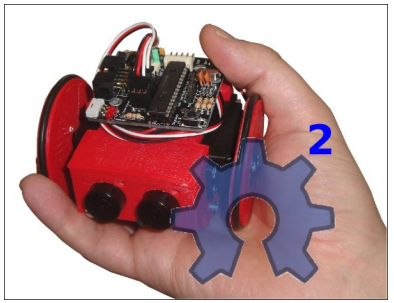
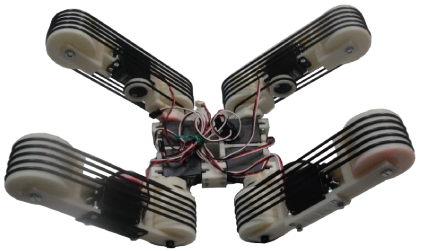
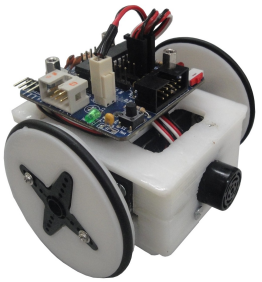
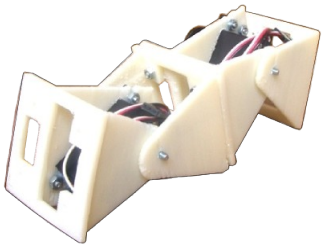
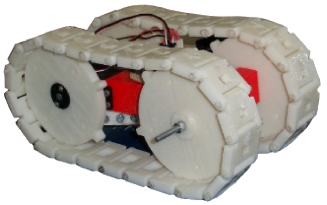
PRINTBOTS:
Robots Libres e Imprimibles




Juan González-Gómez (UPM)
Alberto Valero Gómez (UC3M)

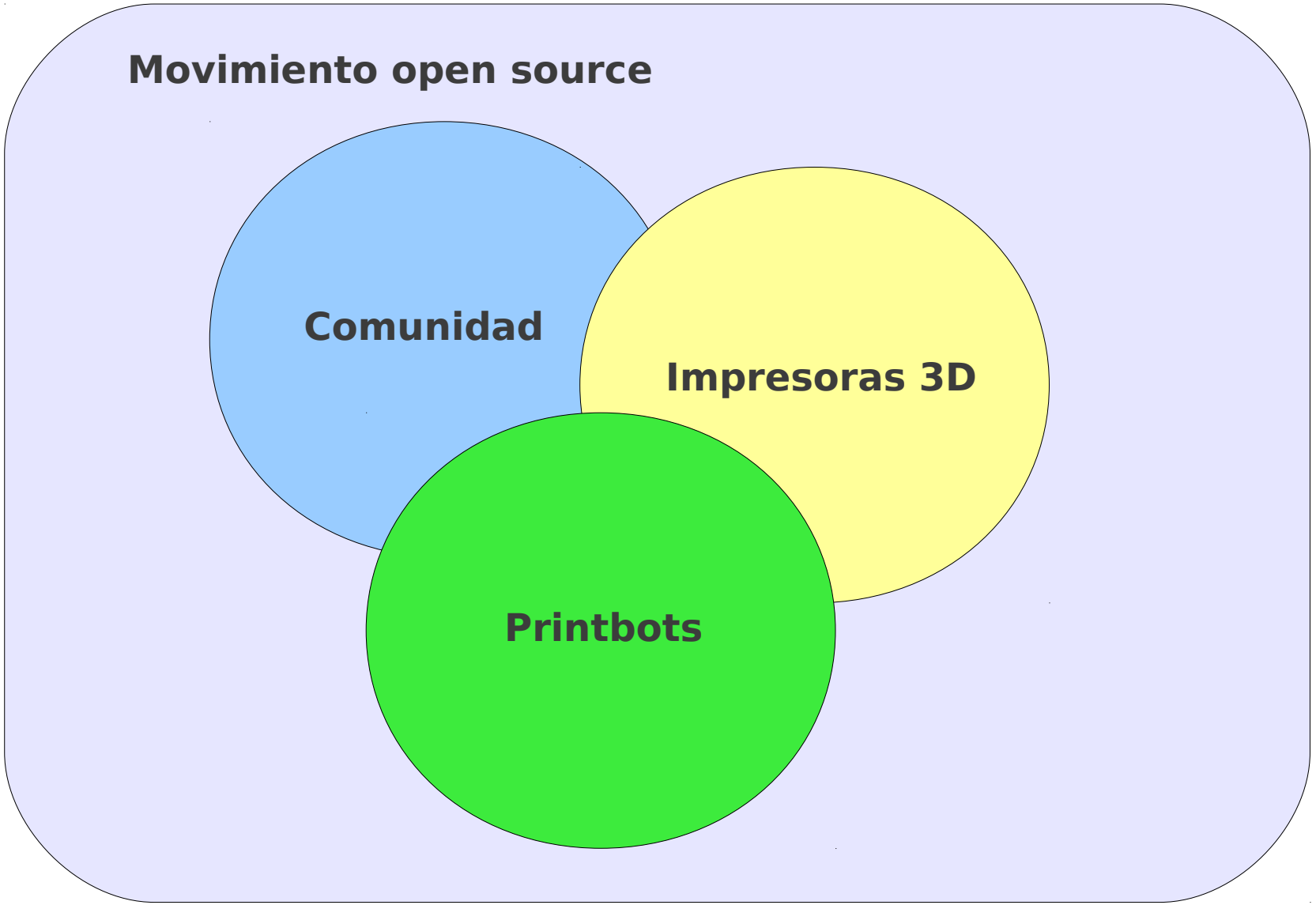
Universidad Politécnica de Madrid
Universidad Carlos III de Madrid

juan@iearobotics.com

Índice

juan@iearobotics.com

El “ecosistema”



