

Labs Land

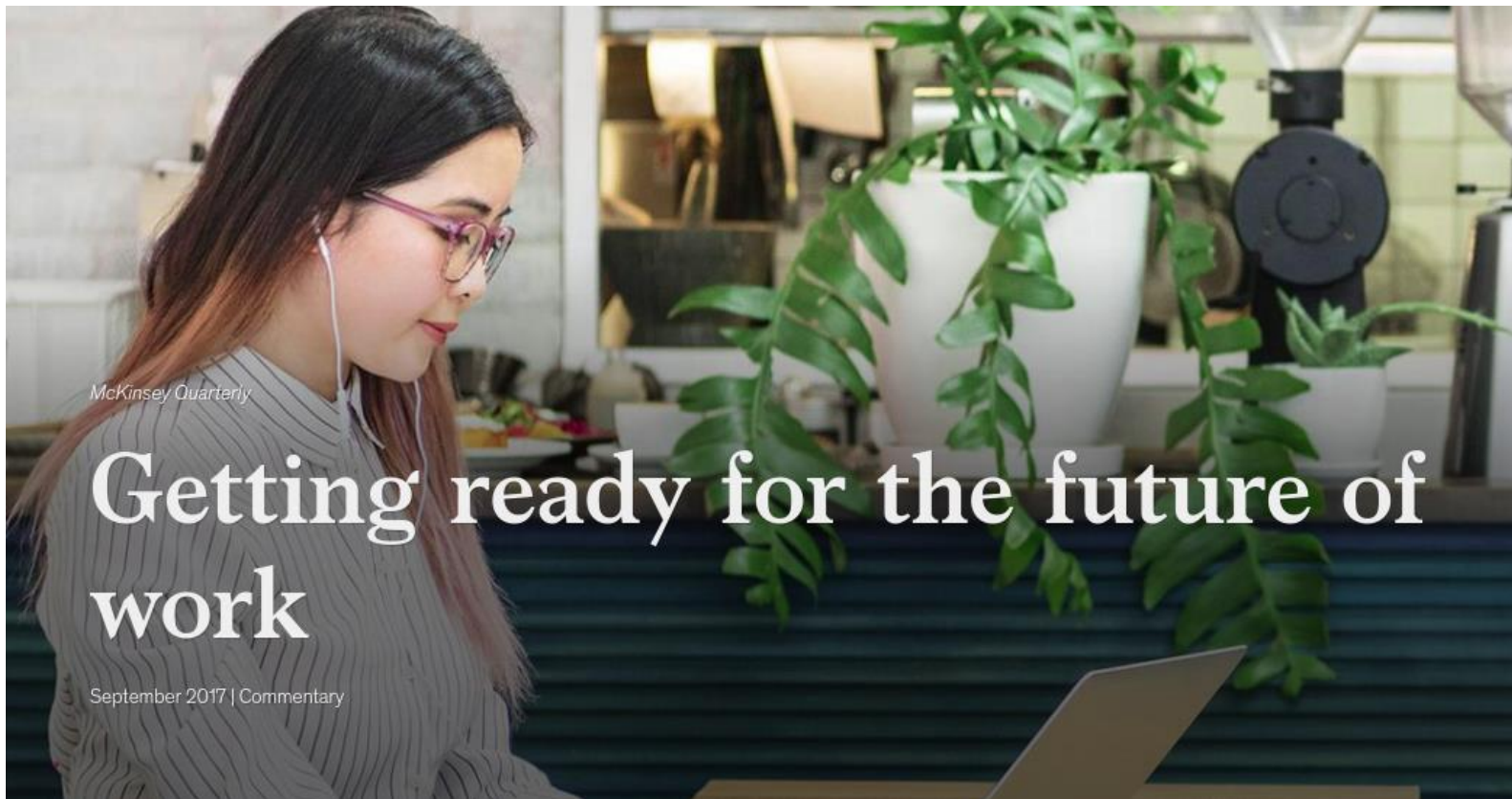
Experiment for real

<https://labsland.com>

McKinsey Quarterly

Getting ready for the future of work

September 2017 | Commentary



Future of Work: most occupations are changing

30% of the activities of the **majority of occupations** in the US **could be automated**

McKinsey
Global Institute

[Harnessing automation for a future that works](#). 2017



[The Future of Jobs Report](#). 2018

50% of the companies expect that **automation** will lead to **reduction** in their **full-time workforce** by 2022

Lifelong learning + online education play key role

ECONOMY

Automation Will Make Lifelong Learning a Necessary Part of Work

by Jacques Bughin, Susan Lund, and Eric Hazan

[Automation will make Lifelong Learning \[...\]](#), 2018

McKinsey
& Company

Lower barriers to training by:

- Tackling time constraints through modular training options, training delivered outside of working hours or online courses, as well as by providing workers with education and training leave.

[The Future of Work OECD Employment Outlook](#) 2019

Harvard Business Review

For workers of the future, then, the ability to adapt their skills to the changing needs of the workplace will be critical. Lifelong learning must become the norm—and at the moment, the reality falls far short of the necessity.

