



# ESmartlz



Space settlers on Orion

# Agenda

- Theory
  - Energy Basics
  - Laws of thermodynamics
- ESMartlz
  - Chapter 1: The mine
    - Extracting energy from the mine
  - Chapter 2: The oleoduct

# Agenda

- Lego Mindstorms EV3 Programming
  - Sequence, iteration & bifurcation
- Missions
- Teamwork tips
- Homeworks
- How to get more points?

## Annual balance of electrical energy

	Peninsular system		Extra-peninsular system		National total	
	GWh	% 13/12	GWh	% 13/12	GWh	% 13/12
Hydro	34,205	75.8	0	-	34,205	75.8
Nuclear	56,378	-8.3	-	-	56,378	-8.3
Coal <sup>(1)</sup>	39,792	-27.3	2,591	-11.9	42,384	-26.5
Fuel/gas <sup>(2)</sup>	-	-	6,981	-7.4	6,981	-7.4
Combined cycle	25,409	-34.2	3,574	-8.8	28,983	-31.8
<b>Gross production</b>	<b>155,785</b>	<b>-10.6</b>	<b>13,147</b>	<b>-8.7</b>	<b>168,932</b>	<b>-10.4</b>
Self-consumption	-6,241	-20.9	-771	-9.3	-7,012	-19.8
Hydro	7,095	52.8	3	-	7,098	52.8
Wind	53,926	12.0	375	1.8	54,301	12.0
Solar photovoltaic	7,982	1.9	415	12.6	8,397	2.4
Solar thermoelectric	4,554	32.2	-	-	4,554	32.2
Renewable thermal	5,011	5.6	9	11.4	5,020	5.6
Non-renewable thermal	32,048	-4.3	260	-5.1	32,309	-4.3
<b>Special regime</b>	<b>110,616</b>	<b>8.1</b>	<b>1,062</b>	<b>4.1</b>	<b>111,679</b>	<b>8.1</b>
<b>Net production</b>	<b>260,160</b>	<b>-3.2</b>	<b>13,438</b>	<b>-7.8</b>	<b>273,598</b>	<b>-3.4</b>
Pumped storage consumption	-5,769	14.9	-	-	-5,769	14.9
Peninsula-Balearics interc. <sup>(3)(4)</sup>	-1,266	-	1,266	-	0	-
International exchanges <sup>(4)</sup>	-6,958	-37.9	-	-	-6,958	-37.9
<b>Demand (b.c.- at power station busbars)</b>	<b>246,166</b>	<b>-2.3</b>	<b>14,704</b>	<b>-2.9</b>	<b>260,870</b>	<b>-2.3</b>

Source: REE

[http://www.ree.es/sites/default/files/downloadable/preliminary\\_report\\_2013.pdf](http://www.ree.es/sites/default/files/downloadable/preliminary_report_2013.pdf)

# Energy (15')

- Energy basics.  
<http://energy.gov/eere/energybasics/energy-basics>
  - What is your favorite energy? Why?
- Laws of thermodynamics.  
[http://en.wikipedia.org/wiki/Laws\\_of\\_thermodynamics](http://en.wikipedia.org/wiki/Laws_of_thermodynamics)
- What does NASA do in space missions?  
<http://www.nasa.gov/missions/>
  - In ESMartlz, what is the best way?