Movimiento *Open Source (I)*

Patrimonio tecnológico de la humanidad

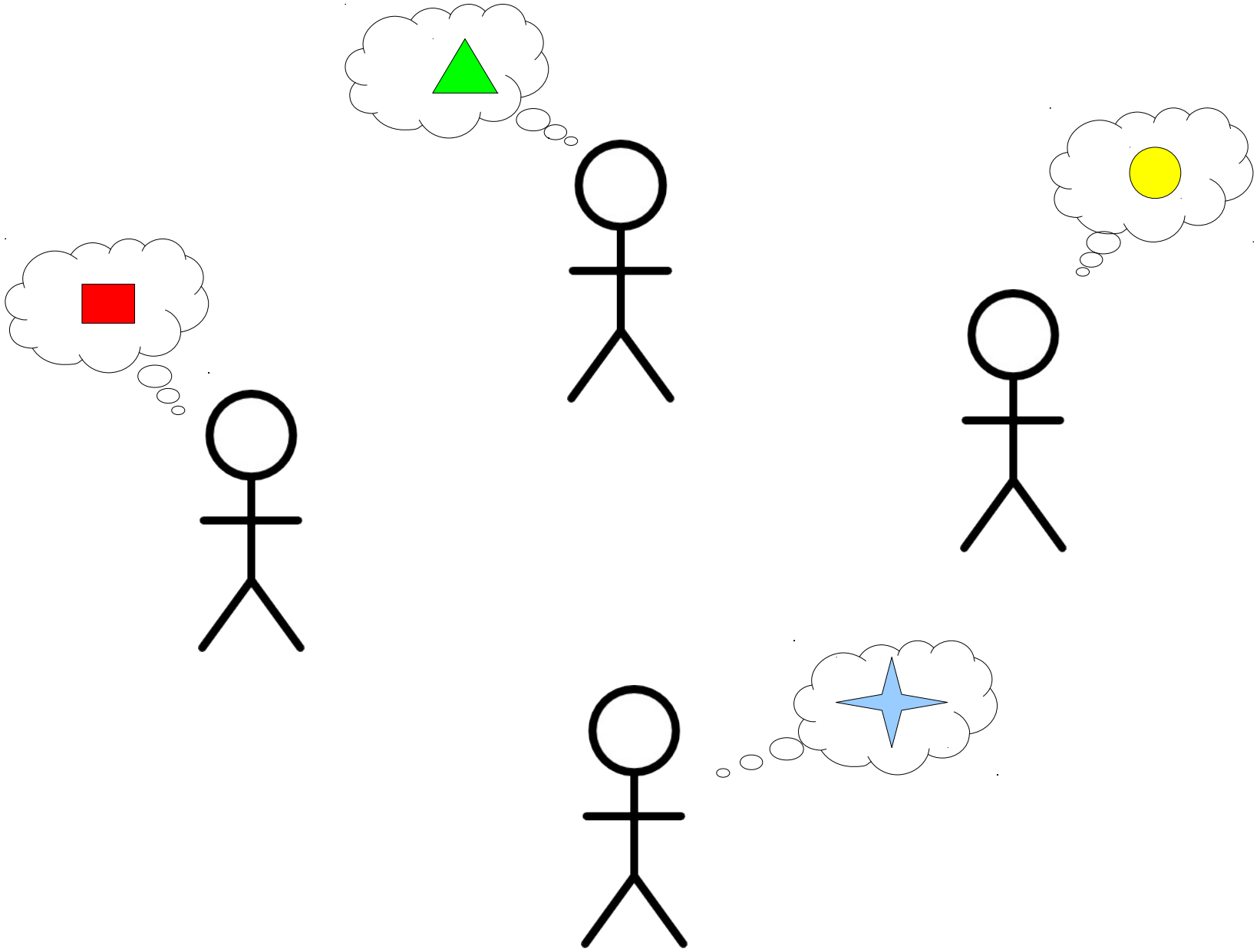
Movimiento *Open Source (II)*

Patrimonio tecnológico de la humanidad

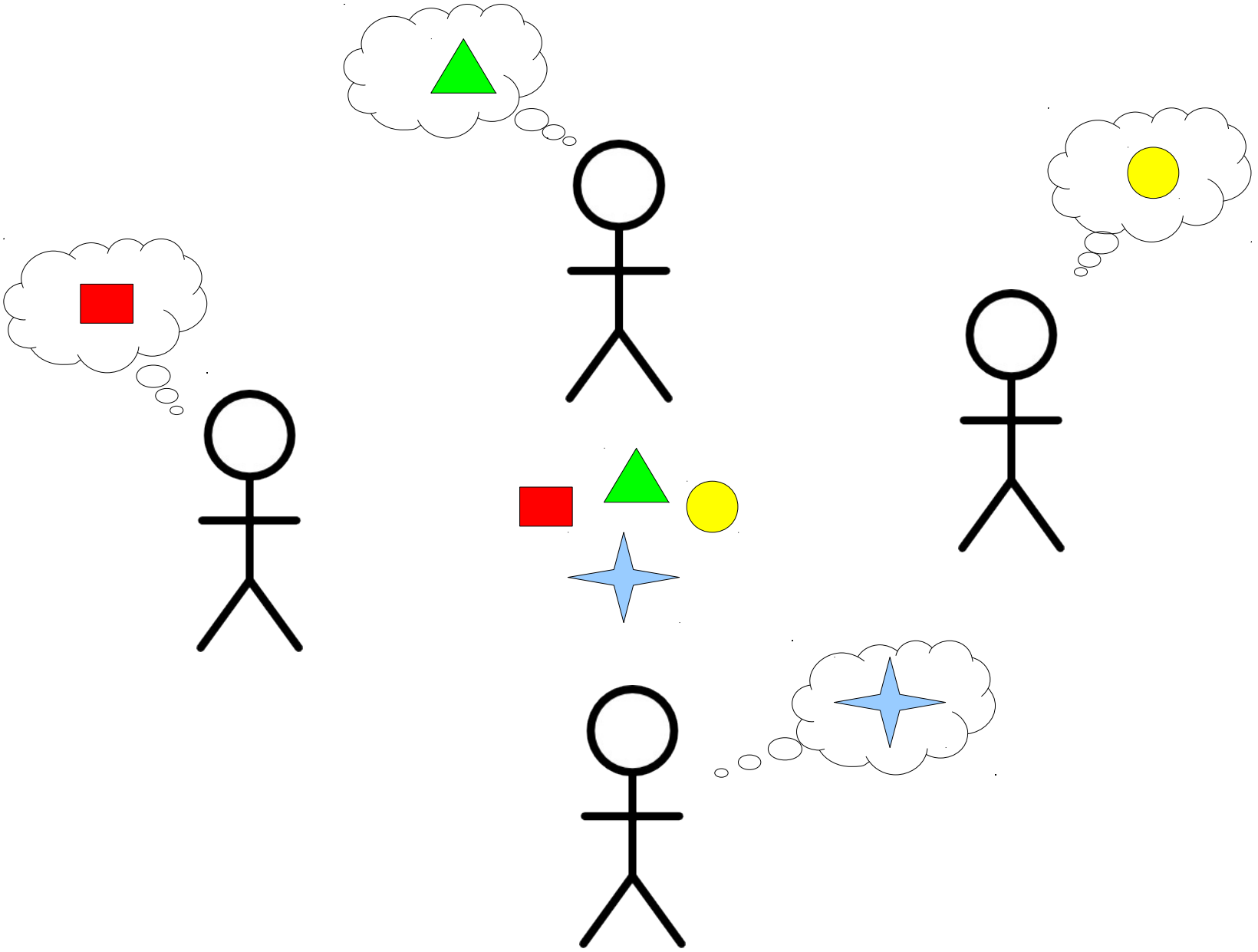
Comunidad científica

Conocimiento humano

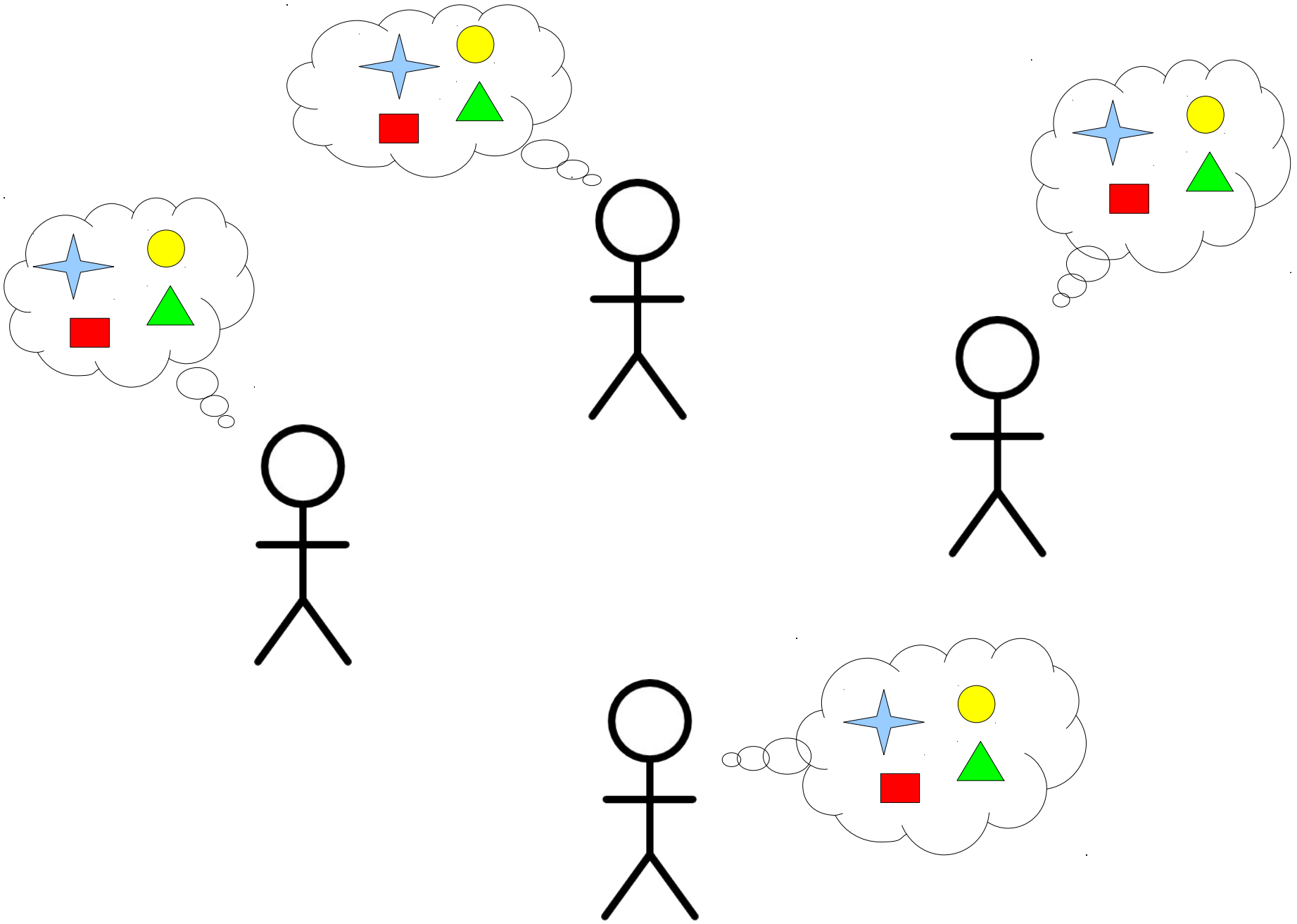
Comunidad: “el efecto comunidad” (I)



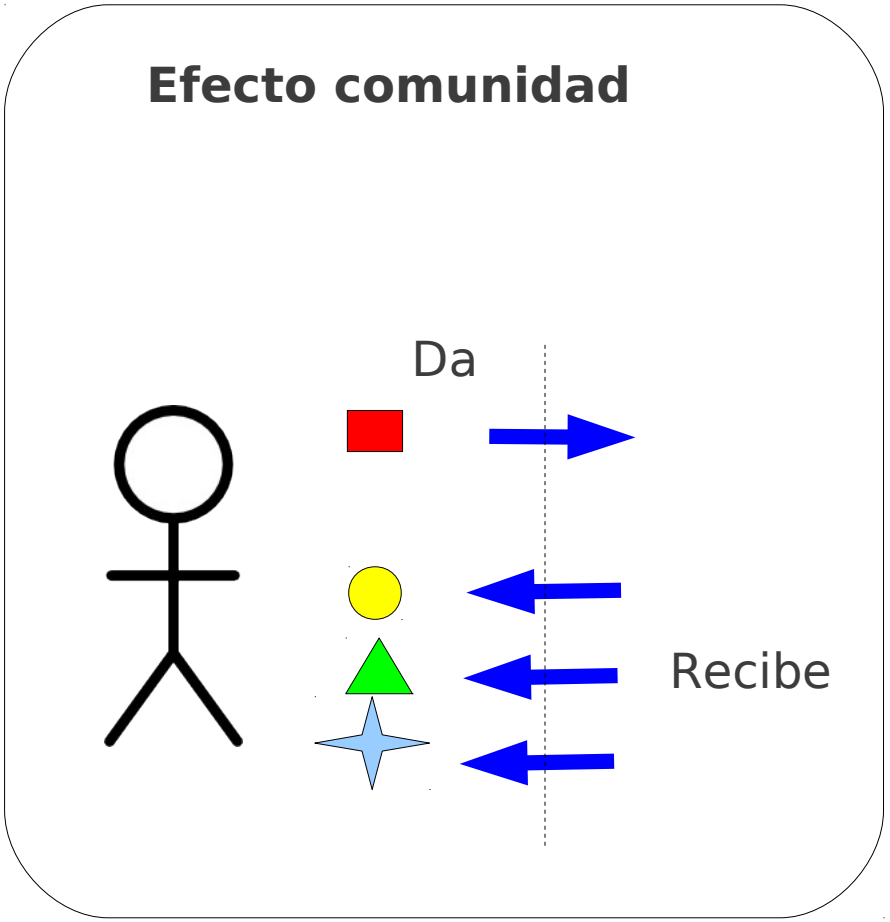
Comunidad: “el efecto comunidad” (II)



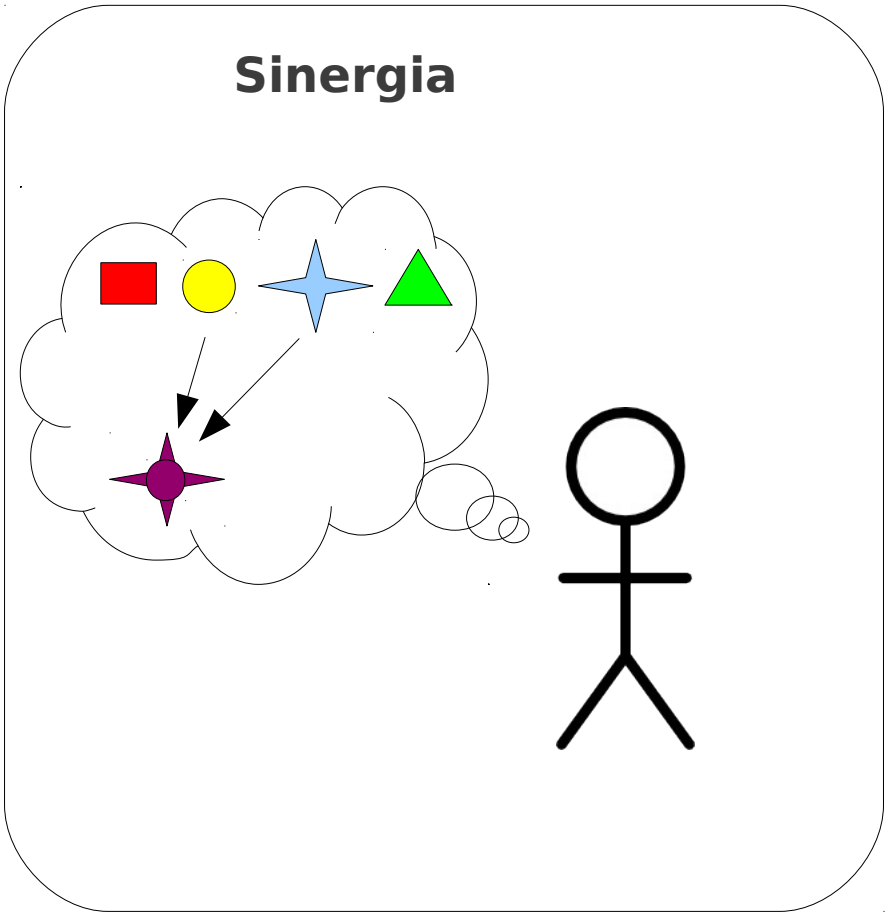
Comunidad: “el efecto comunidad” (III)



Comunidad (IV)



Balance positivo



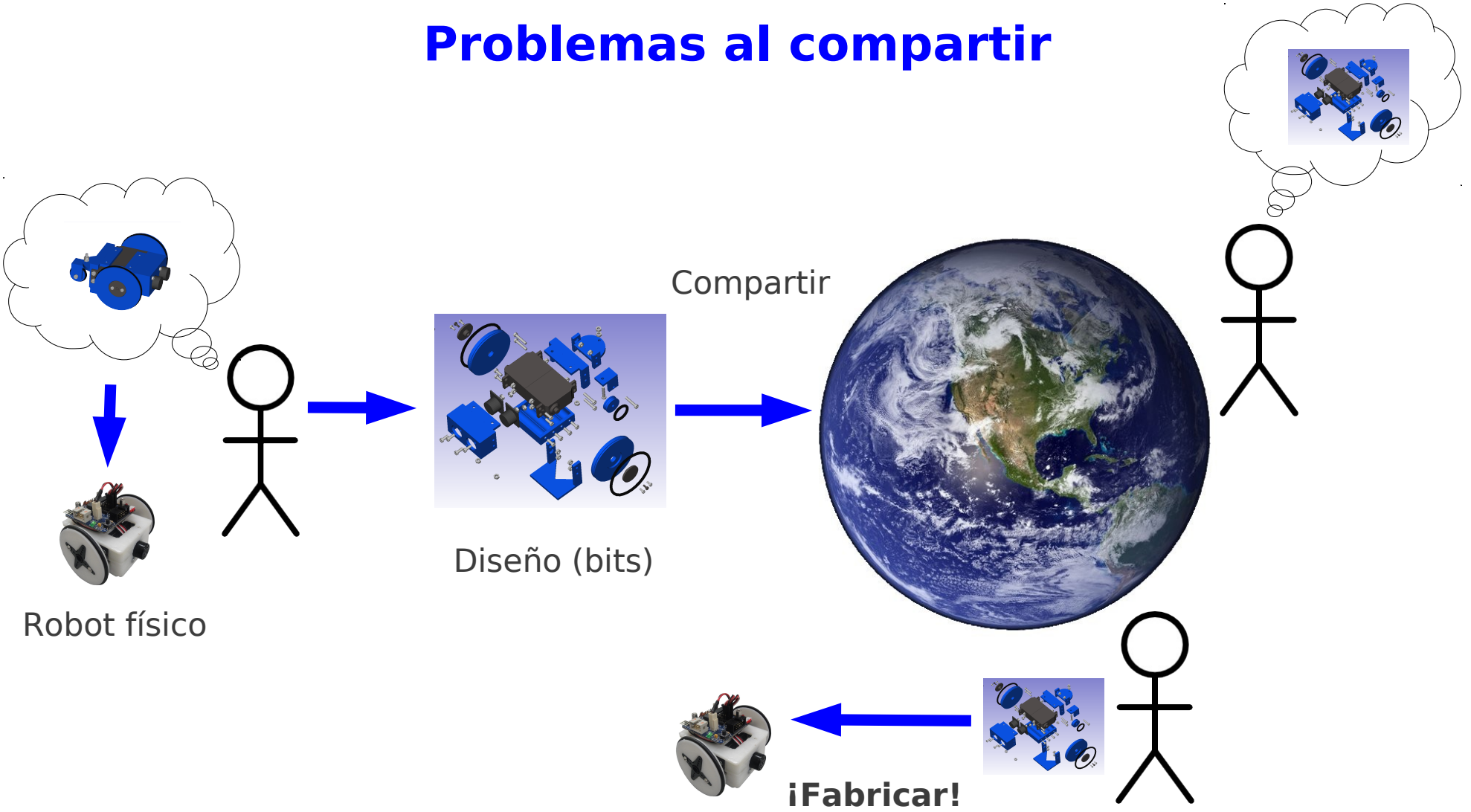
Aparecen nuevas ideas

Motivación

¿Por qué no aplicar este modelo a la robótica?