[Getting ready for the Future of Work](#). 2017

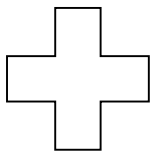


Re-training: who will provide it

Professional training programs

Virtual programs

Universities





Online Courses

The following programs offer one or more online courses:

Clinical Medical Assistant Online
Clinical Trials Design & Management (Biotechnology)
Construction Professional
Dental Assistant Online
E-Learning Design & Development
Education: Professional Development Courses for Teachers
EKG Technician Online
Event & Meeting Planning
Human Resource Management
Marketing
Medical Administrative Assistant Online
Medical Billing & Coding Online
Multimedia, Design & Development
Music/Recording Industry
Paralegal Studies
Pharmacy Technician Online
Project Management
Spanish/English Interpretation (Legal/Court)

PLS 345 Summer19 Section 01Z	Immigration Law	1994	• Mon, 6/10/19 - 8/12/19, 6:00PM - 9:45PM
PLS 300 Summer19 Section 01Z	Introduction to Civil Procedure	1968	• Tues, 6/11/19 - 8/13/19, 6:00PM - 9:45PM
PLS 310 Summer19 Section 01Z	Communication Skills and Legal Ethics	1988	• Tues, 6/11/19 - 8/13/19, 6:00PM - 9:45PM
PLS 305 Summer19 Section 01Z	Investigation, Discovery & Trial Preparation	1987	• Wed, 6/12/19 - 8/14/19, 6:00PM - 9:45PM
PLS 395 Summer19 Section 01Z	Pleadings	1990	• Wed, 6/12/19 - 8/14/19, 6:00PM - 9:45PM
PLS 320 Summer19 Section 01Z	Legal Research & Writing	1989	• Thu, 6/13/19 - 8/15/19, 6:00PM - 9:45PM
PLS 330 Summer19 Section 01Z	Family Law	1996	• Thu, 6/13/19 - 8/15/19, 6:00PM - 9:45PM
PLS 414 Fall19 Section 01Z	Introduction to Professional Legal Writing - GVAR	10763	• Mon, 8/26/19 - 12/16/19, 6:00PM - 8:45PM
PLS 435 Fall19 Section 01Z	Patents	10764	• Mon, 8/26/19 - 12/16/19, 6:00PM - 8:45PM

All Development courses

 Not sure? Every course comes with a 30-day money-back guarantee

 Filter

Ratings ▾

Duration ▾

Sort

10000 courses



The Web Developer Bootcamp

BESTSELLER 398 lectures • 47 hours • All Levels

The only course you need to learn web development - HTML, CSS, JS, Node, and More! | By Colt Steele

\$11.99

~~\$199.99~~

★★★★★ 4.6
(127,278 ratings)



Complete Python Bootcamp: Go from zero to hero in Python 3

BESTSELLER 186 lectures • 24 hours • All Levels

Learn Python like a Professional! Start from the basics and go all the way to creating your own applications and games! | By Jose Portilla

\$11.99

~~\$194.99~~

★★★★★ 4.5
(166,325 ratings)



Angular 8 (formerly Angular 2) - The Complete Guide

BESTSELLER 503 lectures • 37 hours • All Levels

Master Angular (Angular 2+, incl. Angular 8) and build awesome, reactive web apps with the successor of Angular.js | By Maximilian Schwarzmüller

\$11.99

~~\$189.99~~

★★★★★ 4.6
(86,630 ratings)

Development

- Development >
- Business >
- Finance & Accounting >
- IT & Software >
- Office Productivity >
- Personal Development >
- Design >
- Marketing >
- Lifestyle >
- Photography >
- Health & Fitness >
- Music >
- Teaching & Academics >

- All Teaching & Academics
- Engineering >
- Humanities >
- Math >
- Science >
- Online Education >
- Social Science >
- Language >
- Teacher Training >
- Test Prep >
- Other Teaching & Academics >

- Popular Topics
- All Engineering
- Data Structures
- Algorithms
- Electronics
- Civil Engineering
- Robotics
- Electrical Engineering
- Structural Engineering
- Aerospace Engineering
- Mechanics

All All Engineering courses

 Not sure? Every course comes with a 30-day money-back guarantee

Filter

Ratings

Duration

Sort

480 courses



Electricity & electronics - Robotics, learn by building

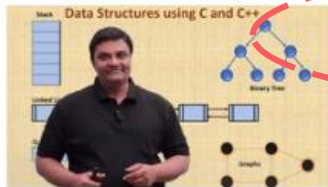
BESTSELLER 54 lectures • 10 hours • All Levels

Over 13,000 enrolled! Open career opportunities and have fun learning electronics focused on building robots/automation! | By Ian Juby

\$11.99

\$99.99

★★★★★ 4.6
(1,901 ratings)



Mastering Data Structures & Algorithms using C and C++

BESTSELLER 376 lectures • 56 hours • All Levels

Learn, Analyse and Implement Data Structure using C and C++. Learn Recursion and Sorting. | By Abdul Bari

\$11.99

\$174.99

★★★★★ 4.6
(1,267 ratings)

Business

Leadership And Management

Finance

Marketing

Entrepreneurship

Business Essentials

Business Strategy

Filter by:

Skills

Job Title

Level

Language

Type

Creator

Type

COURSE (1072)

SPECIALIZATION (146)



Computer Science

Software Development

Mobile And Web Development

Algorithms

Computer Security And Networks

Design And Product

Filter by:

Skills

Job Title

Level

Language

Type

Creator

Type

COURSE (788)

SPECIALIZATION (119)



Explore > Physical Science and Engineering

Physical Science and Engineering

Electrical Engineering

Mechanical Engineering

Chemistry

Environmental Science And Sustainability

Physics And Astron




Filter by:

Skills 

Job Title 

Level 

Language 

Type 

Creator 

Type

- COURSE (431)
- SPECIALIZATION (23)



