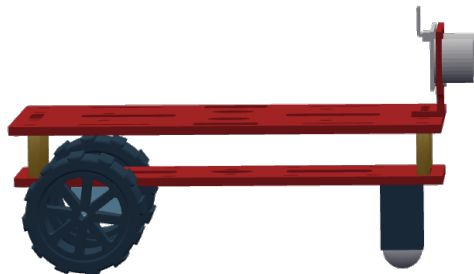# DISRUPTED LESSONS IN ENGINEERING ROBOTICS: AUTHENTIC LEARNING EXPERIENCES WITH VIRTUAL LABS AND OPEN-SOURCE HARDWARE

+ GUIDELINES FOR USE

SALTISE 2021

Joel Trudeau[1], Tanya Chichekian[2], Tawfiq Jawhar[1]

[1]Dawson College, [2]Université de Sherbrooke

OVERVIEW

- **Education 4.0:** Learning for the Fourth Industrial Revolution (*4IR*)
  Arduino microcomputing use case

- **Engineering Robotics:** Active, hands-on learning in and out of the classroom
  A COVID-19 pivot to the virtual

- **Blended Learning:** Virtual labs + physical labs
  Guidelines for use: Open discussion

ARDUINO 101: WHAT IS ARDUINO?

- Arduino is an open-source microelectronics platform based on easy-to-use hardware and software.

- Arduino microcontroller boards can read inputs and turn them into outputs.

- Arduino is composed of two major parts:
  1. Hardware microcontroller
  2. IDE software to program the microcontroller
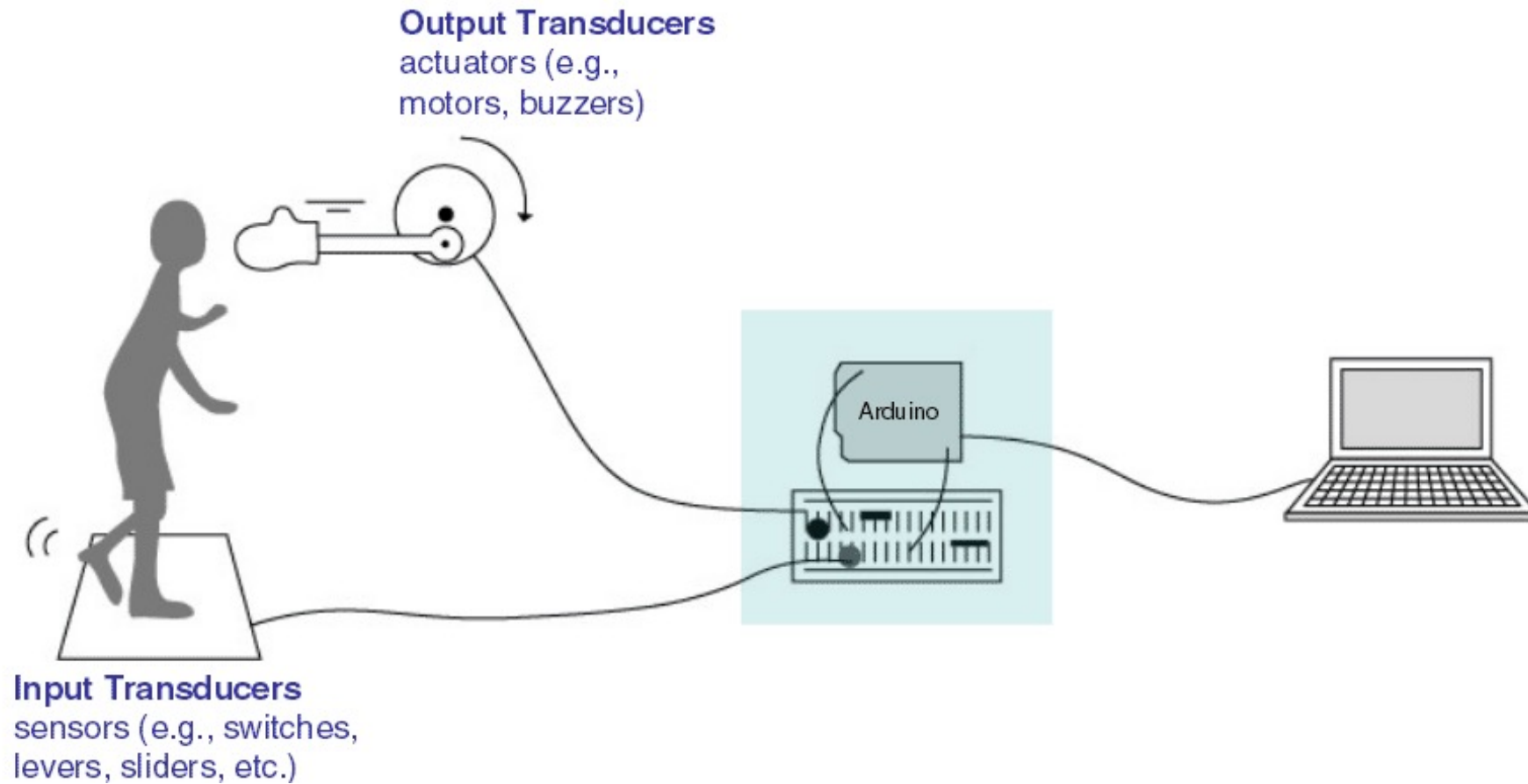
ARDUINO 101: HOW IT WORKS