- Robots desarrollados por la comunidad
- Compartidos por Internet
- Robots que evolucionan
- ¡Aparición de diseños asombrosos!

Problemas al compartir



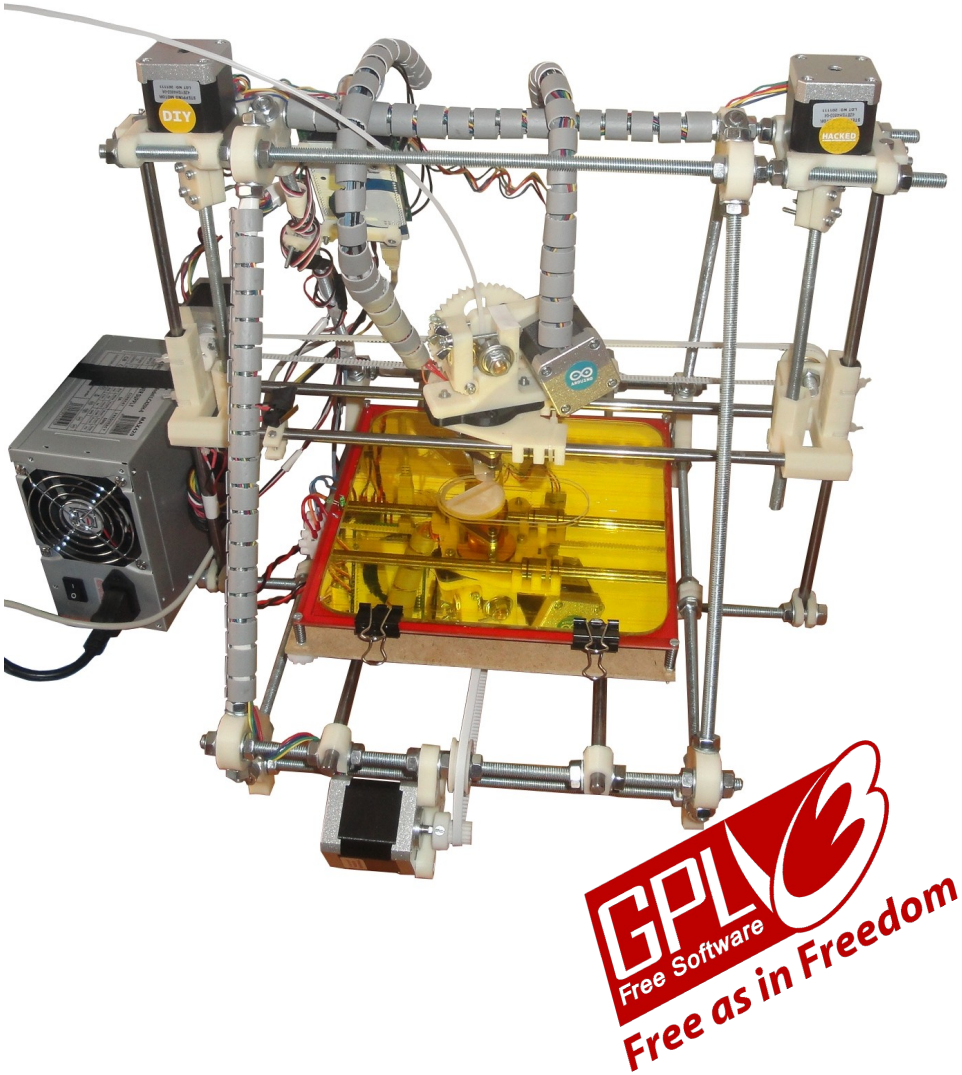
Índice

juan@iearobotics.com

Un sueño hecho realidad

MATERIALIZAR una idea en un objeto físico, rápidamente y barato

Y además... ¡open-source!



- Esquemas de diseño libres
- Te la puedes construir
- Puedes clonarla
- ¡Imprime una impresora a tus amigos!
- Precio aprox: 350€ - 500€

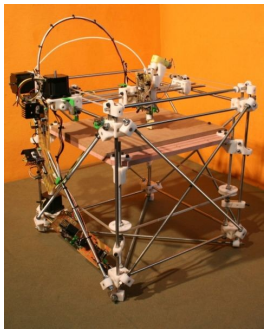
¡Ansia viva!

Historia (muy resumida...)

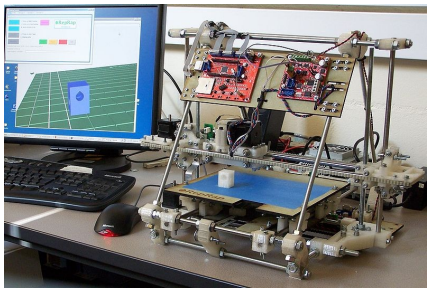
(A. Bowyer, 2005)

RepRap

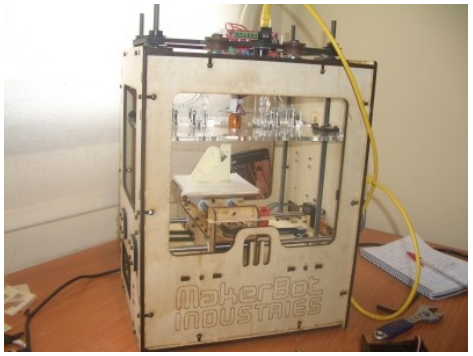
Darwin, 2007



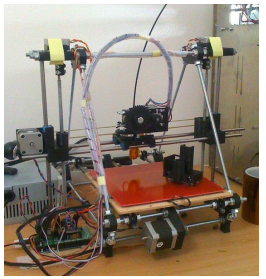
Mendel, 2009



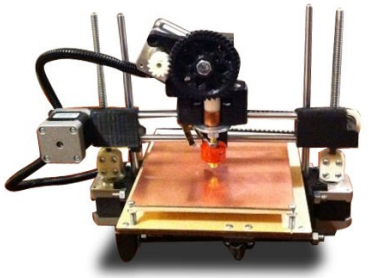
Cupcake,
Makerbot (2009)



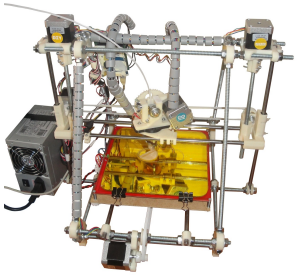
Prusa Mendel,
2010



Printrbot, 2012



Prusa II, 2011



Prusa III, 2012

Thingiverse

Nuestra evolución...

Darwin, Feb/2009

MediaLab PRADO

Mayo 2009

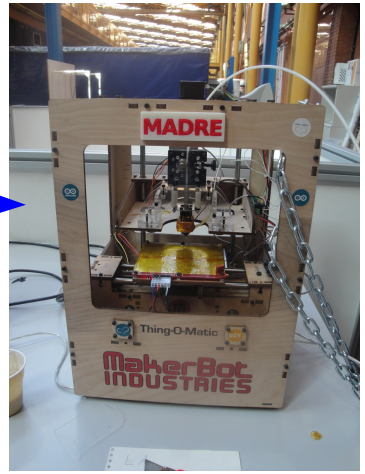
Makerbot #8

Abril, 2011

Proyecto CloneWar

Mayo 2011

MADRE! (ASROB-UC3M)

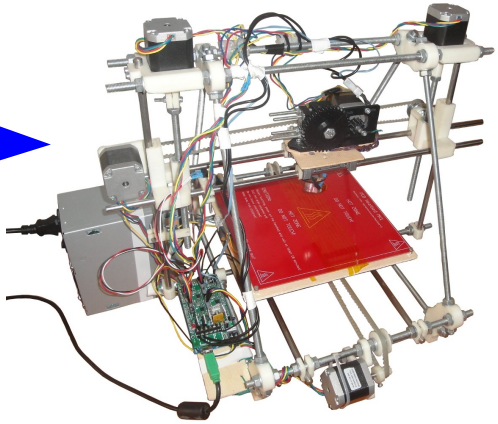


Octubre 2011

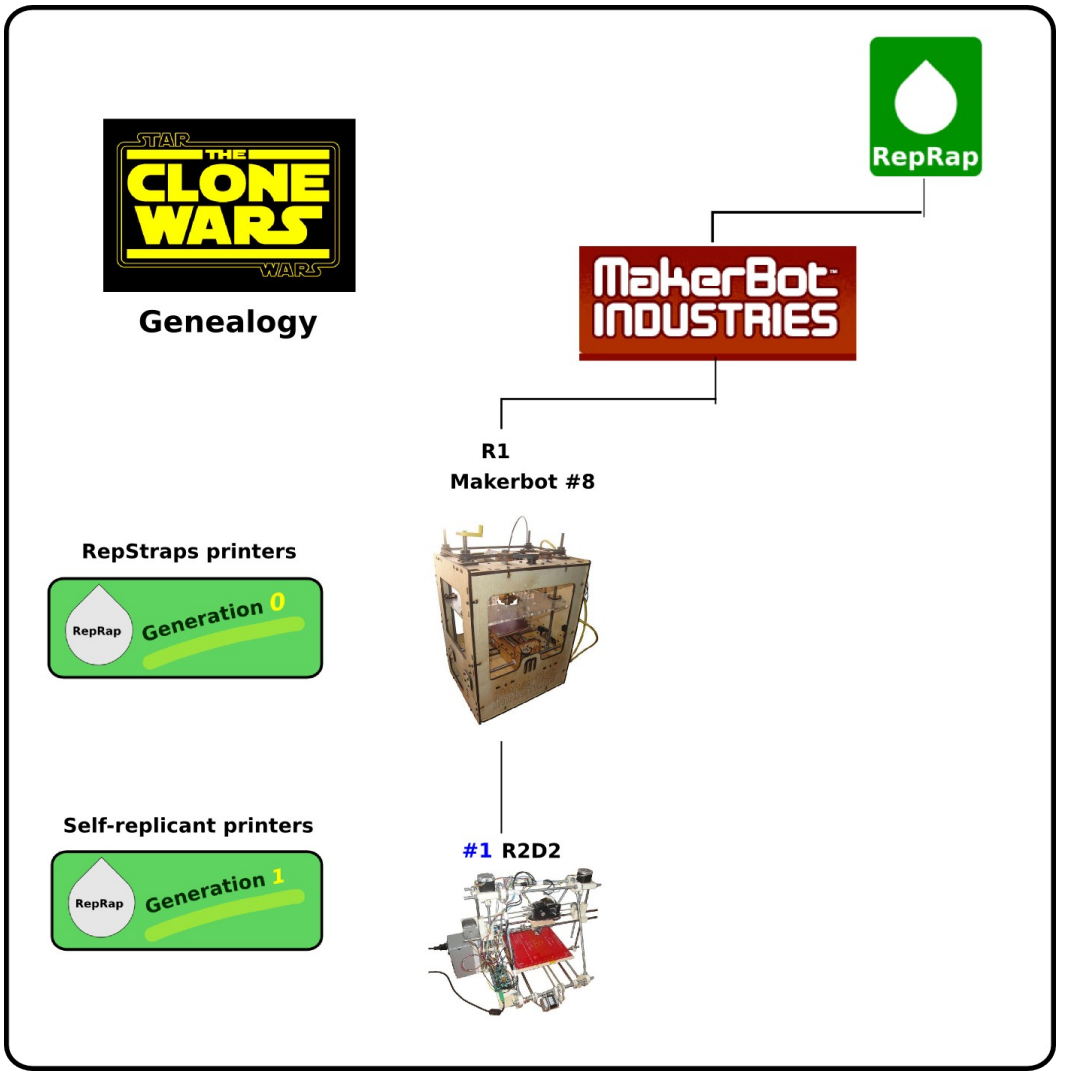
PADRE (UC3M)