Table 3: Examples of stable, new and redundant roles, all industries

Stable Roles	New Roles	Redundant Roles
Managing Directors and Chief Executives	Data Analysts and Scientists*	Data Entry Clerks
General and Operations Managers*	AI and Machine Learning Specialists	Accounting, Bookkeeping and Payroll Clerks
Software and Applications Developers and Analysts*	General and Operations Managers*	Administrative and Executive Secretaries
Data Analysts and Scientists*	Big Data Specialists	Assembly and Factory Workers
Sales and Marketing Professionals*	Digital Transformation Specialists	Client Information and Customer Service Workers*
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	Sales and Marketing Professionals*	Business Services and Administration Managers
Human Resources Specialists	New Technology Specialists	Accountants and Auditors
Financial and Investment Advisers	Organizational Development Specialists*	Material-Recording and Stock-Keeping Clerks
Database and Network Professionals	Software and Applications Developers and Analysts*	General and Operations Managers*
Supply Chain and Logistics Specialists	Information Technology Services	Postal Service Clerks
Risk Management Specialists	Process Automation Specialists	<u>Financial Analysts</u>
Information Security Analysts*	Innovation Professionals	Cashiers and Ticket Clerks
Management and Organization Analysts	Information Security Analysts*	Mechanics and Machinery Repairers
<u>Electrotechnology Engineers</u>	Ecommerce and Social Media Specialists	Telemarketers
Organizational Development Specialists*	User Experience and Human-Machine Interaction Designers	Electronics and Telecommunications Installers and Repairers
<u>Chemical Processing Plant Operators</u>	Training and Development Specialists	Bank Tellers and Related Clerks
University and Higher Education Teachers	<u>Robotics Specialists and Engineers</u>	Car, Van and Motorcycle Drivers
Compliance Officers	People and Culture Specialists	Sales and Purchasing Agents and Brokers
<u>Energy and Petroleum Engineers</u>	Client Information and Customer Service Workers*	Door-To-Door Sales Workers, News and Street Vendors, and Related Workers
<u>Robotics Specialists and Engineers</u>	Service and Solutions Designers	Statistical, Finance and Insurance Clerks
Petroleum and Natural Gas Refining Plant Operators	Digital Marketing and Strategy Specialists	<u>Lawyers</u>

Source: Future of Jobs Survey 2018, World Economic Forum.

Note: Roles marked with * appear across multiple columns. This reflects the fact that they might be seeing stable or declining demand across one industry but be in demand in another.

Philosophy

Philosophy courses address the big questions that make us human—morality, ethics, purpose, and rationality—in the modern historical context. Explore the field's eastern and western traditions, including specific schools of philosophy such as eastern

[See more](#)

Filter by: Skills Job Title Level Language Type Creator

Type

COURSE (84)

Music and Art

Music and arts courses develop skills in the practice and critique of visual art, music, and creative writing. Learn to play the guitar, debate the merits of contemporary graphic novels, or explore the history of human creativity.

Filter by: Skills Job Title Level Language Type Creator

Type

COURSE (178)
 SPECIALIZATION (14)

History

History courses investigate ancient and modern events and social trends. Explore themes such as war, imperialism, and globalization and study the history of specific groups or time periods through courses on black history, women's history, and more.

Filter by: Skills Job Title Level Language Type Creator

Type

COURSE (164)
 SPECIALIZATION (2)

Chemistry

Chemistry courses explore the qualities and interactions of matter. Subtopics include organic and inorganic chemistry, industrial and research applications, and the chemistry of food, healthcare, and the environment.

Filter by: Skills Job Title Level Language Type Creator

Type

COURSE (31)

Mechanical Engineering

Mechanical engineering courses develop your ability to design and create mechanical systems, including those used in the automotive, aeronautics, robotics, and manufacturing industries. Subtopics include mechanics, fluid dynamics, heat transfer, and more.

Filter by: Skills Job Title Level Language Type Creator

Type

COURSE (109)
 SPECIALIZATION (7)

Electrical Engineering

Electrical engineering courses teach the use of electronics to create, convey, and manipulate information. You'll master the basics of circuits and signal processing, then move on to advanced subtopics such as microelectronics, telecommunications, and power...

[See more](#)

Filter by: Skills Job Title Level Language Type Creator

Type

COURSE (104)
 SPECIALIZATION (15)

Pick a track that fits your passion



Android Development

Build sophisticated Android apps using Java, Kotlin, C, Python and more.



Data Science

Get the intensive training needed for a career in artificial intelligence and machine learning.



Full Stack Web Development

Learn the fundamentals of frontend, backend, servers, databases, APIs, and more.



iOS Development

Create powerful iPhone and iPad apps with Swift, Objective-C, and Cocoa Touch. Learn CS with Python and C.



User Experience Design

Master the entire UX design process and learn the basics of building for web and mobile.

Why does this happen?

- Why do **you** think this happens?
- Does this happen in **your** university / company?
 - e-Technologies in Engineering Education

How can we improve this?

CHALLENGES IN EXPERIMENTATION: ONLINE

Experimentation requires **laboratories**

Laboratories require a physical location



In online education, number of courses and enrollment drastically decreases when hardware is required

I'm a believer in online technology in education.

*I think we have learned enough about this to understand that **it will be transformative. It's going to change the world, and it's going to change the way we think about education.** [...]*

*Could you imagine a situation where students do some of their degree work remotely and then do some on campus, particularly the small, **experiential classes that don't transfer well to online?***

-- John L. Hennessy, Past President of Stanford

CHALLENGES IN EXPERIMENTATION: IN CLASS



Inconvenience

Lab space, safety,
time constraints,
liability, setup time,
required supervision



Costs

Acquisition,
maintenance,
security

Fizz! Pop! Bang! Teachers find new science standards fun, but costly

MATH AND SCIENCE

NOVEMBER 26, 2017



CAROLYN JONES

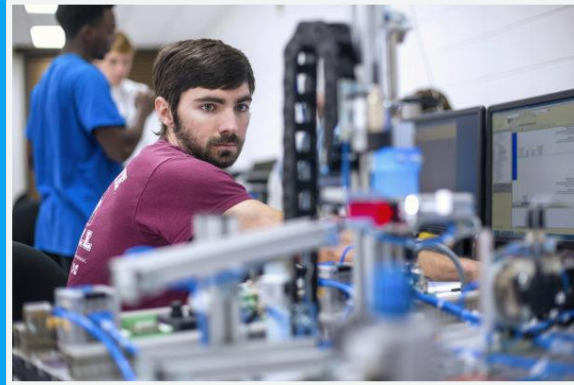
With their emphasis on hands-on experiments, California's new science standards have turned classrooms into noisy, messy laboratories.