# Teamwork - Tips

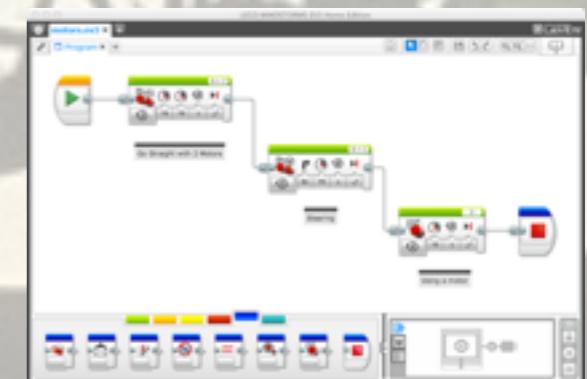


+25

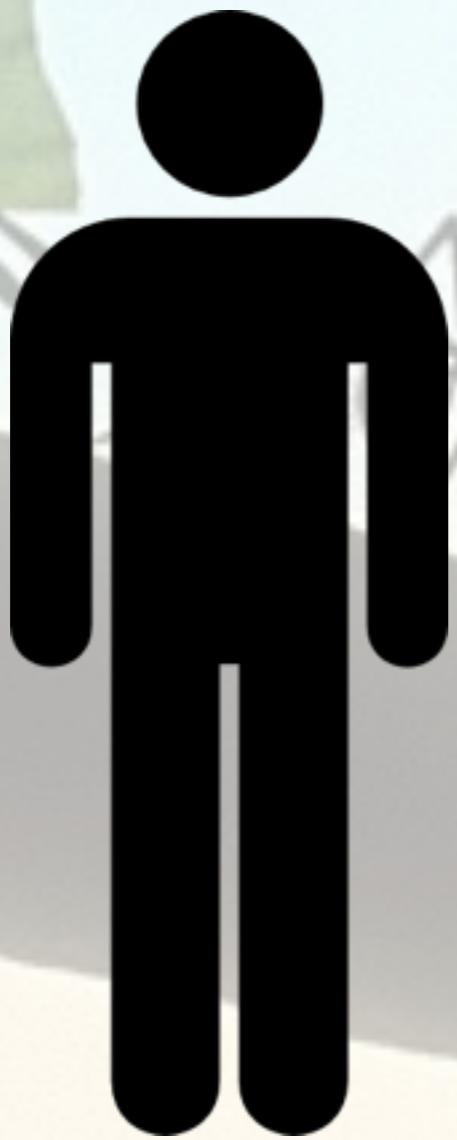