Dic 2011

Primer clon R2D2

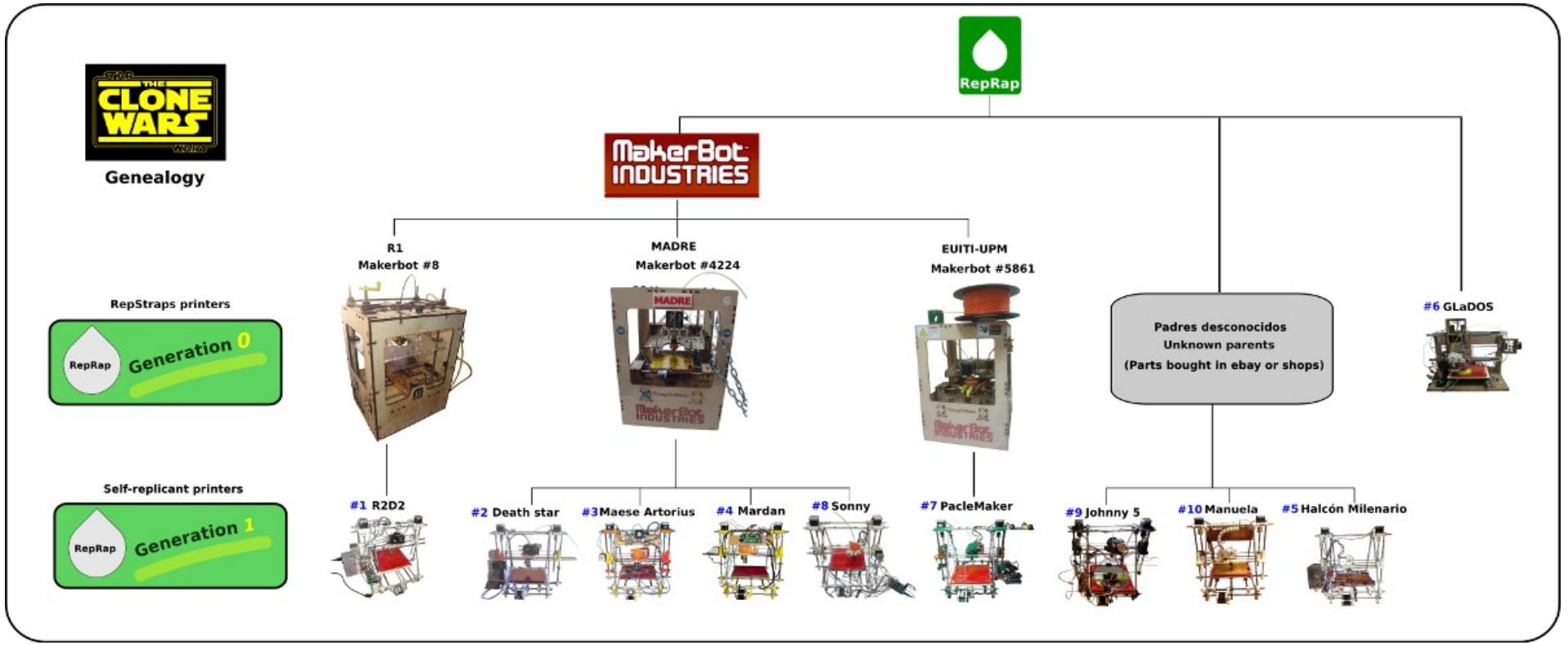


Clone wars: Dic/2011



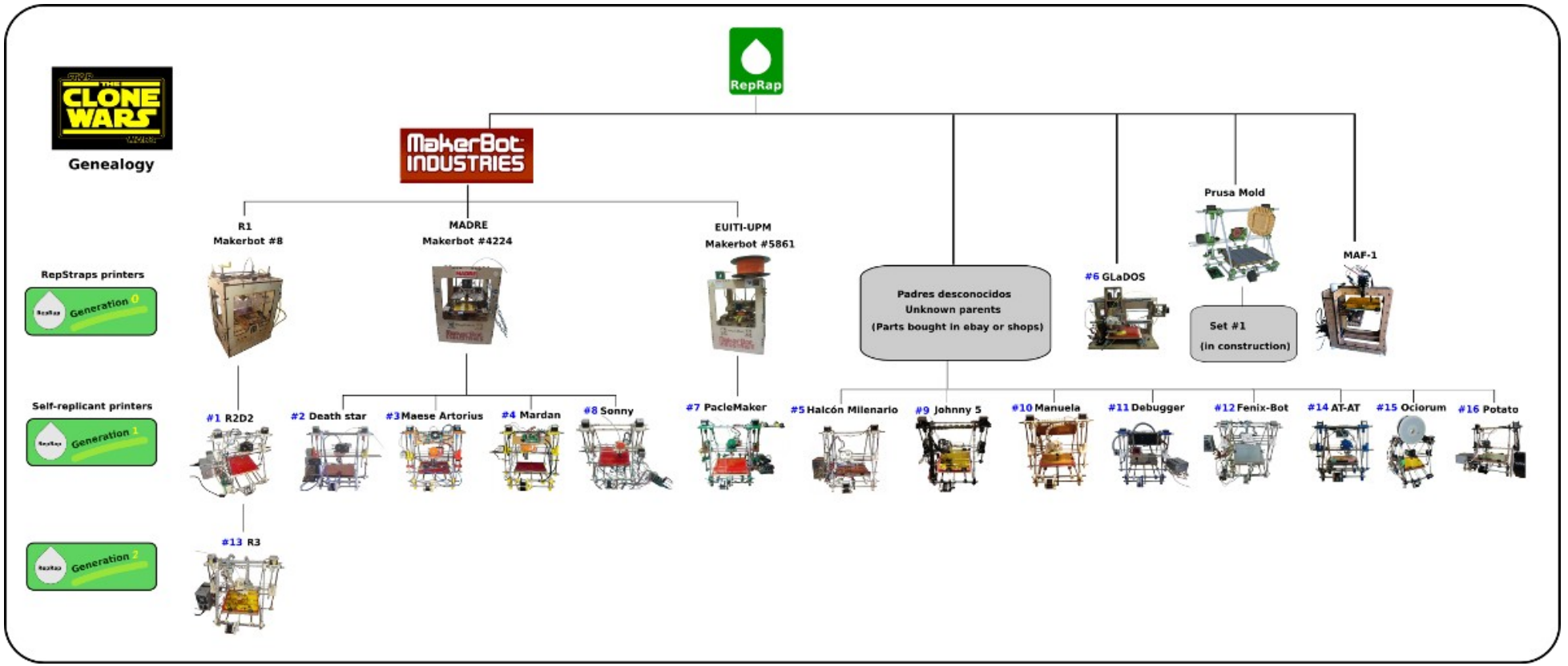
Clones: 1

Clone wars: Marzo/2012



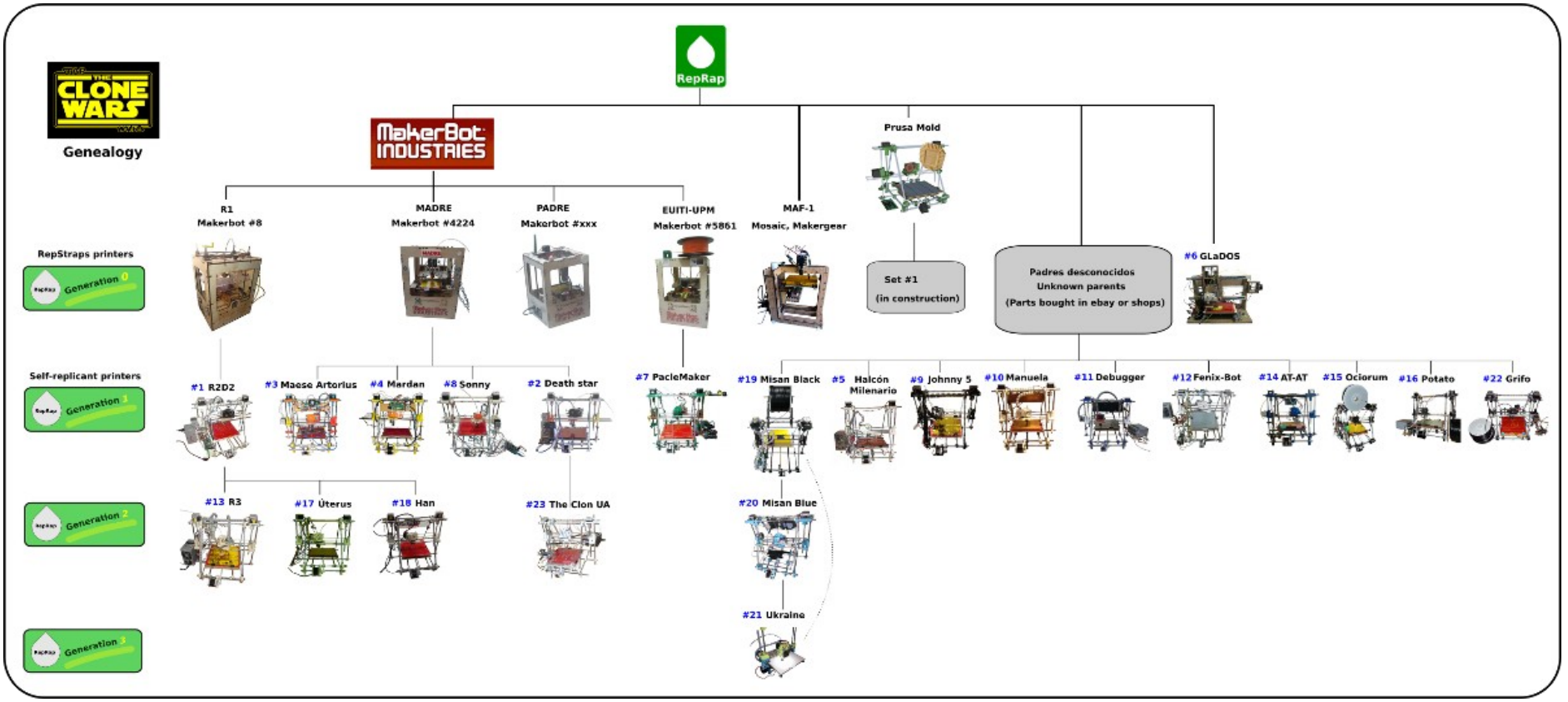
Clones: 10

Clone wars: Abril/2012



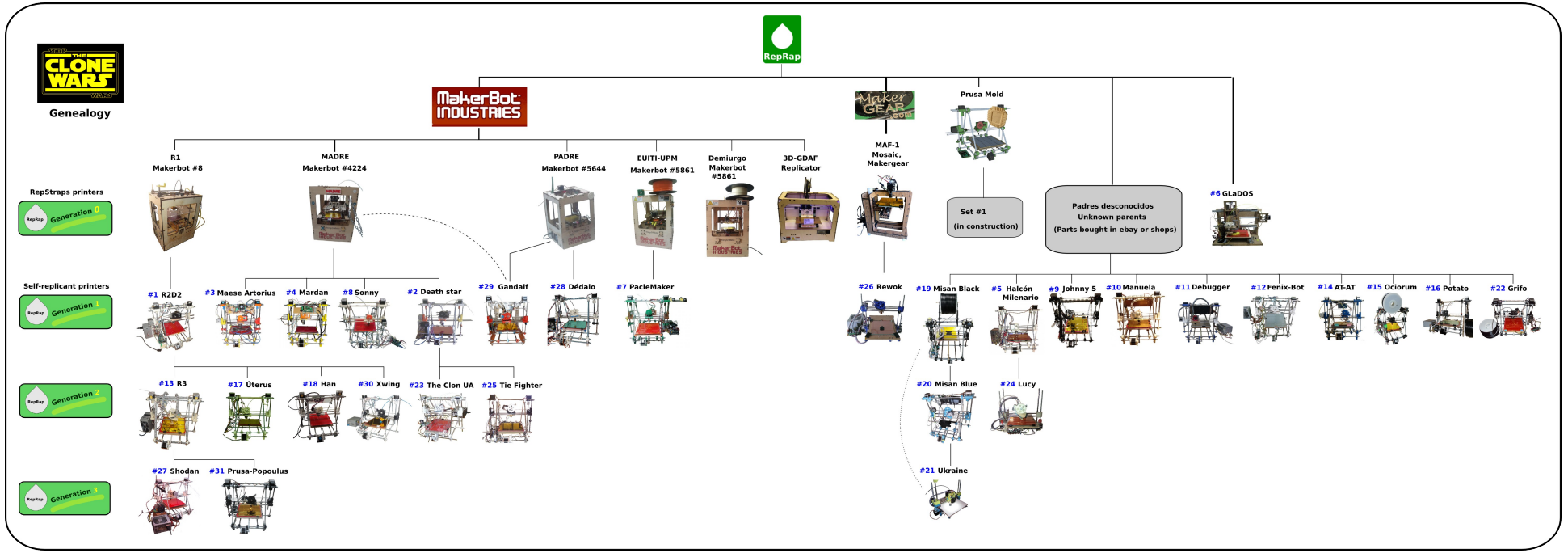
Clones: 16

Clone wars: Mayo/2012



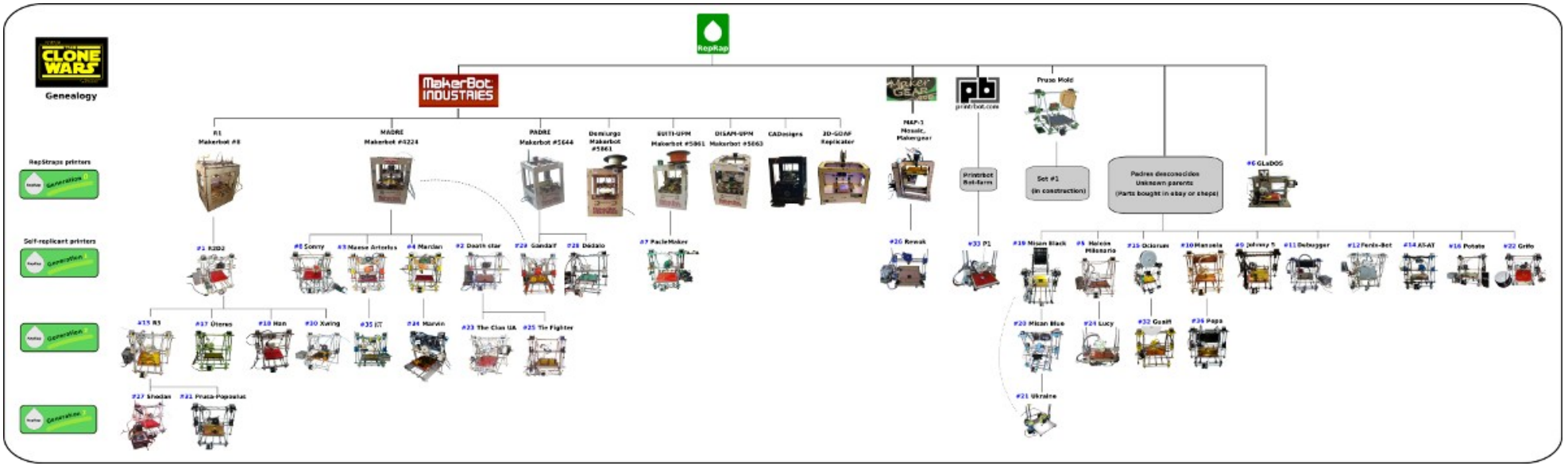
Clones: 23

Clone wars: Junio/2012



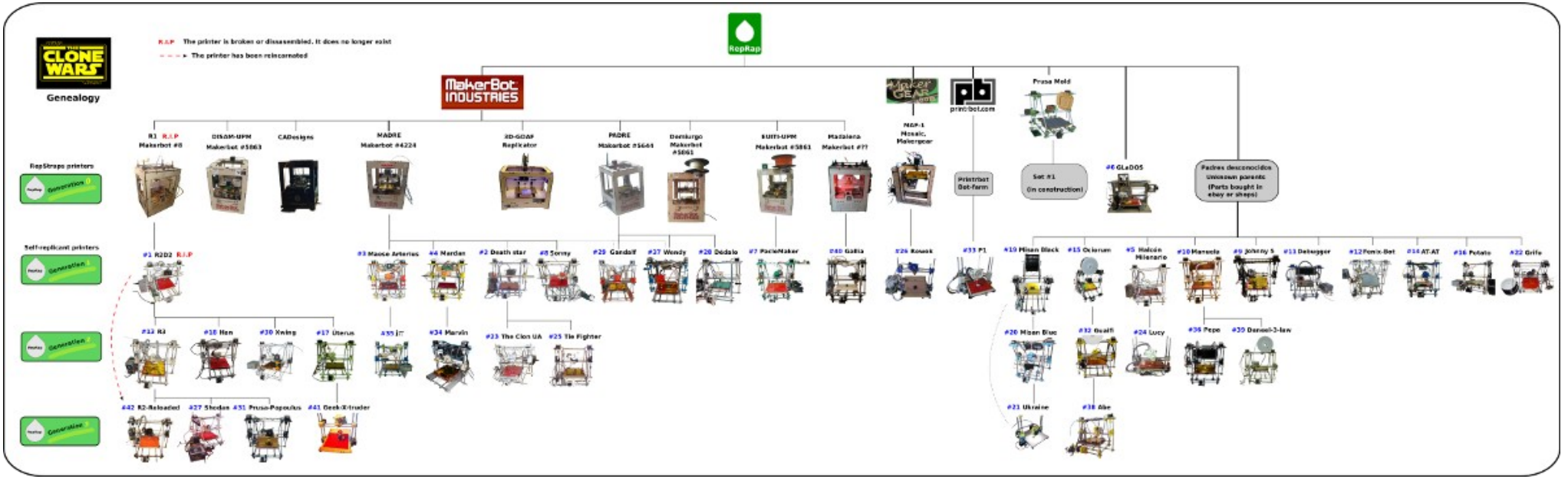
Clones: 31

Clone wars: Julio/2012



Clones: 36

Clone wars: Agosto/2012



Clones: 42