"I love the new standards, I really do. But it's so expensive, I just don't see how it's going to happen," said Laura Ruiz, a science teacher at a middle school in Los Angeles Unified. "All of us teachers are spending hundreds of dollars a year of our own money to purchase supplies. Is there a cheap way to teach these standards? I'm trying to find one, but I just don't think so."

The new K-12 standards, called the **Next Generation Science Standards**, were approved by the

Example

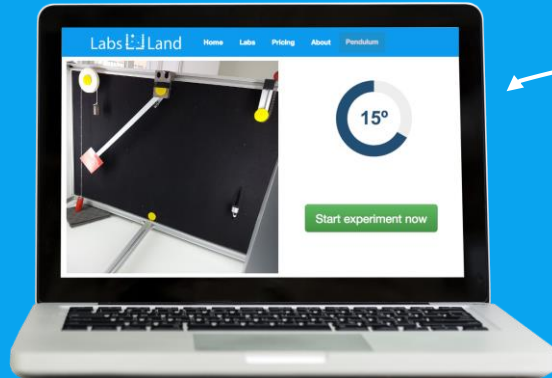
In both traditional and online education,
educators need **affordable,**
real experimentation



LabsLand solution: Real labs, available online

Learn anywhere,
anytime

View and interact
with the real
equipment



The equipment is real,
no simulations.
LabsLand or partner
institutions

EXAMPLE: ARDUINO ROBOT



LabsLand Arduino robot: students write code and see how it behaves in a real robot on real-time



01:26 Leave now

Arduino robot

LabsLand

Your own programs

Your Arduino IDE program

This is the last program that you prepared in the Arduino IDE editor.

Program into robot

View example programs

In the beginning, you can move the robot wherever you want. Then, you can use the left panel to upload a program to the robot.

Serial Monitor

Send:

↑

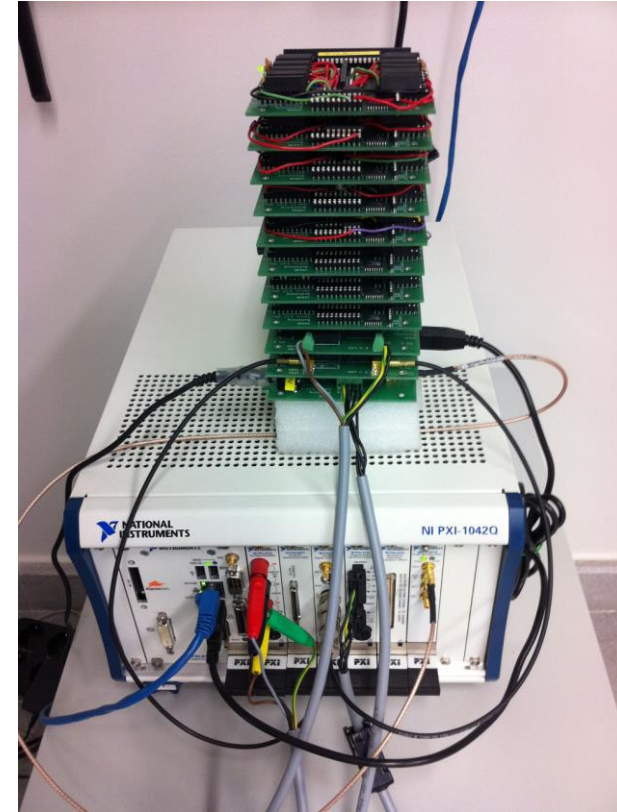
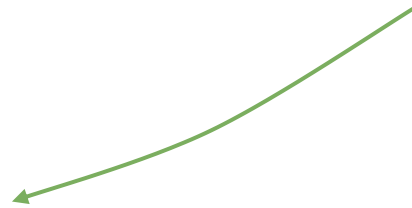
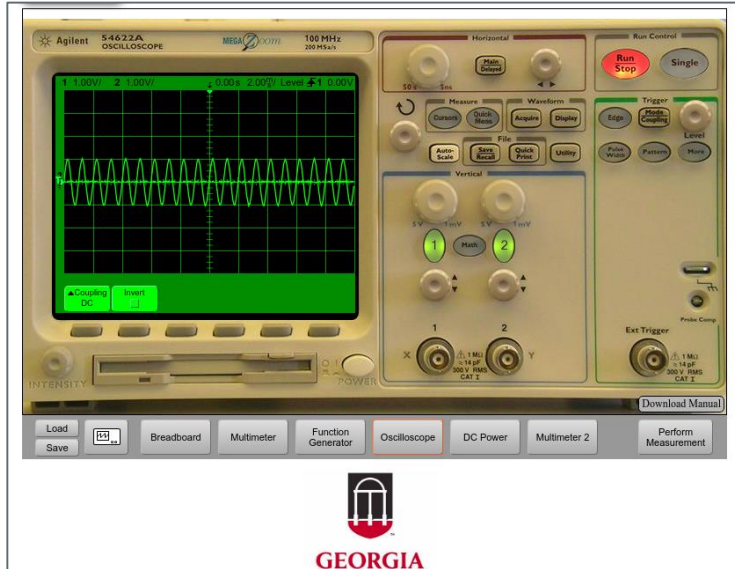
← →

