first session started at 10:10 am and Prof. Hemal Nayak explained about the General Purpose Input Output (GPIO) Interface, Python programming, and Scratch. Next session explained some demo of LED interface with Raspberry Pi, generate LED pattern such as Simple, ON/OFF, ODD/EVEN, MOD-3 etc. and interfacing with seven segments.



MSP430 Launchpad

The MSP-EXP430G2 Launchpad Development Kit is an easy-to-use microcontroller development board for the low-power and low-cost MSP430G2x MCUs. It has on-board emulation for programming and debugging and features a 14/20-pin DIP socket, on-board buttons and LEDs & Booster Pack Plug-in Module pin outs that support a wide range of modules for added functionality such as wireless, displays & more.

First session started at 10:15 am and Prof. Mitesh Solanki explained about basic introduction of MSP430 Launchpad, MSP430 Launchpad series such as MSP-EXP432P401R, MSP-EXP430FR4133, MSP-EXP430FR5969 and MSP-EXP430G2. Also explained free software development tools are like TI's Eclipse-based Code Composer Studio™ IDE (CCS), IAR Embedded Workbench™ IDE (IAR), and the community-driven Energia open source code editor.

Winter Camp 2016 (Hardware & Software)

Next session was also conducted by Prof. Mitesh Solanki. He explained LED interface, LED pattern such as all on and off, one by one on/off, ODD/EVEN, Fibonacci and seven segment interfaces. Also interfaces like buzzer, LCD (16x2) and Bluetooth. Students were divided in random groups and tasks were assigned to them. Students worked on various types of applications and implement on MSP430 Launchpad.



Python

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding; make it very attractive for Rapid Application development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary from without charge for all major platforms, and can be freely distributed.

Day 1, first session started at 10:15 am and Prof. Hemal Nayak & Ms. Dhvani Sanghavi explained about basic introduction of Python, Environment setup, Basic setup, Variable types, Basic Operator and Decisions making.

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Day 2, first session started at 10:10 am and Prof. Hemal Nayak & Ms. Dhvani Sanghavi explained about the Loops, Numbers, Strings, Lists, Functions and module.



Octave

GNU Octave is software featuring a high-level programming language, primarily intended for numerical computations. It provides a command-line interface for solving linear and nonlinear problems numerically, and for performing other numerical experiments using a language that is mostly compatible with MATLAB. It may also be used as a batch-oriented language. It is a part of the GNU Project, it is free software under the terms of the GNU General Public License.

Octave is one of the major free alternatives to MATLAB, others being Julia and Scilab. These however put less emphasis on (bidirectional) syntactic compatibility with MATLAB than Octave does.

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First session started at 10:15 am and Prof. Mitesh Solanki explained about basic introduction of Octave, different windows, Input conventions, Variables & Standards operations, Vector & Matrix operations, Element-wise operations, Indexing & Slicing, Graphics (2D & 3D) , Complex number, transfer function, step response analysis and block diagram



Scilab

Scilab is a freely distributed open source scientific software package, first developed by researchers from INRIA and ENPC, and now by the Scilab Consortium. It is similar to Matlab, which is a commercial product. Yet it is almost as powerful as Matlab. Scilab consists of three main components:

- an interpreter
- libraries of functions (Scilab procedures)
- libraries of Fortran and C routines

Scilab is specialized in handling matrices (basic matrix manipulation, concatenation, transpose, inverse, etc.) and numerical computations. Also it has an open programming environment that allows users to create their own functions and libraries.

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First session started at 10:15 am and Prof. Rutika Ghariya explained about basic introduction of Scilab, Why use Scilab?, SciNotes, Scripts and functions, Build in functions, Variables and Constants, Operators, Graphics, Gadgets (calendar & Puzzle), Matrix Manipulation, Trigonometric functions, Flow control.