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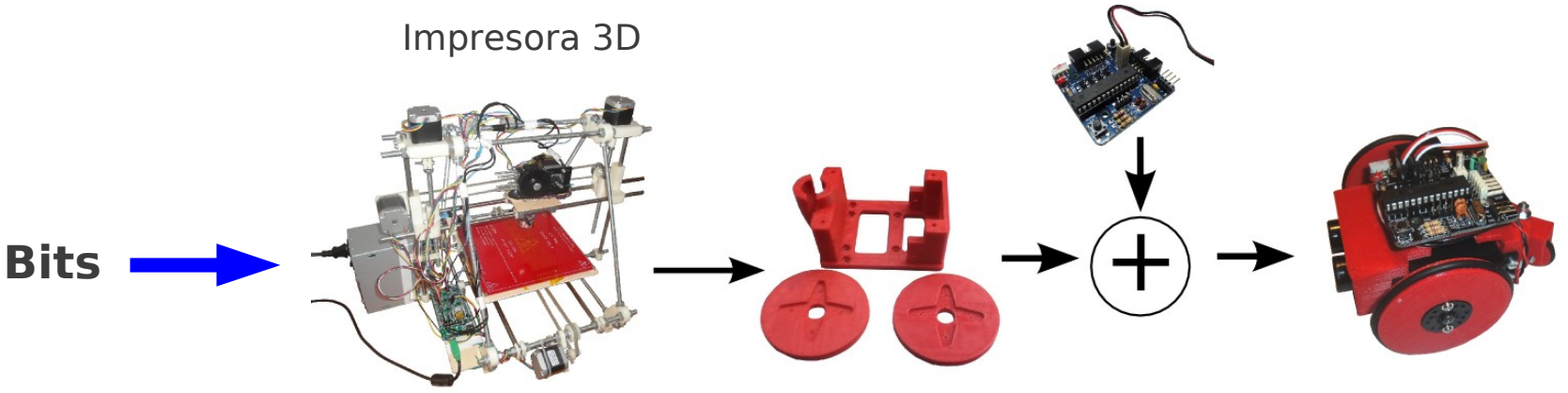
juan@iearobotics.com

Los printbots

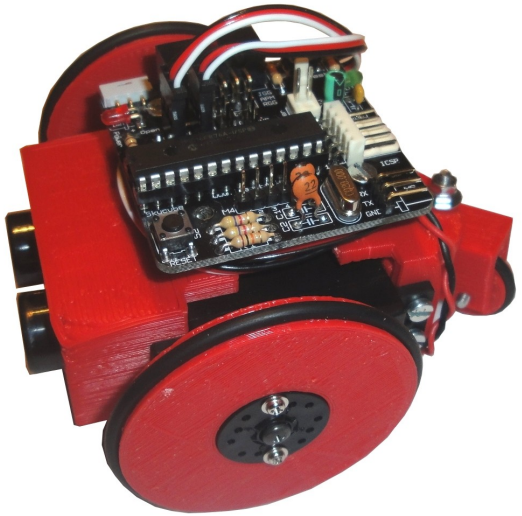
- **PRINTBOTS** = **PRINT**able ro**BOTS**
- Robots “orientados a la comunidad”

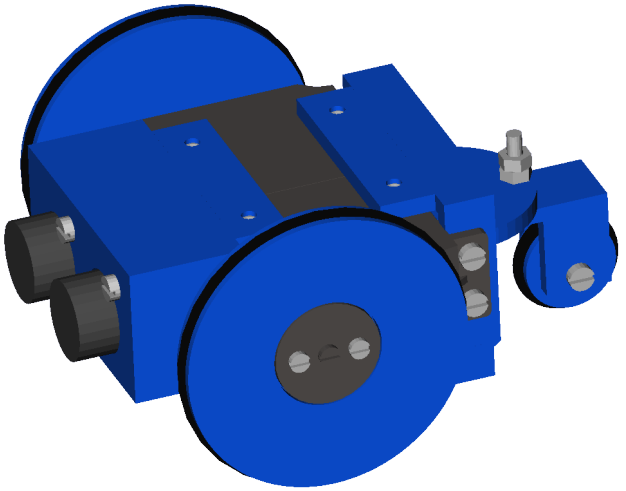
- **Construcción**:

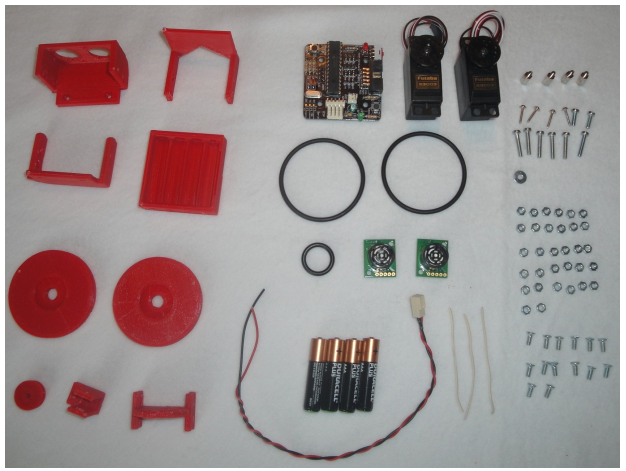


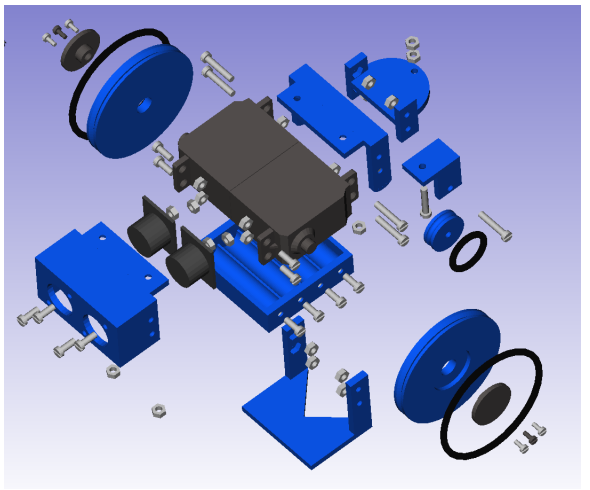
Miniskybot 1.0

http://www.thingiverse.com/thing:7989









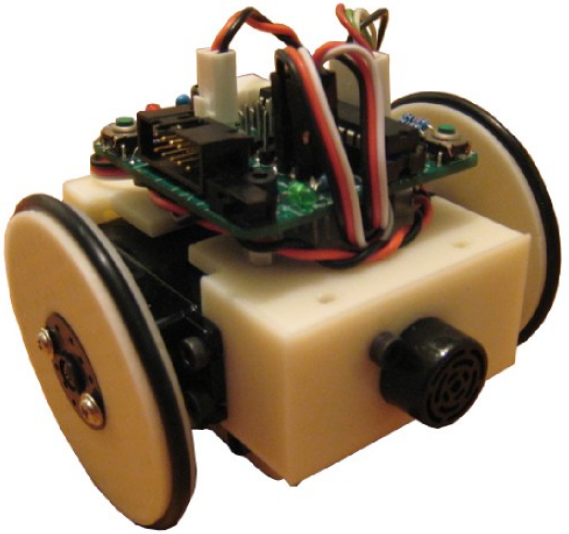
Hardware libre²

2

- Panos libres
- Software Libre

Telecopias

•Cw Kreimer (Pittsburgh, USA)