EXAMPLE: ARDUINO ROBOT

The screenshot shows the 'Arduino robot' interface within the LabsLand application. At the top left, there is a timer showing '00:30' and a 'LabsLand' logo. The main title 'Arduino robot' is centered at the top. Below the title, a light blue text box contains the instruction: 'In the beginning, you can raise the robot wherever you want. Then, you can use the left panel to upload a program to the robot.' The central area features a video feed of a blue robot on a white surface with a black infinity-shaped track. Below the video are three blue circular directional buttons (left, up, right) and two white spherical objects. On the left side, a panel titled 'Your own programs' includes a sub-section 'Your Arduino IDE program' with a 'Program into robot' button and a 'View example programs' button. On the right side, a 'Serial Monitor' panel is visible with a 'Send' button.

EXAMPLE: ELECTRONICS

LabsLand Electronics: students create complex circuits, and a real hardware with a set of relays build the circuit and take measurements shown in the web interface

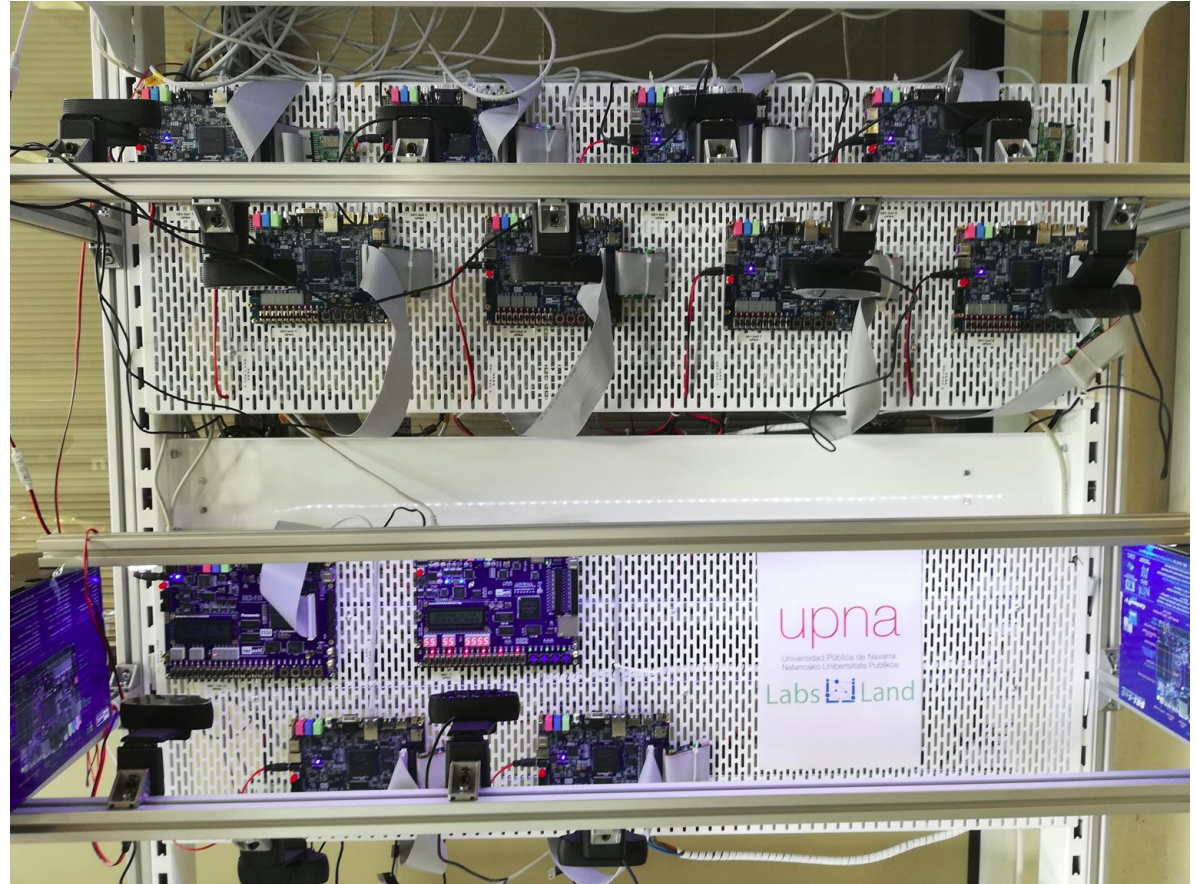


Example: FPGAs (Intel/Altera and Xilinx)



upna

Labs  Land



Example: FPGAs (Intel/Altera and Xilinx)



