TURNING ECLIPSE INTO AN ARDUINO PROGRAMMING PLATFORM FOR KIDS

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CURIOSITY
Explore, question and learn
DISCOVER BY YOURSELF

Explore to understand cause and effects.
COMPUTERS ARE EVERYWHERE

To understand the world, you need to understand how computers work
UNDERSTAND ELECTRONICS

Play with sensors and actuators
OPEN HARDWARE
ELECTRONIC FOR KIDS
Open hardware dedicated to kids learning electronics:
littleBits
ARDUINO
ARDUINO KITS

Cheap, easy to find thanks to many different providers: AdaFruit, DFRobot, SeeedStudio, SnootLab, ... So many kinds of modules available!
UNDERSTAND PROGRAMMING

Many open source software are dedicated to learn programming to kids: Scratch, TurtleLogo, KidsRuby, Python4Kids...

Initiatives: Programatoo, Devoxx4Kids, greenlight, coding goûter...
# flower
reset
canvassize 170,170
canvascolor 140,255,200
go 50,130
pencolor 230,60,255
penwidth 3
repeat 8 {
  repeat 4 {
    fw 20
    tr 30
  }
  repeat 7 {
    fw 10
    tr 15
  }
  repeat 9 {
    fw 3
    tr 10
  }
}
go 150,150
PROGRAM THE REAL WORLD
ECLIPSE IDE FOR DEVELOPERS

Complex UI, concepts (perspectives, project lifecycle...), languages (Java, C)
TURNING ECLIPSE AN IDE FOR KIDS

Graphical programming & light UI
A SIMPLIFIED UI

No menu, only a toolbar with 4 buttons activated according to what is possible
DASHBOARD

The process:
1. Define connection between hardware platform and modules
2. Describe the sketch
3. Upload on the target
HARDWARE

Platform, Modules, Wire
PROTOTYPE BASED ON DFROBOT ARDUBLOCK KIT

Sensors: ambient light, infrared, sound, push button, rotation
Actuators: LEDs, micro servo motors, fan
HELLO WORLD

Blink a LED!
GRAPHICAL BLOCK-BASED LANGUAGE

- Structures: while, repeat, if
- Functions: delay
- Hardware modules: Status, Level, Sensor
- Variables
- Constants
- Mathematical operators
SIRIUS

A tool to quickly define DSL based custom multi-view workbenches with dedicated representations
WHY USING SIRIUS?

- For the tool development phase: Dynamic & iterative (live) development
- For kids: Tooling adapted to the development of arduino small projects
ARDUINO DESIGNER DEVELOPMENT

STEP 1 - ARDUINO DSL

DSL describing what are Arduino hardware modules and sketches
ARDUINO DESIGNER DEVELOPMENT

STEP 2 - ARDUINO DIAGRAM SPECIFICATION

Sirius specification
int brightness;
void setup() {
  brightness=0;
}
void loop() {
  while ((brightness<255))
  {
    brightness=(brightness+1);
    analogWrite(11,255-(brightness));
    delay(8);
  }
  while ((brightness>1))
  {
    brightness=(brightness-1);
    analogWrite(11,255-(brightness));
    delay(8);
  }
delay(200);
ARDUINO DESIGNER DEVELOPMENT
STEP 4 - INTEGRATE ARDUINO COMPILER

arduino.mk
Generate Makefile with Acceleo
make

BOARD_TAG    = uno
ARDUINO_PORT = /dev/ttyACMO
ARDUINO_LIBS = Servo

include /usr/share/arduino/Arduino.mk
ARDUINO DESIGNER DEVELOPMENT

STEP 5 - INTEGRATE TARGET UPLOADER

avr-gcc, avrdude
make upload
USE SENSOR

A LED + push button
FADE LIGHT

1 LED + programming language
A MORE COMPLEX PROJECT

A pet robot
TIGGER
MANY SENSORS AND ACTUATORS
RECYCLED HIGH TECH COMPOSITE
TOUCH

Push button nose commands a blinking necklace
SEE

Infrared sensor eye commands the servo-motored tail
HEAR

Sound sensor ear commands the bubble machine
MORE 'SIRIUS' PRESENTATIONS

- Wednesday
  - 14:30 - Changing the Game of Systems Architecture
  - 16:15 - Sirius By Example
  - 17:00 - EcoreTools 2.0: The Making Of
  - 19:00 - BOF "Let's get Sirius"
- At any time: ask us or visit Obeo booth
FIND THE CODE?

https://github.com/mbats/arduino
THANKS! QUESTIONS?
CLAP YOUR HANDS TO MAKE MORE BUBBLES! AND MAYBE ASK QUESTIONS...