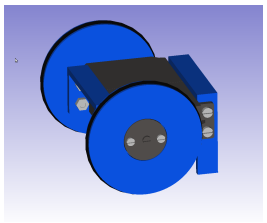
Primera Tele-copia

• Hackerspace Adelaida (AUSTRALIA)

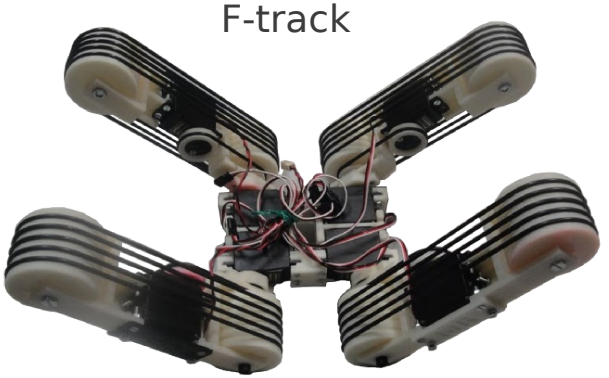
Segunda Tele-copia

Evoluciones y mutaciones

Miniskybot 0.1

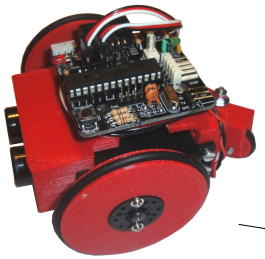


F-track

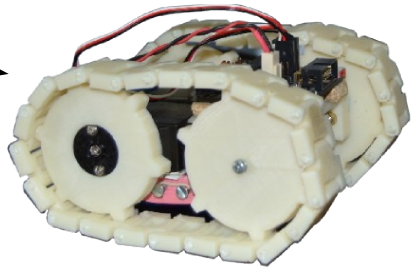


Unitrack

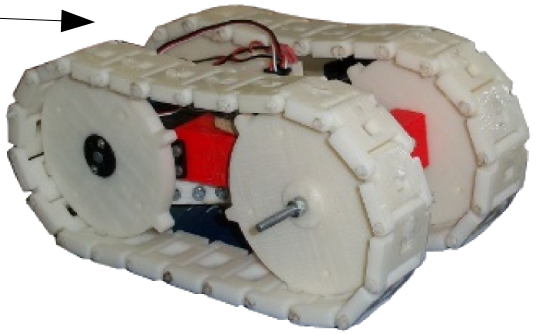
Miniskybot 1.0

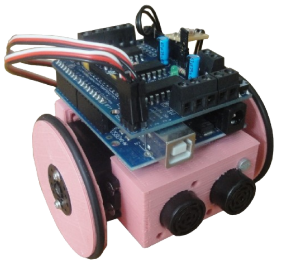


Orugator 1.0



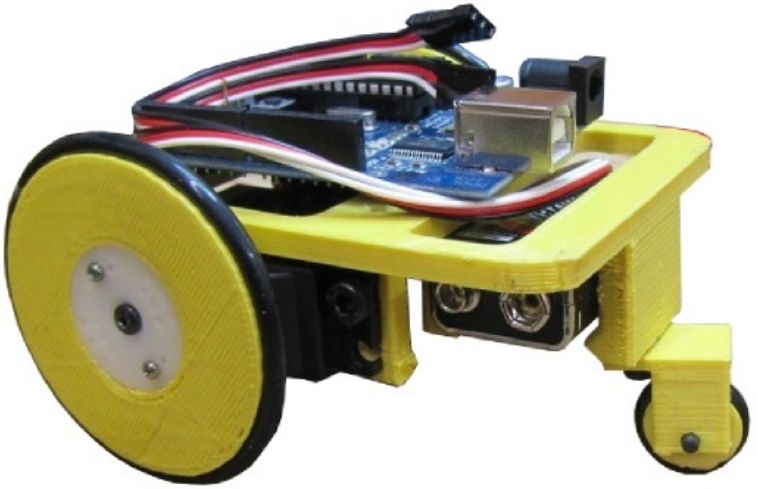
Orugator 1.1





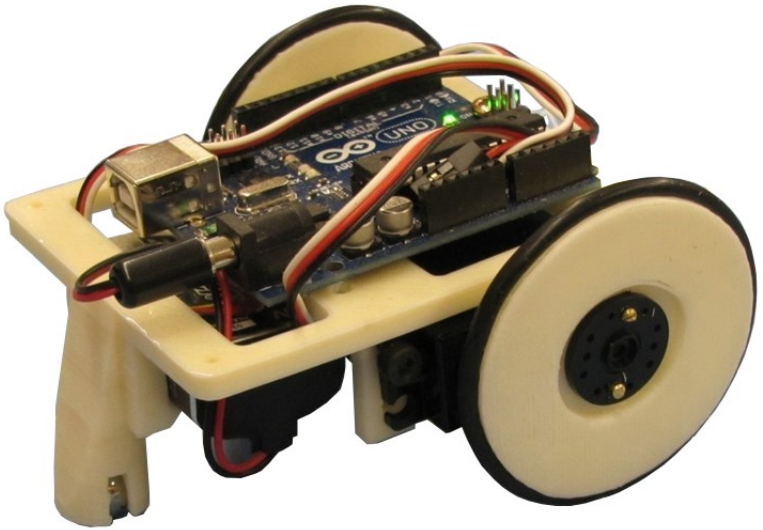
La mutación de Scout

Scout I



- **Sliptonic**, Missouri (USA)
- Chásis mejorado

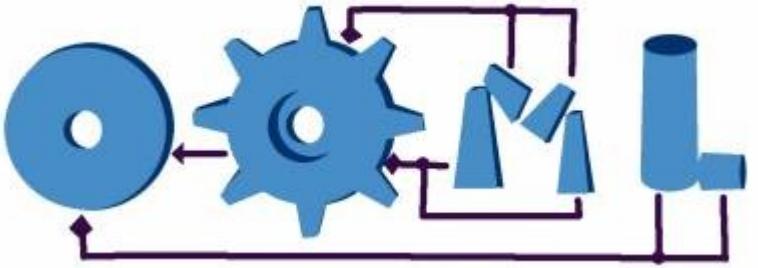
Scout II



- Scout II: Canica como rueda loca

http://www.thingiverse.com/thing:13042

Protobot: evolución + cambio de paradigma

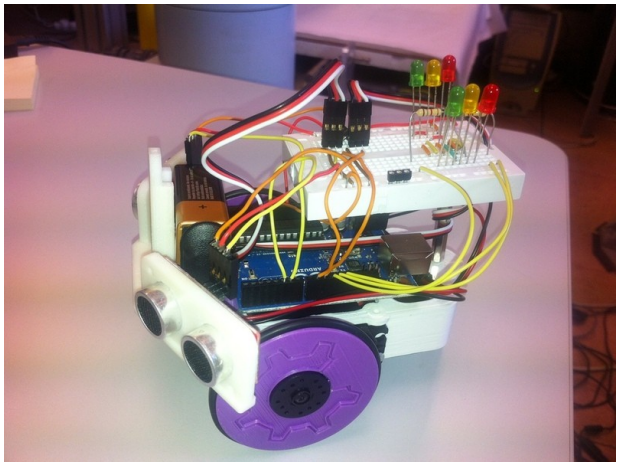


- **Mario Almagro** (UC3M)
- **Nieves Cubo** (UC3M)
- **Alberto Valero** (UC3M)