upna

Labs  Land

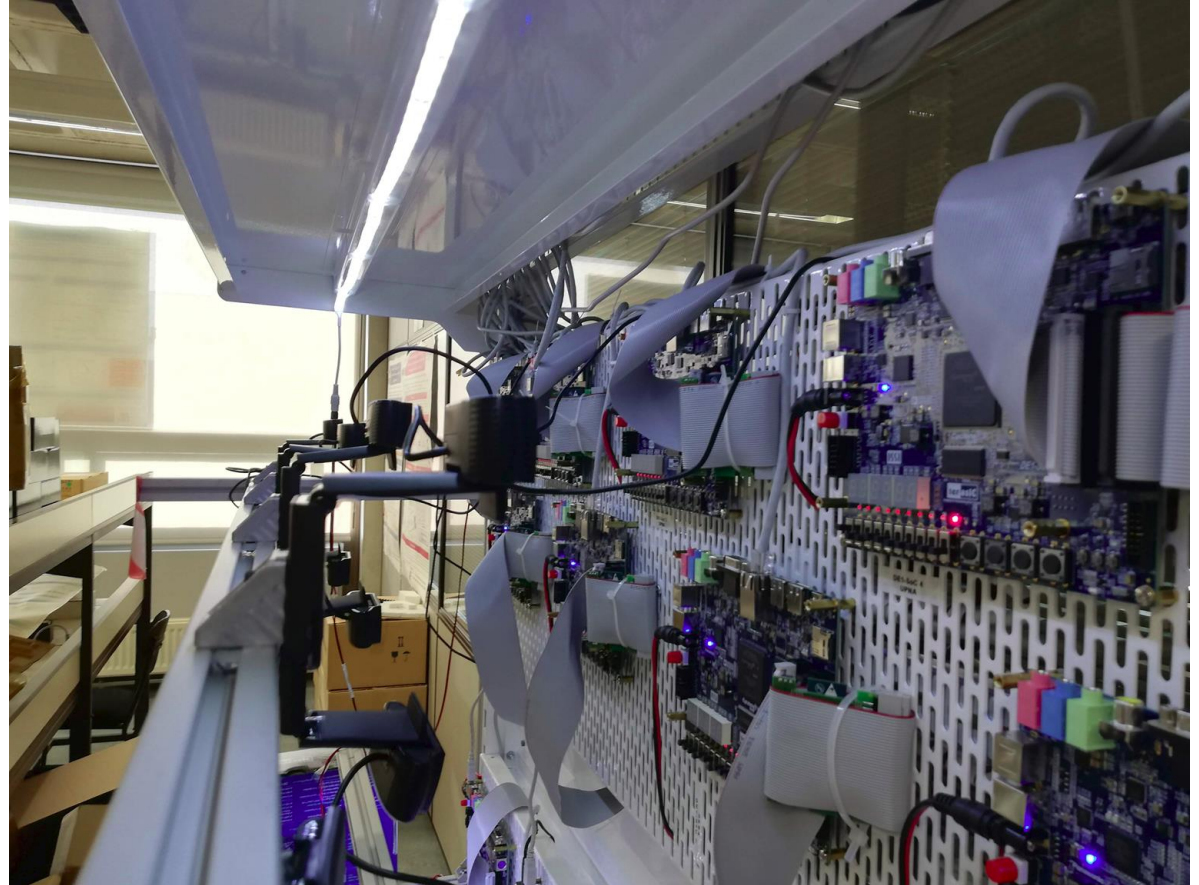




Figure 2 The robot arm, ERIC, in Oregon State University control engineering laboratory

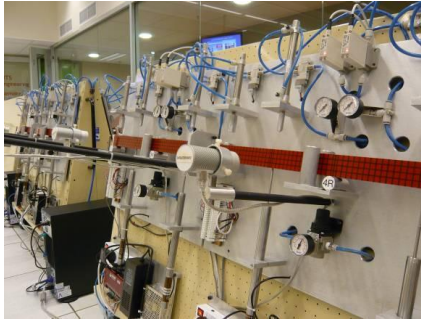


Figure 1 Burçin Aktan preparing to demonstrate the remote laboratory functionality



Figure 6 SBBT implementation with remote user operating experiment live from a remote location

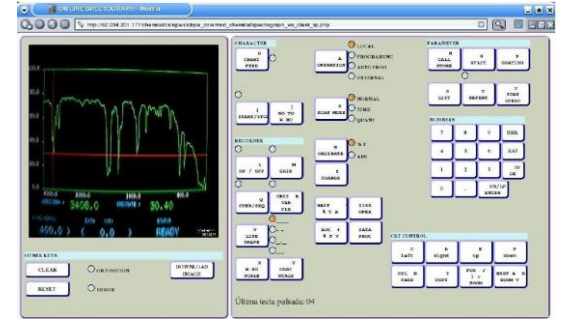
Shor, Bohus, Atkan. Oregon State University, 1993.



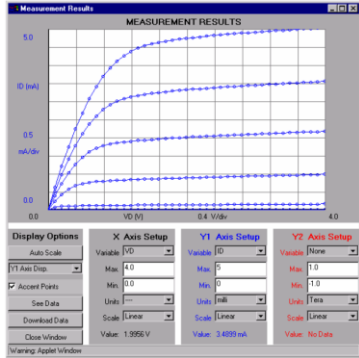
(Murray et al., 2008)



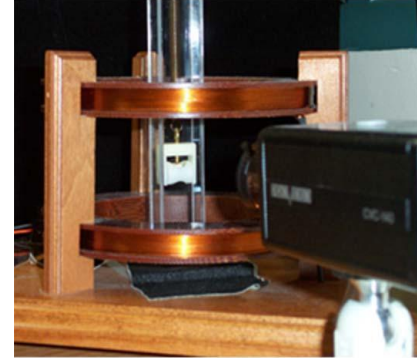
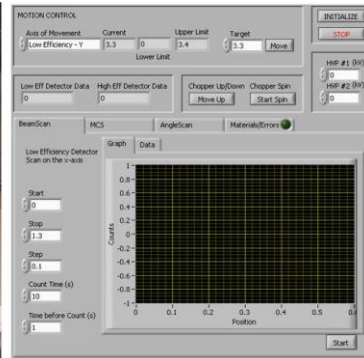
(Zackrisson et al., 2008)



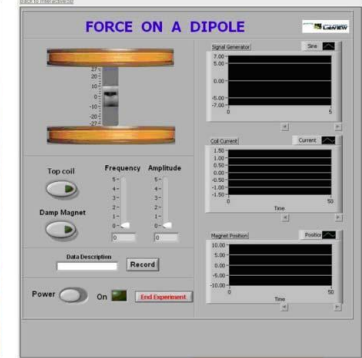
(Cedazo et al., 2006)



(del Alamo et al., 2002)



(Hardison et al., 2008)



Are you familiar with Remote Labs?