Image: *Theory and Practice of Tangible User Interfaces* at UC Berkley

ENGINEERING ROBOTICS PRE-COVID USE CASE

Sample

- N = 58 (17F, 40M, 1 missing)
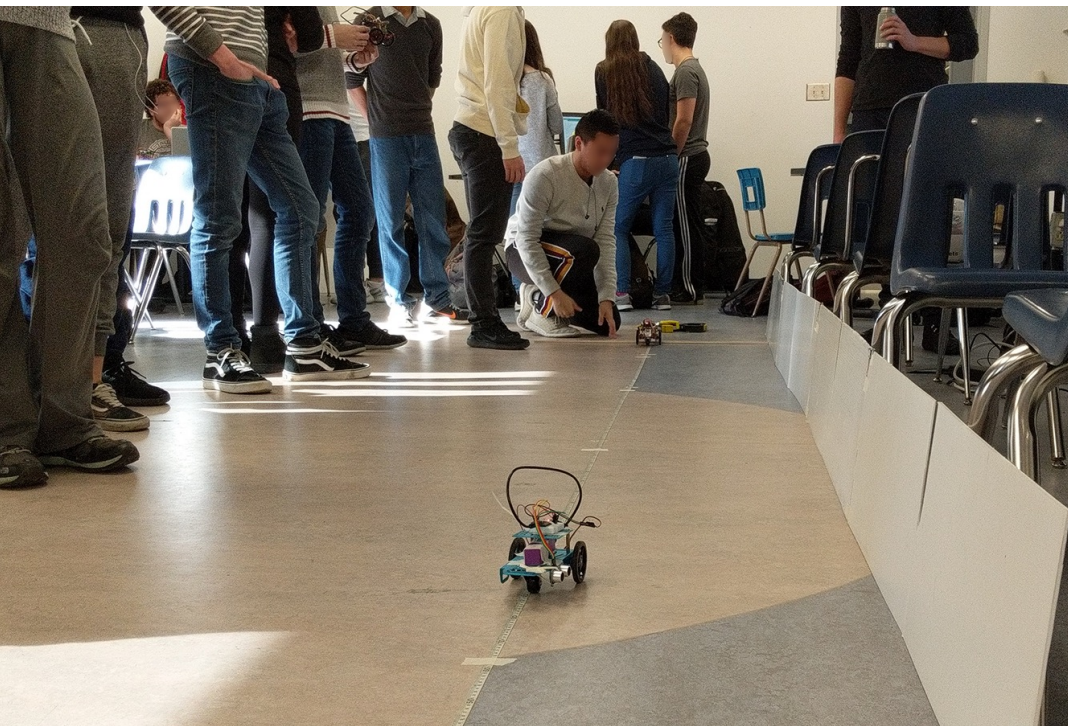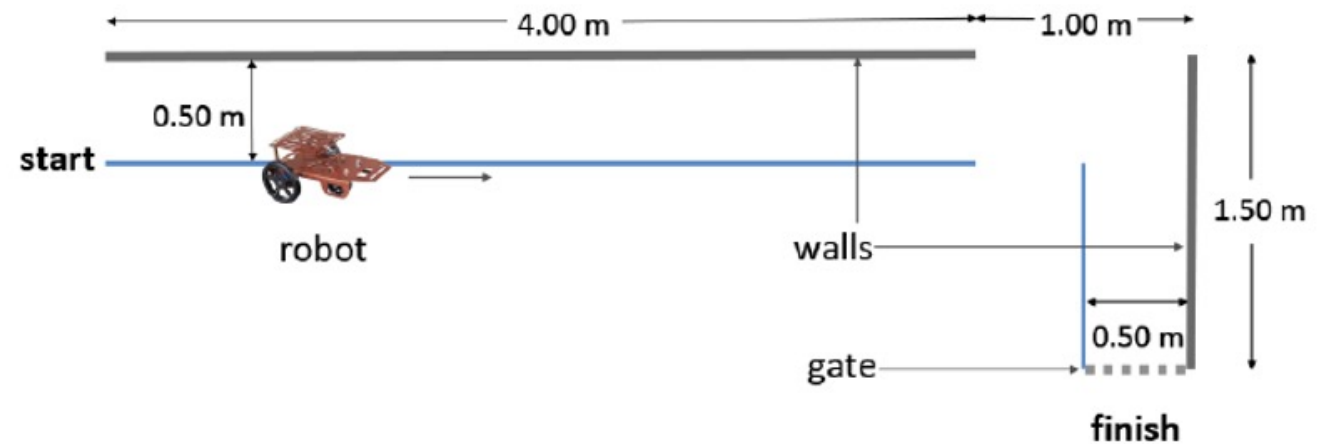
- Final semester Engineering Physics course

Figure 1
Navigation Challenge Before COVID-19 Lockdown

Autonomous Navigation Challenge

4-lab sequence in two Engineering Physics final semester courses culminating with class challenge: *Using sensor feedback program a robot to navigate along a complex path in the shortest possible time.*

First 2 labs done before Covid-19 lockdown

Video

Dawson College
Engineering Robotics

Class Navigation Challenge Robot Testing

see part 2 for additional slides