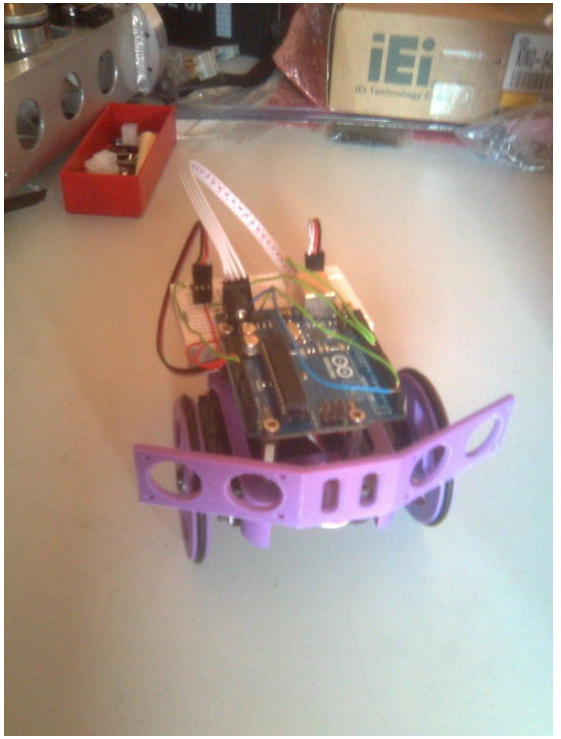
http://www.thingiverse.com/thing:18264

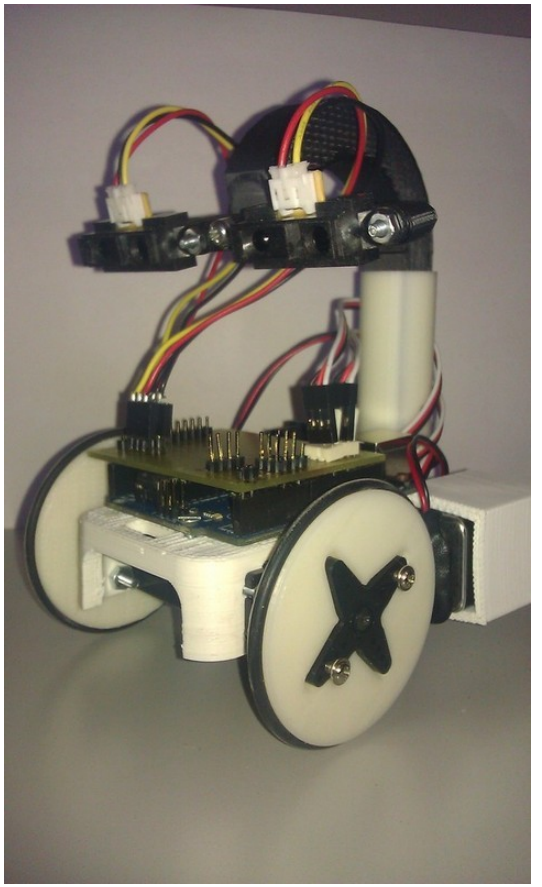
Derivados del Protobot

VIDEO 2



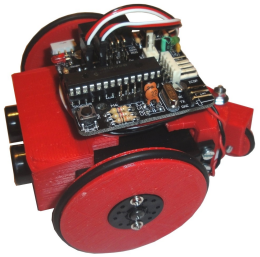
Máster de robótica UC3M



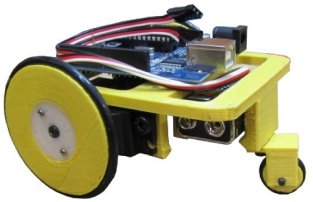


Rama scout/protobot

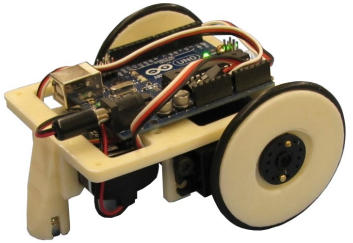
Miniskybot 1.0

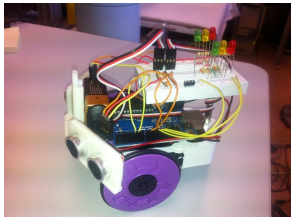


Scout 1

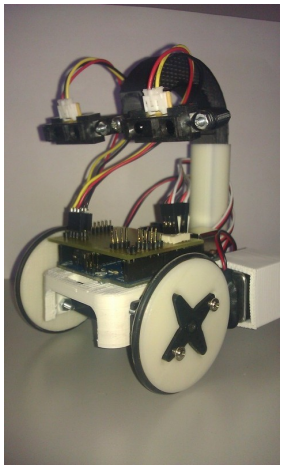


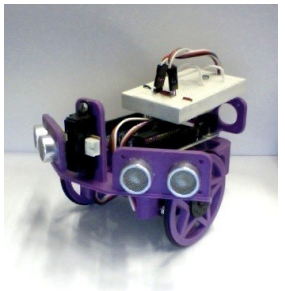
Scout 2

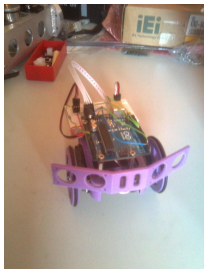




Protobot



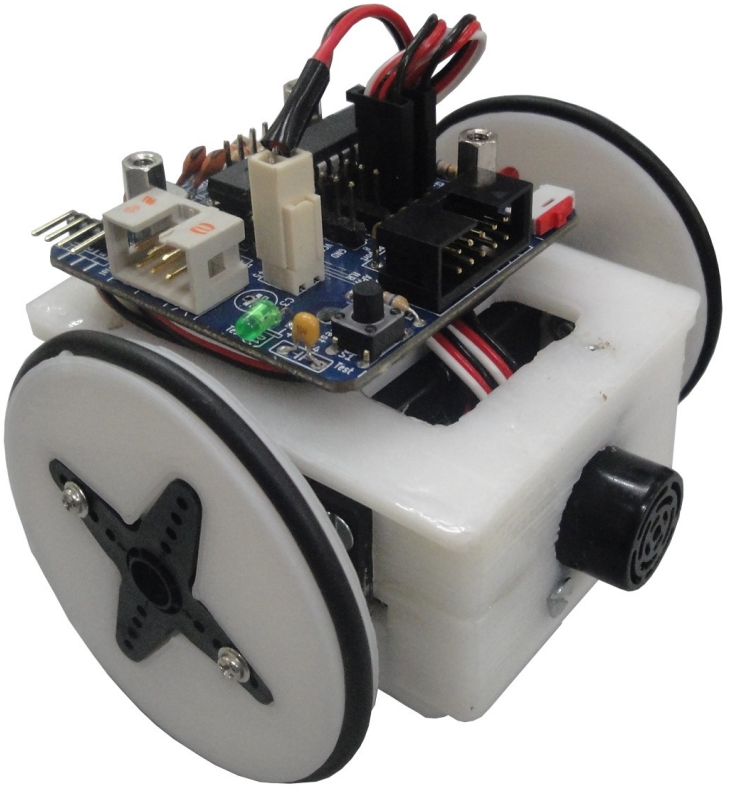


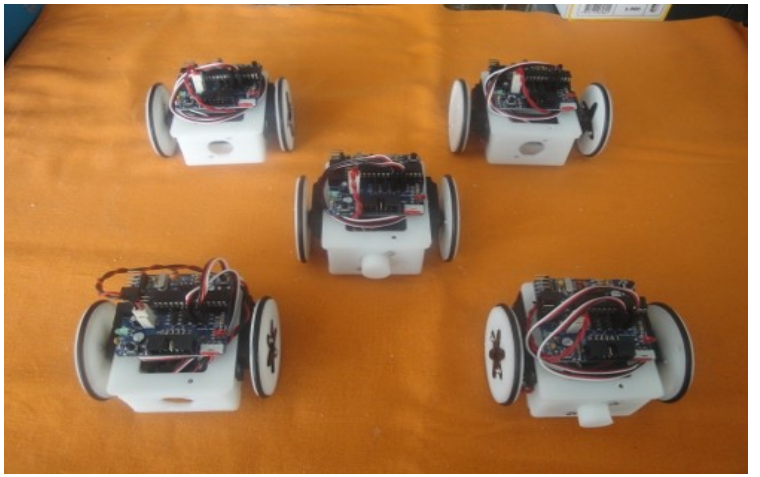


Miniskybot II

VIDEO 3

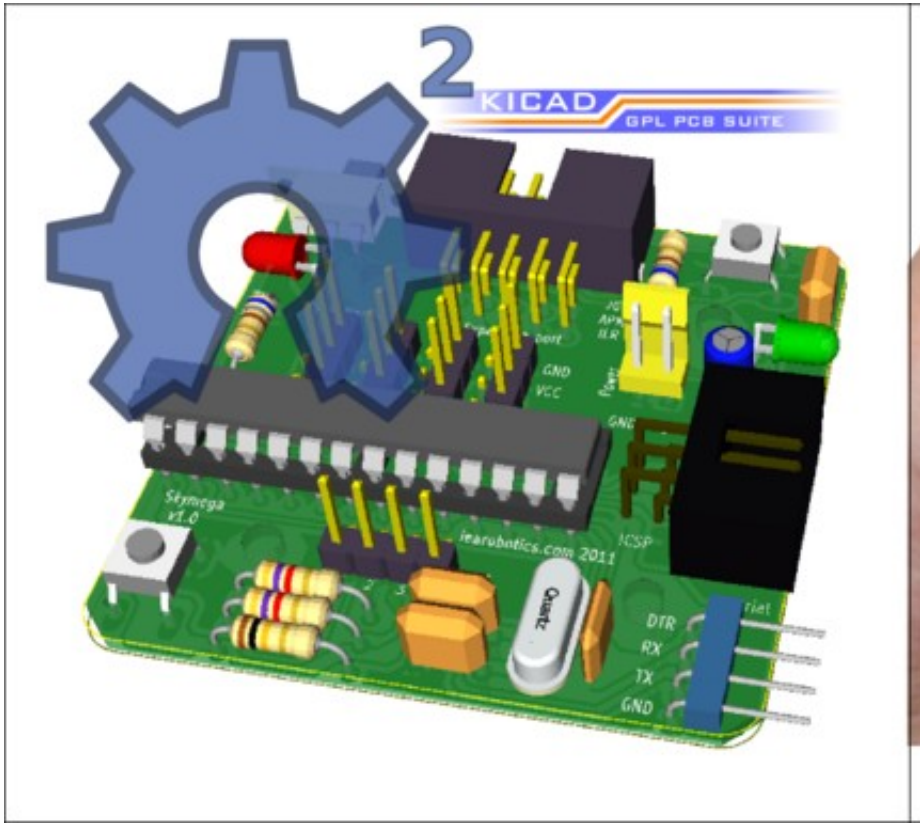
VIDEO 4





- Robótica y Cibernética (UPM)
- “Manada” de robots
- Red de robots
- Ideas del Scout

Electrónica (II)



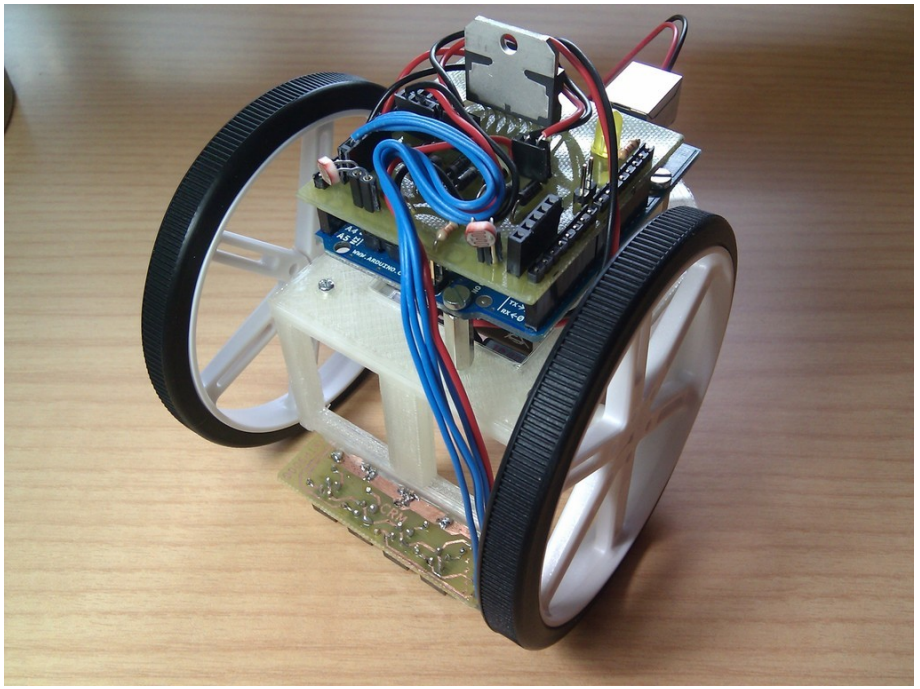
- Tarjeta Skymega
- Micro ATMEGA328
- Diseñada con: KICAD
- KICAD es software libre

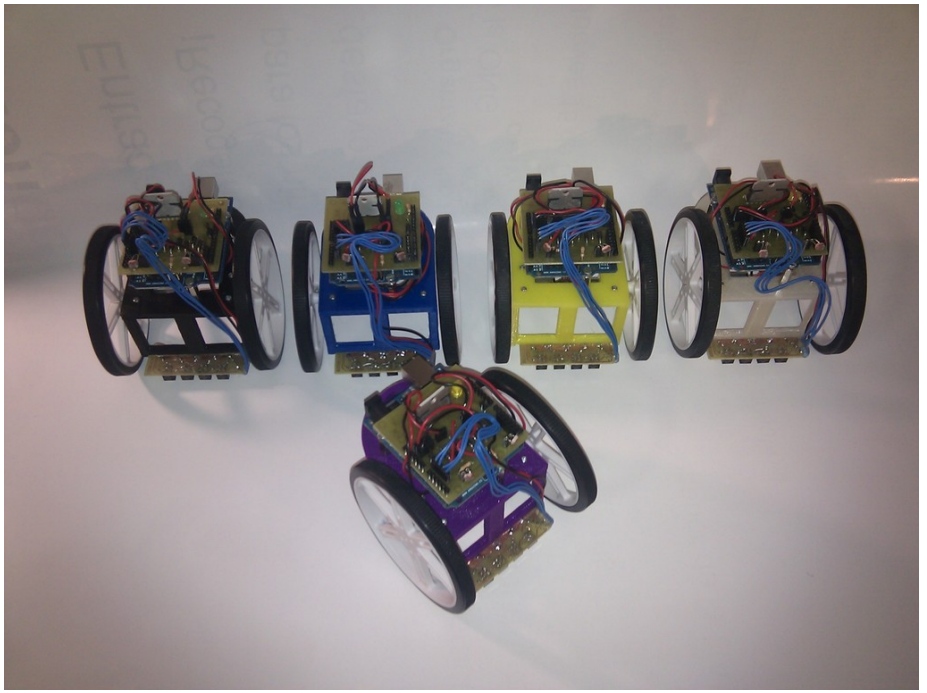
- Compatible ARDUINO
- Reutilización de la comunidad