How many of you have used Remote Laboratories?

How many of you use every year Remote Laboratories?

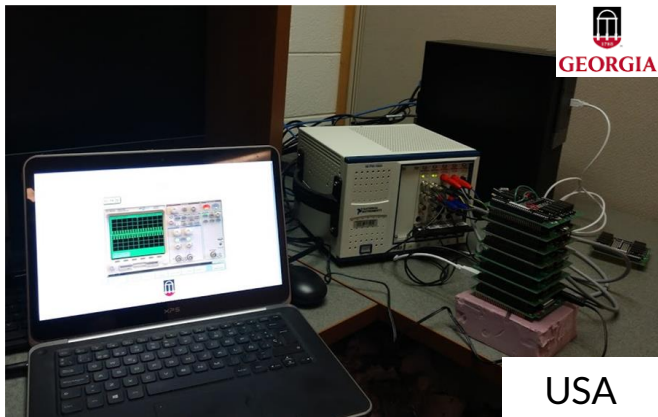
Why is this? What are the problems you see on them?

Why aren't Remote Labs more popular?

1. Robustness and trust
2. Scalability
3. Development process
4. Critical mass of laboratories
5. Integrations in the university context
6. Sustainability

1. Robustness and trust

DEPLOYMENT OF EXISTING LABS

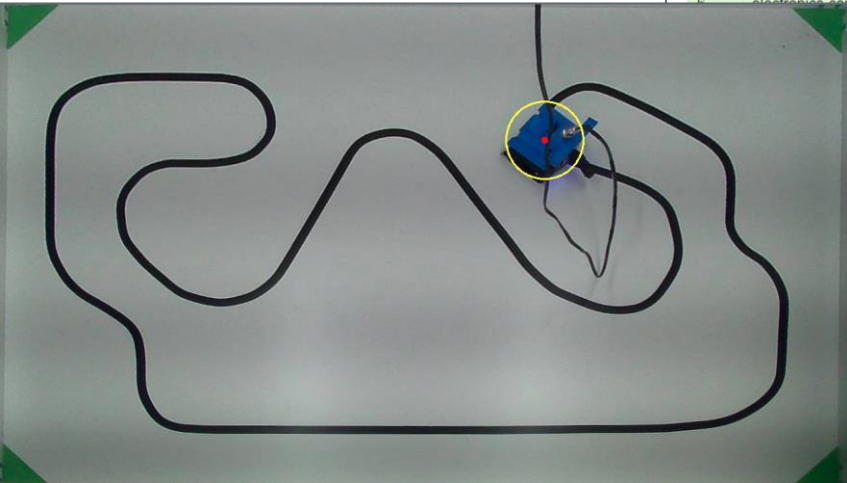


ADVANCED TRACKING OF LAB STATUS

Publicly available laboratories

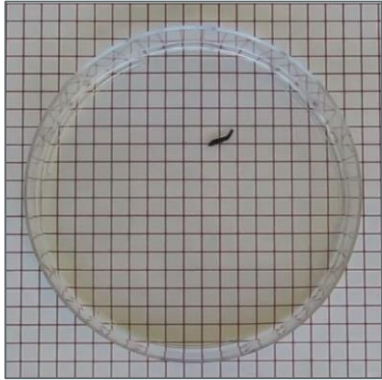
Summary

#	Name	Institution	Status	Details
1	archimedes	UD	working	Details
2	arduino-board	labsland	partial	Details
3	arduino-robot	labsland	working	Details
4	arduino-visual-board	labsland	partial	Details
5	arduino-visual-robot	labsland	working	Details
6	electronics-community	LabsLand Electronics Community	working	Details
		LabsLand FPGA Community	working	Details
		LabsLand FPGA Community	working	Details
		LabsLand FPGA Community	working	Details



2. Scalability

MORE EXAMPLES



Biology:

St. Thomas University in Houston: students see how the planarian reacts in different substances, such as **caffeine**

The screenshot shows a virtual lab interface for 'Planarians' from St. Thomas University Houston. It includes a 'Solution' section with five options: Control (Pond Water), Sugar (20 g/L), Ginseng (120 mg/L), Caffeine (20 mg/L), and Taurine (120 mg/L). Each option has a corresponding image. A green arrow points from the petri dish image to this interface.

The screenshot shows a virtual lab interface for 'Radioactivity laboratory' from The University of Queensland Australia. It features a 'Setup' section with dropdown menus for Source (Strontium-90), Absorber (None), Distance (15), Duration (5), and Repeat (3). A 'Results' section shows a digital readout of '240'. A green arrow points from the petri dish image to this interface.

Physics:

University of Queensland (Australia): students measure particles crossing across different materials through **thousands**



3. Development process

LABSLAND OPEN SOURCE TECHNOLOGIES

<https://github.com/weblabdeusto/weblabdeusto/>
<https://developers.labsland.com/weblablib/>

- Remote Laboratory Management System
- Provides multiple APIs to simplify development of labs
- Covers authentication, authorization, integration...