Ngspice

Ngspice is a mixed-level/mixed-signal circuit simulator. Its code is based on three open source software packages: Spice3f5, Cider1b1 and Xspice. It is the open source successor of these venerable packages. First session started at 10:15 am and Prof. Tosha Shukla explained about following:

Ngspice implements three classes of analysis:

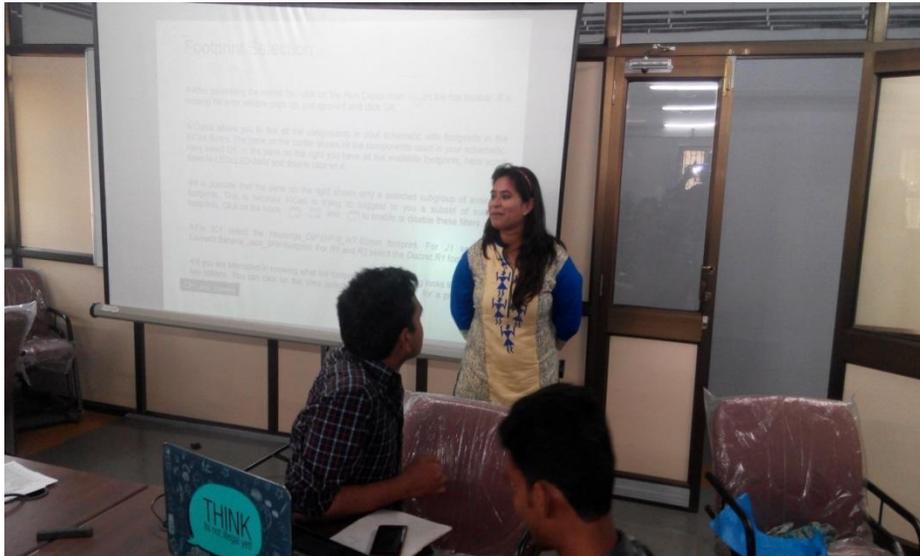
- Nonlinear DC analyses
- Nonlinear Transient analyses
- Linear AC analyses

Transient analysis includes transient noise simulation. AC analysis includes small signal noise simulation, pole-zero and transfer function analysis.

Ngspice implements various circuits elements, like resistors, capacitors, inductors (single or mutual), transmission lines and a growing number of semiconductor devices like diodes, bipolar transistors, MOSFET (both bulk and SOI), MESFET, JFET and HFET.

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Students were divided in random groups and tasks were assigned to them. Students worked on various types of filters, clipper, clamper circuits and rectifiers.



KiCad

KiCad is a free software suite for electronic design automation (EDA). It facilitates the design of schematics for electronic circuits and their conversion to PCB designs. KiCad was originally developed by Jean-Pierre Charras, and features an integrated environment for schematic capture and PCB layout design. Tools exist within the package to create a bill of materials, artwork, Gerber files, and 3D views of the PCB and its components.

First session started at 10:15 am and Prof. Rutika Ghariya explained about basic introduction of KiCad, How to start KiCad?, How to add library?, Create Schematic component, place the PIN, Place wire, Place no connection & power flag, Footprint Selection, Add Track, Run Tracks, Fill Zones, 3D View and Generate Gerber file.



Feedbacks

It was really good. This type of workshop should be done frequently.

UmangBagla, L J I E T

There were excellent workshops conducted by cic3 team, but I think there should be enough time for hands on session for hardware and project.

SavajAmitkumar, VGEC

Everything was good and I suggest you to do more camps like it.

PanchalAbhi, GEC Gnadhinar

Yes, I think the tenure for this program should be increased and should be developed on the basis of IIT's summer programs

Govind Sharma, GEC Gandhinagar

It was awesome. Can increase the level. As this one was the basic. You can add few workshops for intermediate and advance topics.

AkashParakandy, GEC Gandhinagar

Keep doing more workshops based on our subjects like this. It genuinely adds meaning to whatever theory we are learning.

SofiyaMomin, L J I E T

Very nice seminar, taken by all the faculties. Thank you so much...

DwijMistry, SVIT Vasad

It was a great workshop with a combo of hardware n software together for 11days continuously which brings the environment of doing n thinking more regarding the topics.

K Sudha Rani, S V B I T

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