**Build**



**Develop**



# Teamwork - Tips



**Daniel, Team 1**

**Diego, Team 2**

**Rodrigo, Team 1**

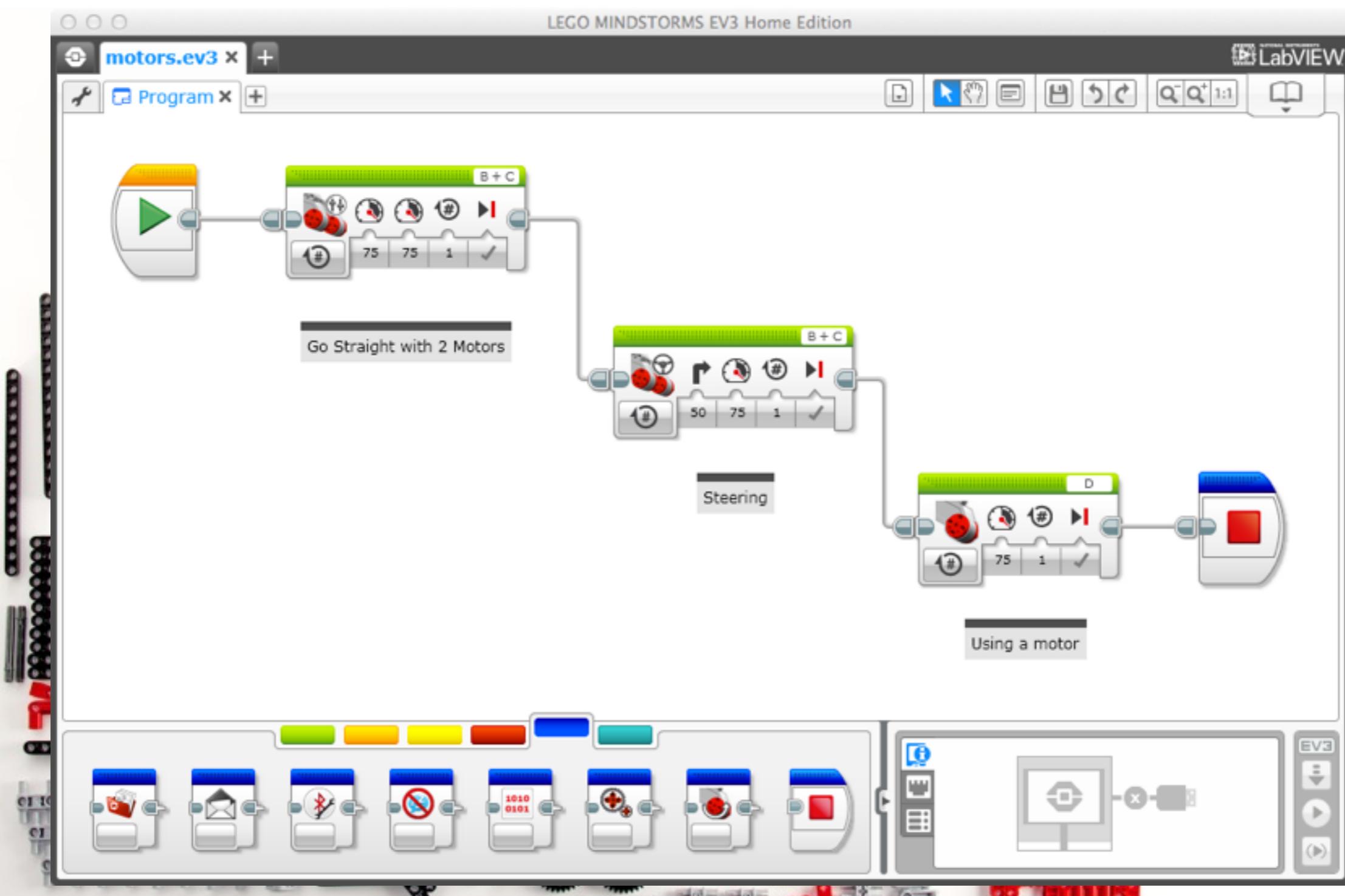
**Francisco, Team 2**



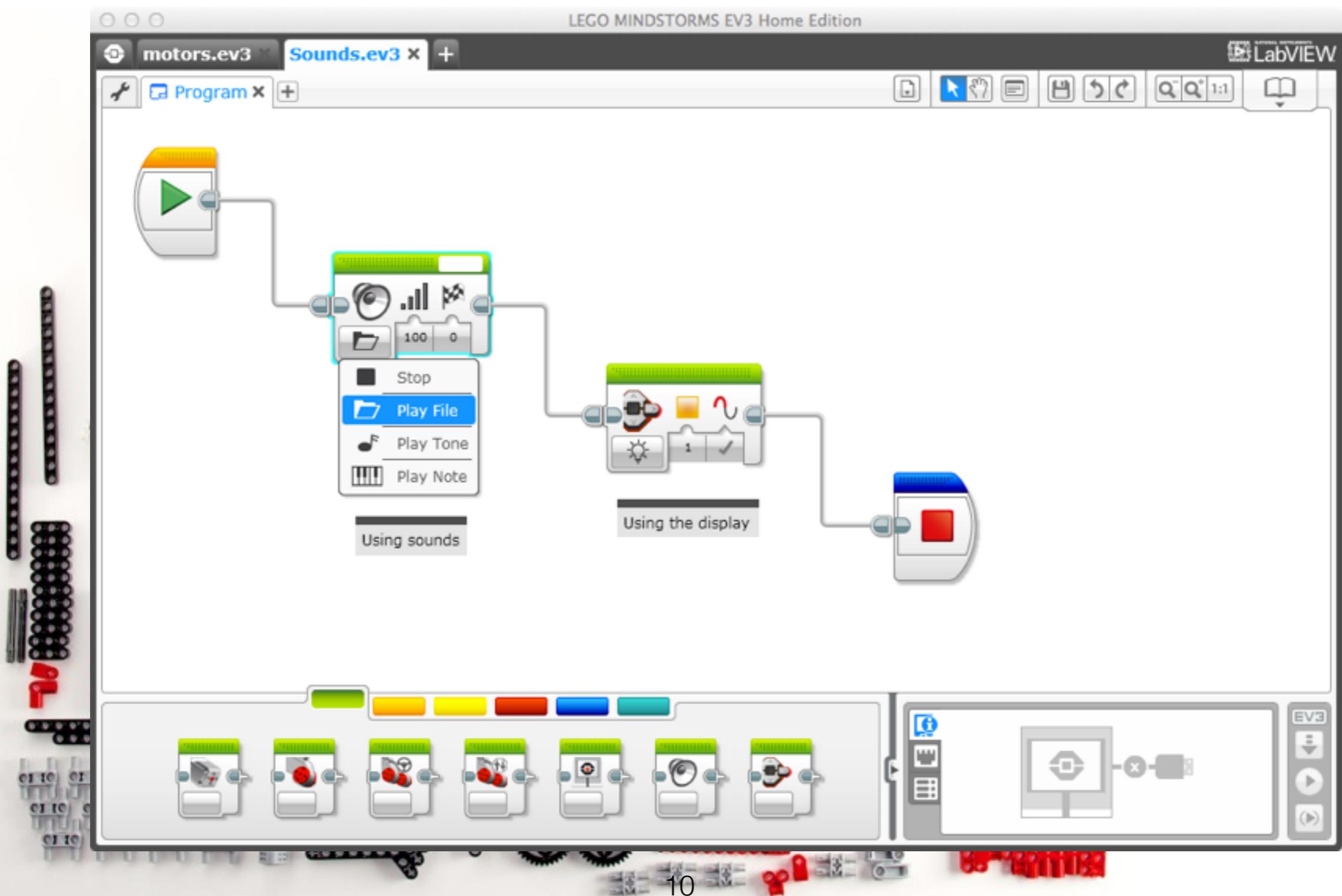
A complete  
NXT-G Course.