Hochschule
Bonn-Rhein-Sieg



MacroFacultad
Ingeniería - Chile



FH AACHEN
UNIVERSITY OF APPLIED SCIENCES

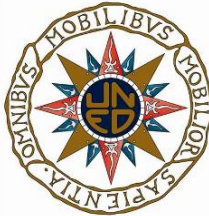


Universidad de Deusto
University of Deusto

Deusto



Universidad de
los Andes



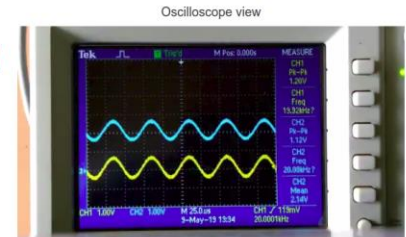
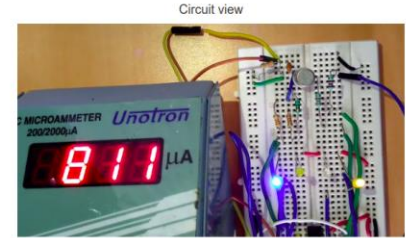
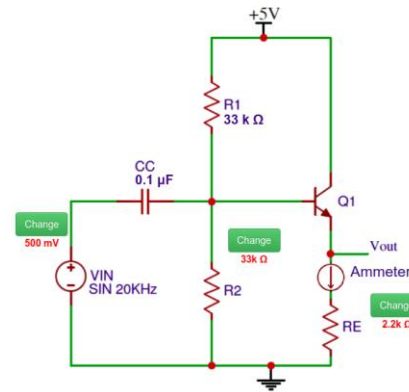
LABSLAND DEVELOPMENT SUPPORT LEVELS

LabsLand
involvement

1. Deployment of existing labs
2. LabsLand: software development / University: pedagogic and video recording
3. LabsLand: real-time software development / University: connections and hardware design
4. LabsLand: web software development / University: automation and recording
5. LabsLand: consultancy & proprietary software provider / University: all software and hardware
6. Use of LabsLand Open Source technologies

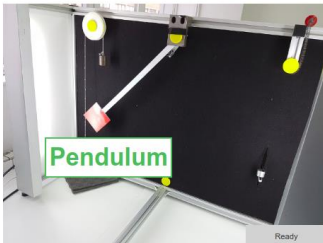
4. Critical mass

Increasing number of laboratories

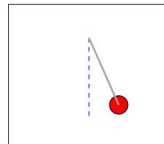


19:44 Leave now

Pendulum



Configuration preview



24°

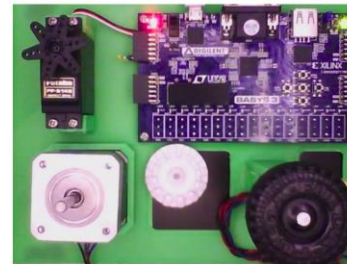
1 Drag the knob above to control the angle of the pendulum.

Start experiment now

1 Once you have chosen an angle, click the START EXPERIMENT button and the experiment will start.

02:15 Leave now

Xilinx FPGA Laboratory



CURRENT PROVIDERS

Current



USA



Brazil



USA



Brazil



Spain



Australia



Spain



India



Germany



Costa Rica



Spain



USA

Under development



North Africa



Colombia



Germany



South Africa



Germany



UNIAGRARIA
Fundación Universitaria Agraria
de Colombia

Colombia



Spain



Argentina



Spain

5. Integrations

Learning Management Systems



- If Learning Management Systems used, no need for students to even go to LabsLand
- Teachers will still have analytics and will be able to see who used what laboratories and when

6. Sustainability

GLOBAL NETWORK OF ONLINE LABS

Lab consumers

universities, schools

Access to
laboratories



Lab providers

universities

Access to
laboratories



NRE projects
Lab development or deployment

FOCUSED IN UNIVERSITIES AND SCHOOLS

“The University of Georgia has been using LabsLand ‘s remote labs and we now have our own lab for our students and for contributing to the LabsLand network. Students find remote labs fun, very easy to use, and very convenient: being able to do homework with real hardware at any time, anywhere.”

-- Dominik May, Assistant Professor, University of Georgia, USA

“UNED is a distance university. For us, it’s necessary to provide our students with all the possible resources online. In science and engineering, LabsLand remote labs are a key solution: engaging, with demonstrated learning outcomes, easy to use, and integrated with our digital tools.”

-- Carlos Arguedas, Universidad Estatal a Distancia (UNED), Costa Rica

“Thanks to the LabsLand robotics laboratory my 15-16-year old students have learned to program robots using real robots without leaving the classroom, and without the common inconveniences of maintaining robots or having a dedicated space. It is so convenient and students love it!”

-- Ainhoa Merino, school teacher, Badaia High School, Spain



2019 Award



MIT TR35 Spain 2012



SINGULARITY
UNIVERSITY

Global Impact Competition 2016 Award



Best PhD & best MSc
awards by ES IEEE EdSoc

Check it out!

LabsLand

Spin-off of the University of Deusto (Bilbao, Spain)



Pablo Orduña, PhD
Founder & CEO - San Francisco Bay Area

MIT TR35 Spain 2012 (top 10 innovators < 35)
Entrepreneurship programs GSP & Launchpad
at Singularity University (5-month), 2016
Visiting Researcher MIT 2011
Past Vice-Chair Standards Committee IEEE
EdSoc & Past Executive Member, IAEO



Luis Rodriguez Gil, PhD
Founder & CTO - Bilbao, Spain

PhD in remote laboratories
IEEE award to the best MSc thesis and best
academic record in 2010 and 2013
MSc in Computers Security, MEng in Computer
Science
MEng in Management Engineering

Check it out (at zero cost)

If you want to explore it (for research or for testing), **go to**:

<https://labsland.com>

And then in “Pricing”. Then select the **Advanced** and you will create your own LabsLand space that you can test all these technologies.

Then send us an e-mail to:

support@labsland.com

With subject [**ETEE2019**] and the space link on it

We will increase the default 14 days demo to be ended manually
(in over 2 months; and no commitment)

Questions?

Labs Land

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