# Basics - Motors



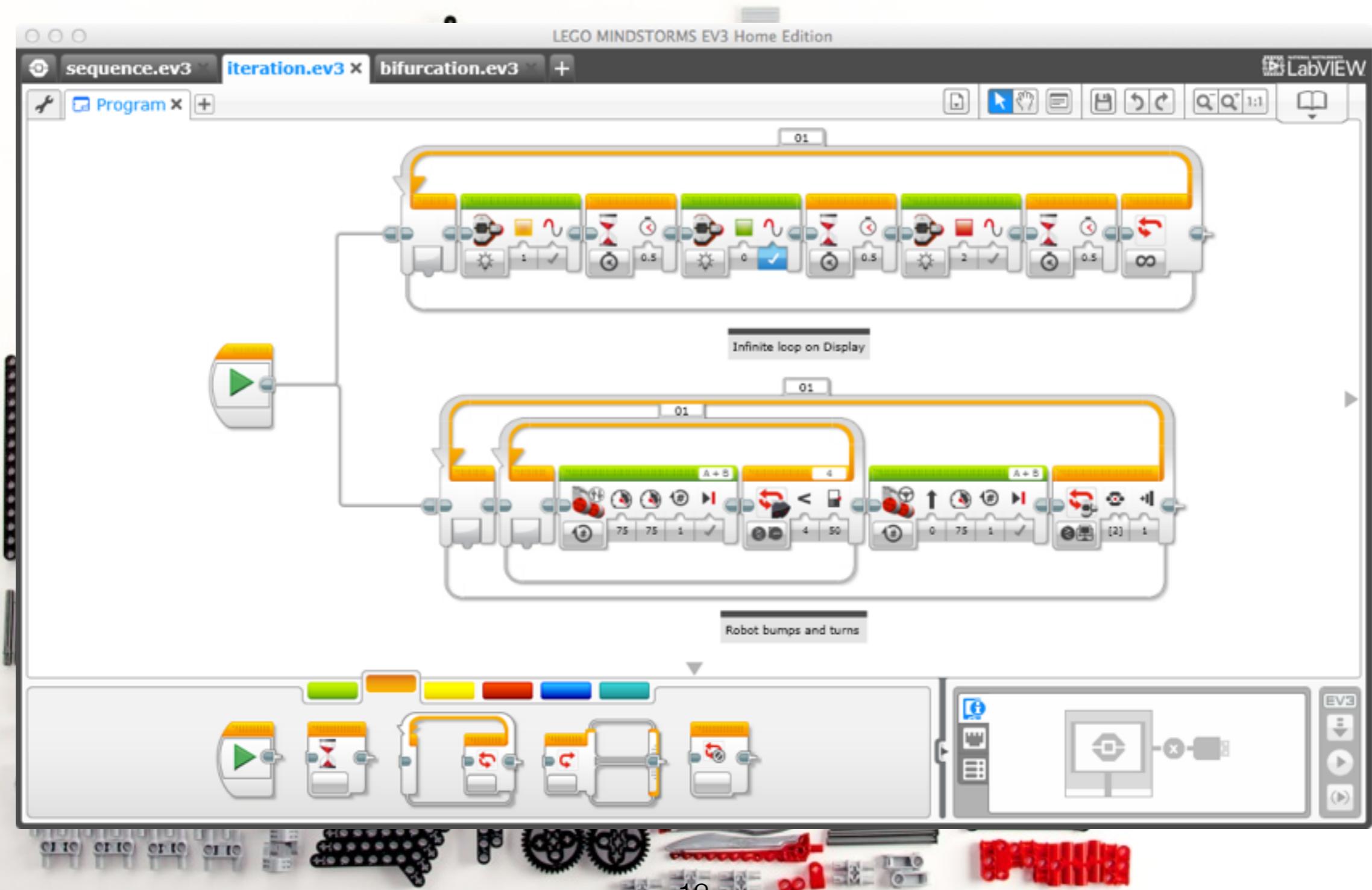
# Basics - Sounds



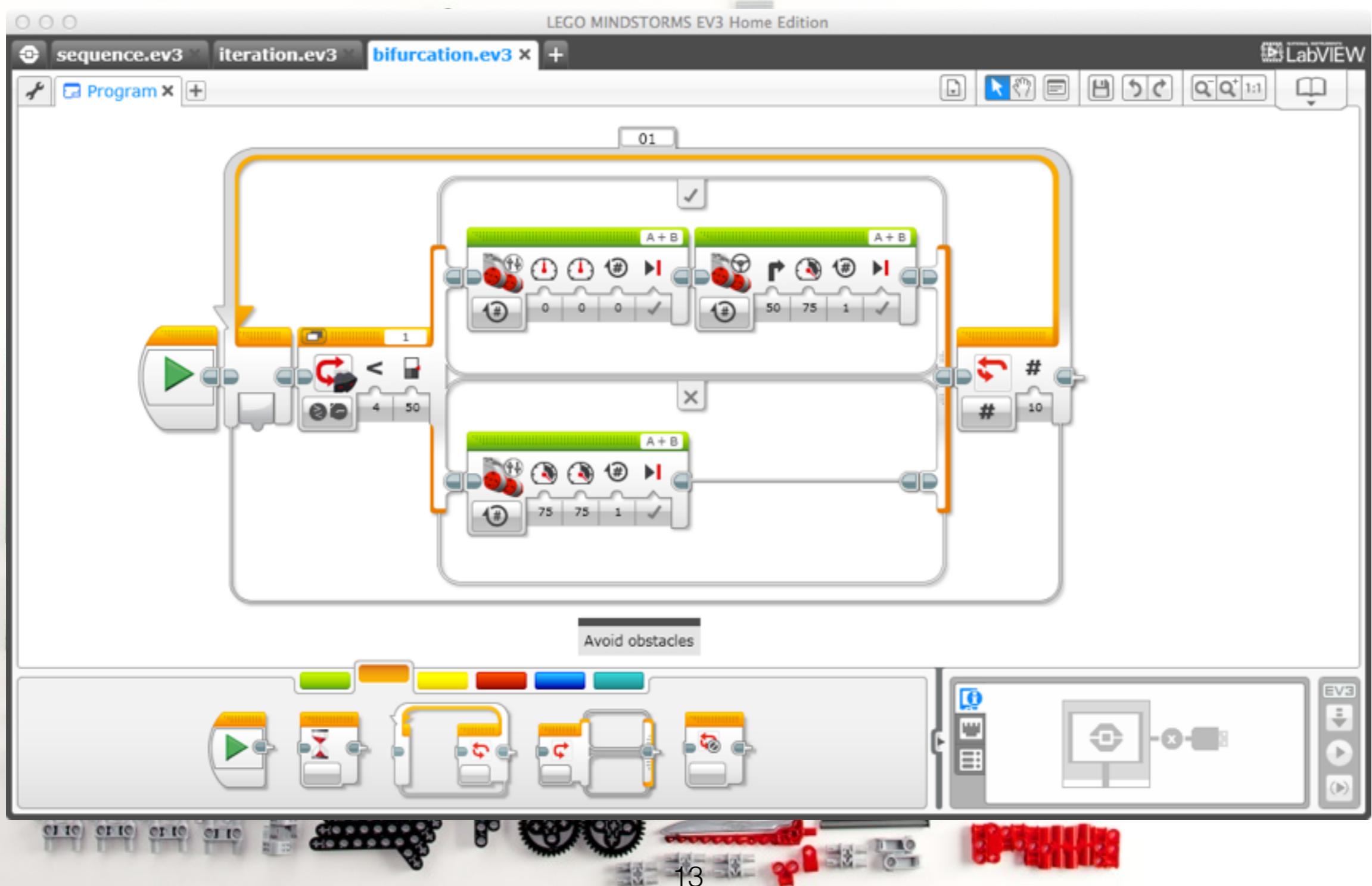
# Concepts - Sequence



# Concepts - Iteration



# Concepts - Bifurcation



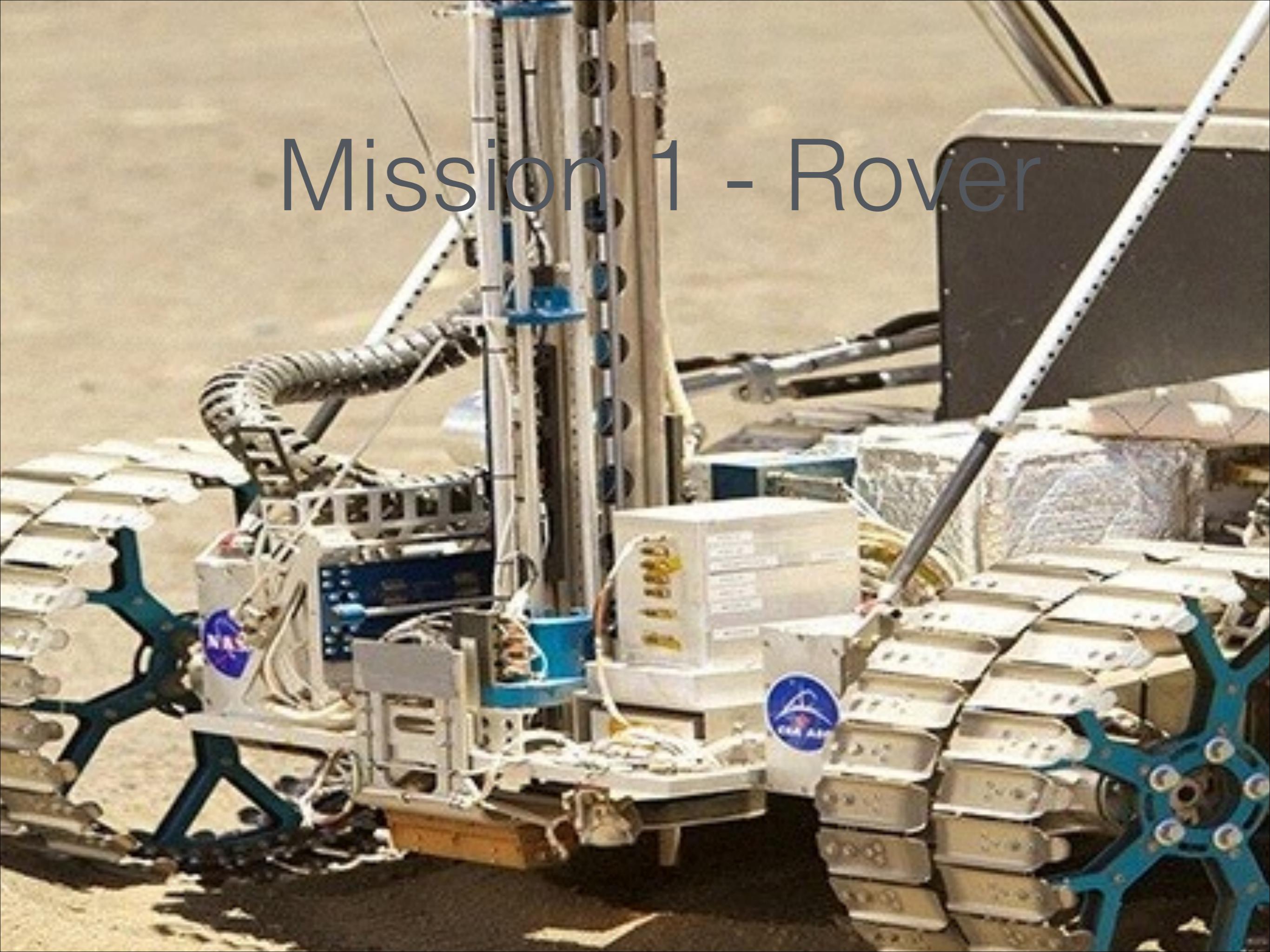
# ESmartlz



# ESmartlz - Mission 1

- Team 1:
  - Create a Robot Explorer
    - Navigation: 2 Motors
  - Design the map to explore the area
  - Develop a program to move your vehicle from Space colony to the mine. Add the program to return home

# Mission 1 - Rover



# ESmartlz - Mission 1

- Team 2:
  - Create a Mineral mine
  - Develop a program for the mine
  - Sounds? Lights?

# Mission 1 - The mine



# ESmartlz - Mission 2

- Team 1: (Rover)
  - Send your program using basic commands. +5
  - Pendrive / Email
  - Design a Robot claw with 2 motors: + 10
  - Design a program to open/close the claw: +15
  - Build a robust platform: +50
  - Design a oleoduct from Colony to Mine + 15

# ESmartlz - Mission 2

- Team 2: (Mine // Urtaku)
  - Send (Pendrive / Email) your program using basic commands. +5
  - Deploy your Mine program in the mine +5
  - Develop a natural behavior for a Space mine. +30  
(Imitate the nature)
  - Develop a mobile Urtaku robot +20
  - Develop a program to protect the Mine +20

# ESmartlz - Urtaku



# Homework

- **Theory**

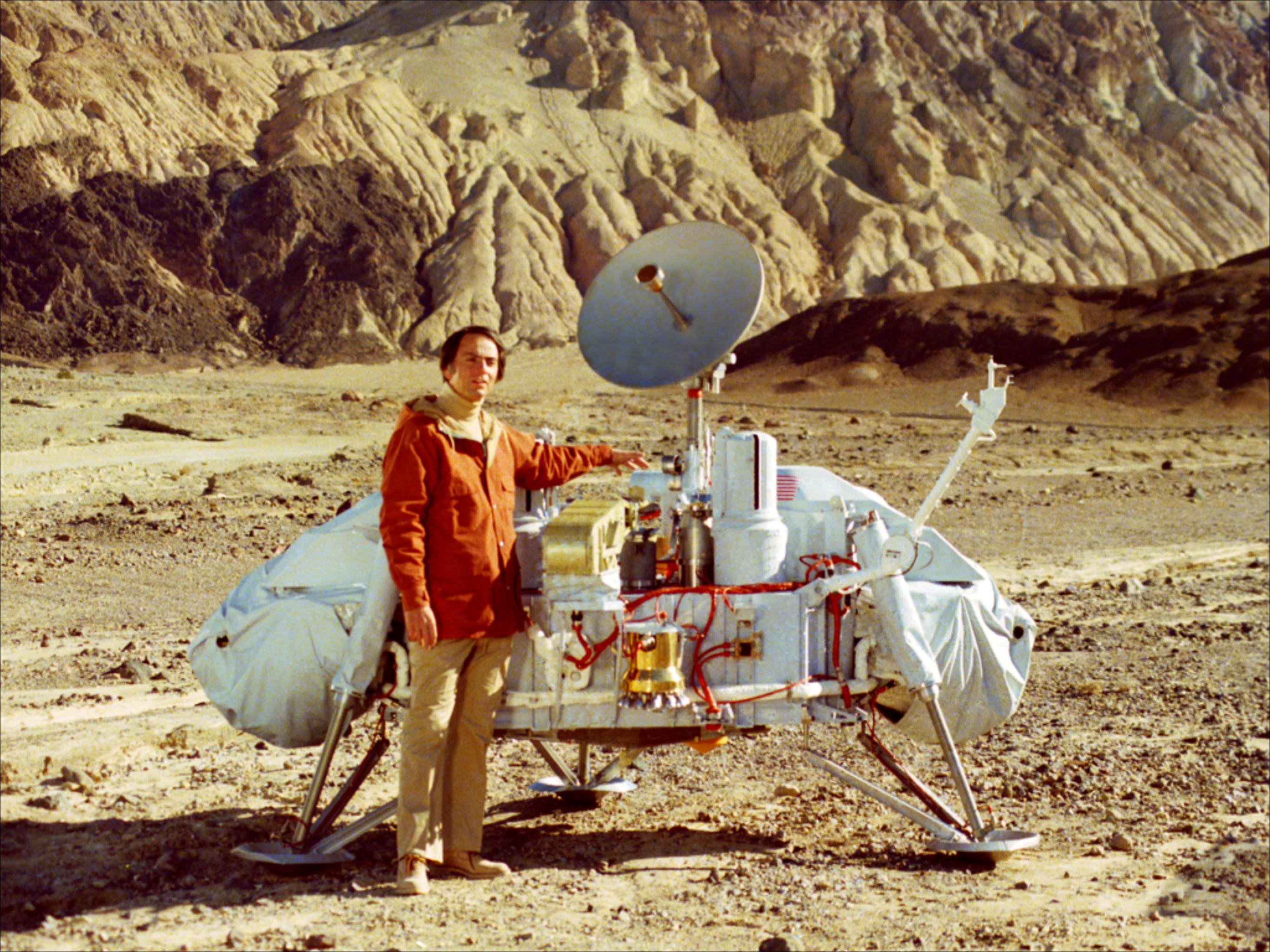
- Discover how many oleoducts exist in Europe
- Where is located Nuclear plants in Spain?
- Who is Nicolas Tesla?
- What invented Nicolas Tesla?

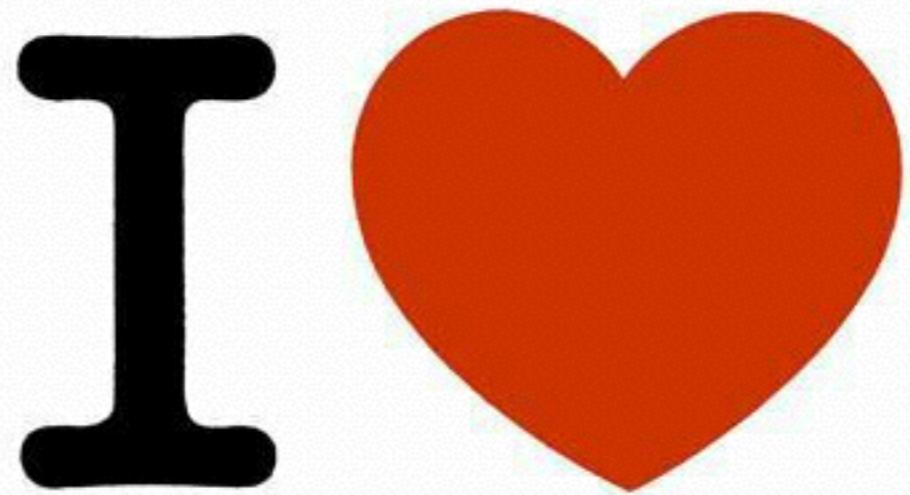
# How to get more points?

- **Social**
  - Inappropriate behavior: -20
  - Team work: +25
  - Speak in english: + 20
  - Participate in class: + 15

# How to get more points?

- **Technology**
  - Innovate: +30
  - Build your Robot / Mine: +10
  - Program your Robot / Mine: +15





**NEUTRINOS**

*for Kids*

<http://www.iloveneutrinos.com/>