http://goo.gl/v0Mtr

Derivados del miniskybot 2: HKTR-9000

VIDEO 5

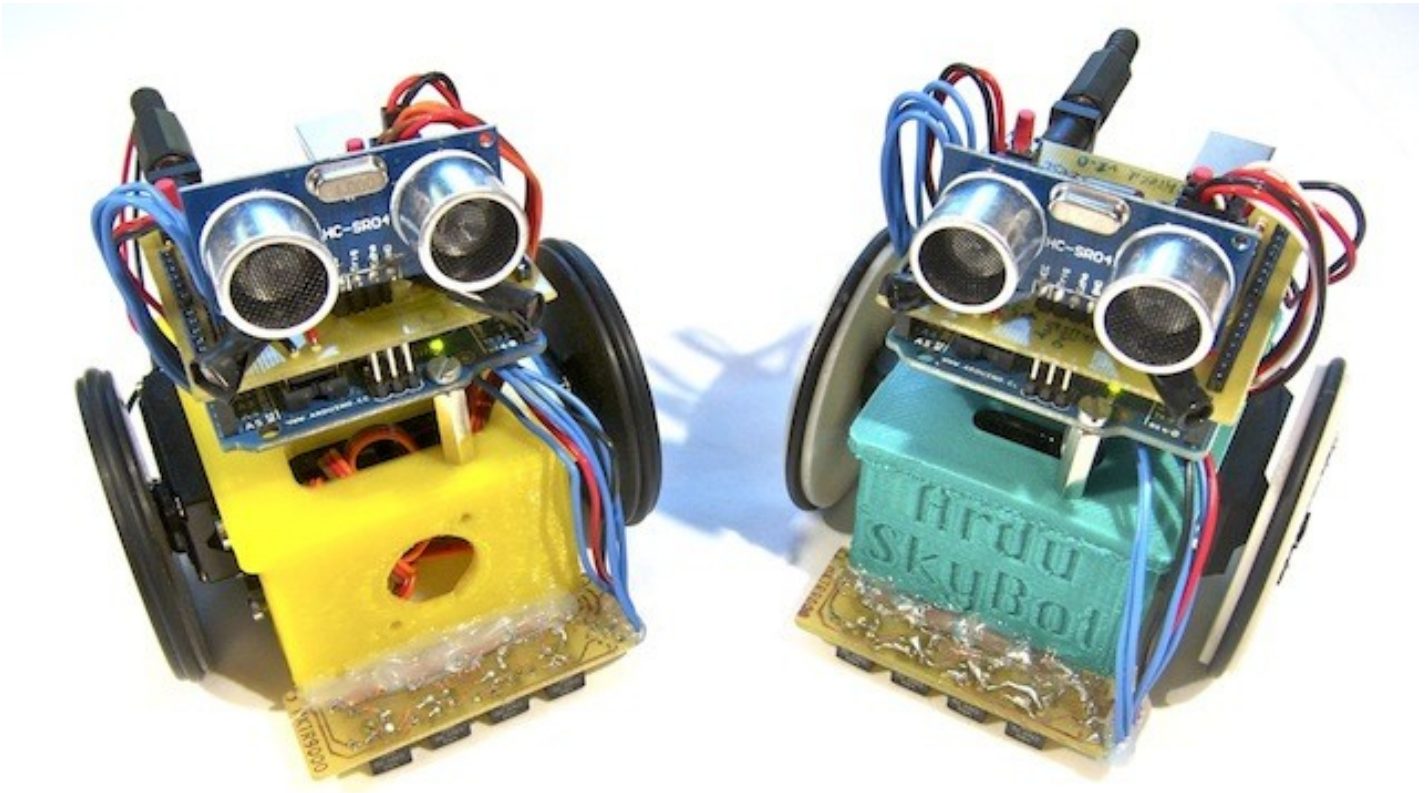




- Taller de robótica: EPS UAM
- Carlos García Saura (UAM)
- *Shield* de arduino + placa sensores (KICAD)

http://www.thingiverse.com/thing:23593

Derivados del miniskybot 2: ArduSkybot

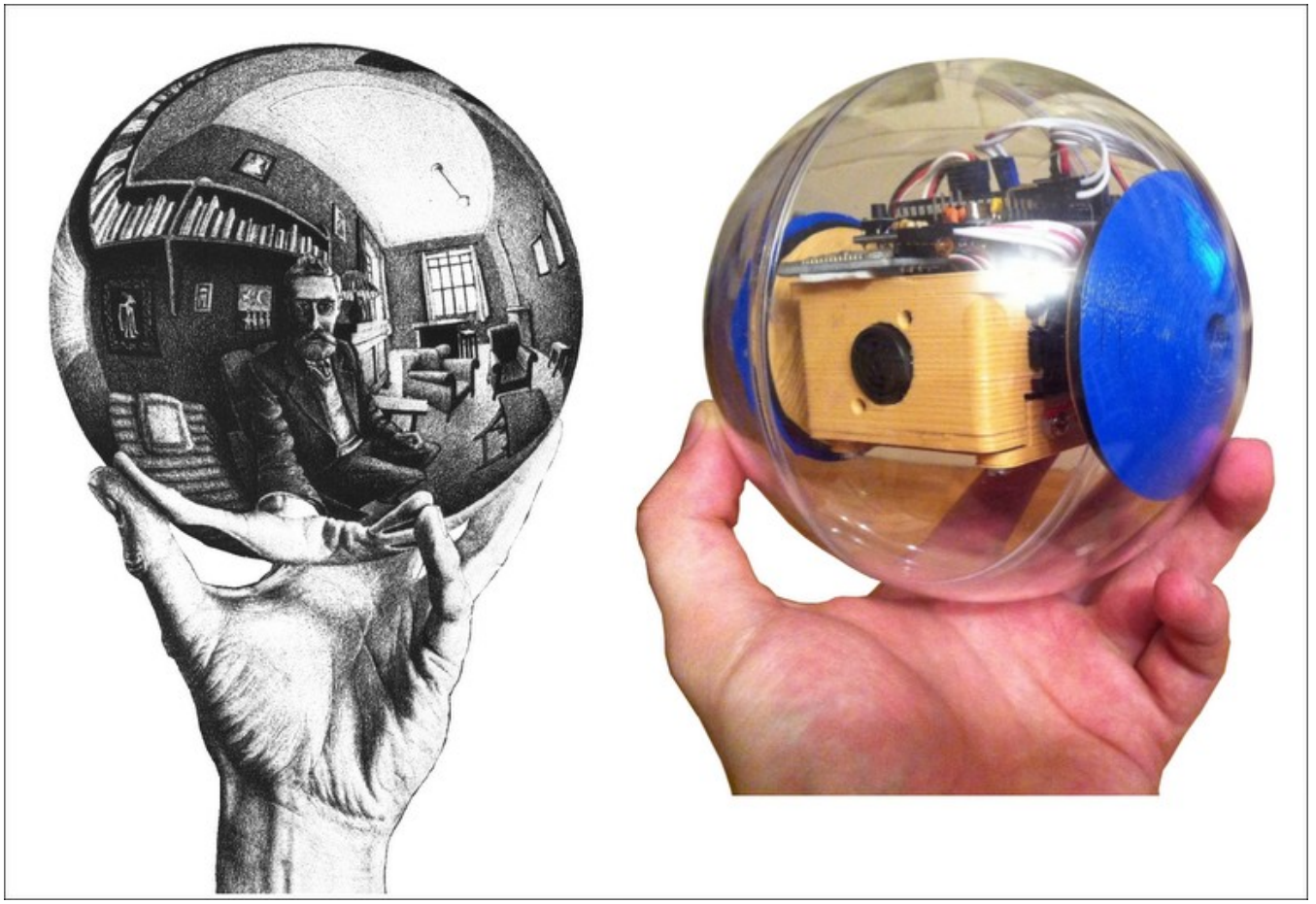


- Carlos García Saura (UAM)

http://carlosgs.es/2012-summer-workshop

Derivados del miniskybot 2: Skyball

VIDEO 6

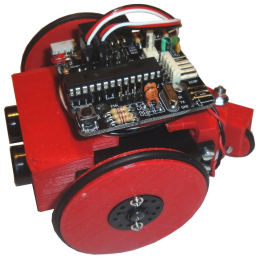


- Miguel Angel de Frutos (UPM)
- Robot-Esfera

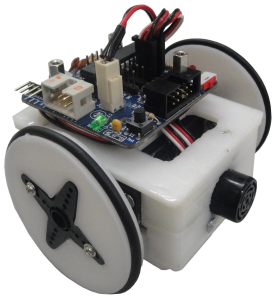
http://www.thingiverse.com/thing:24555

Rama Miniskybot 2

Miniskybot 1.0

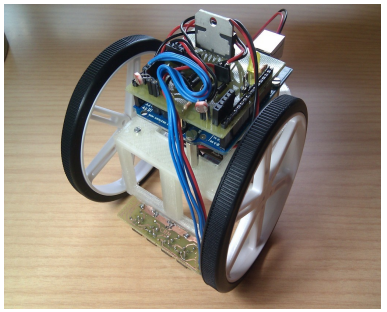


Miniskybot 2.0



Skyball

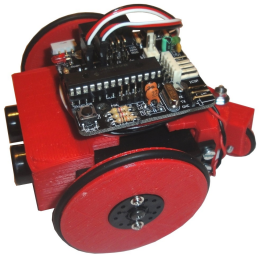
HKTR-9000



ArduSkybot

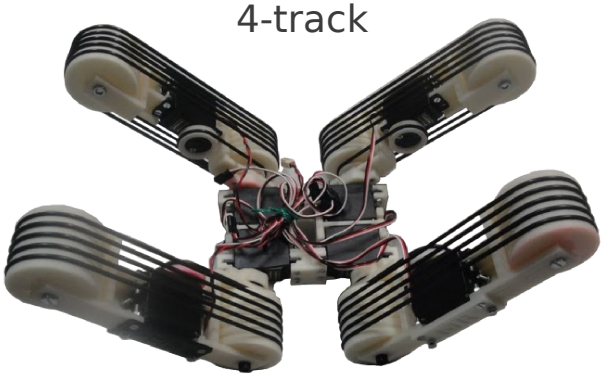
Rama Unitrack

Miniskybot 1.0



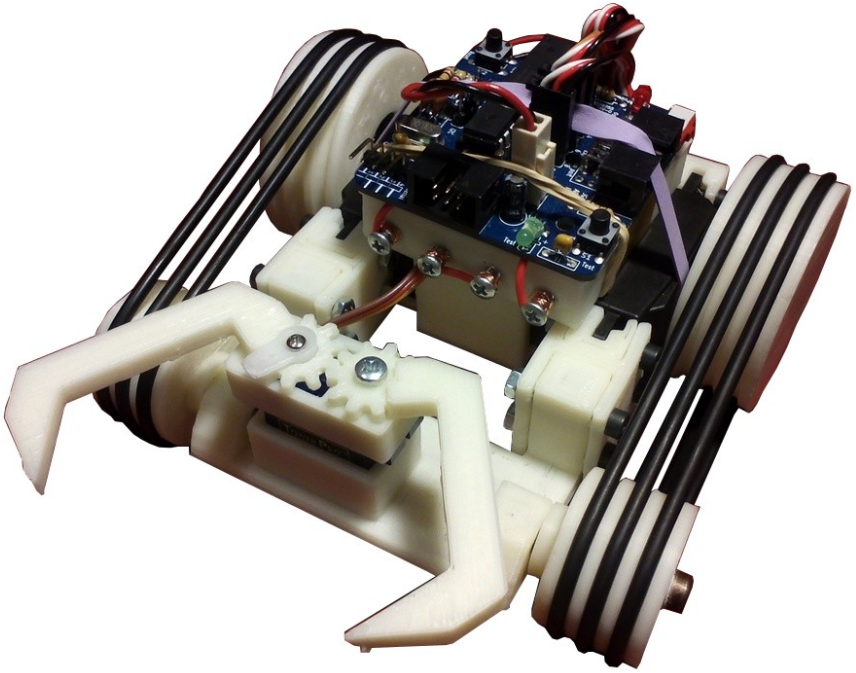
Unitrack

4-track



Rama Unitrack: Rover

VIDEO 7

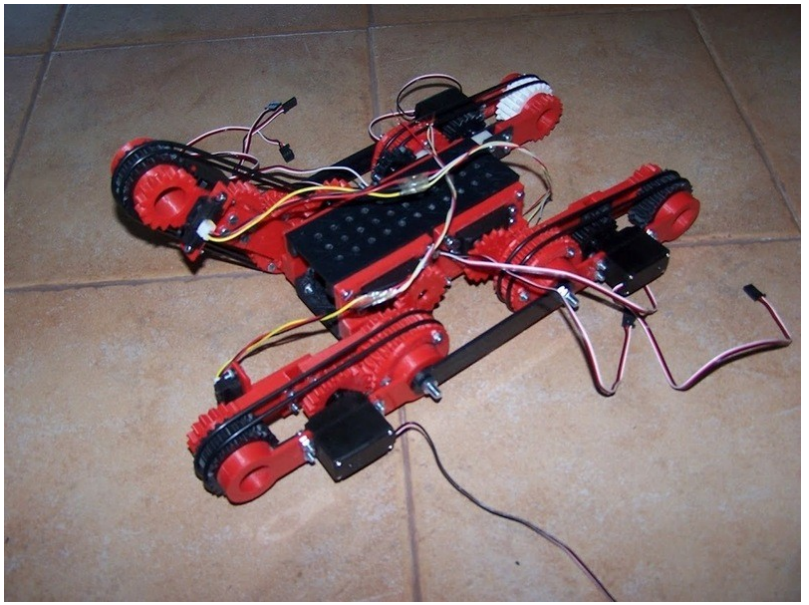


- Jon Goitia (UC3M)
- Pinza frontal para coger objetos

http://www.thingiverse.com/thing:18392

Rama Unitrack: D-track

VIDEO 8

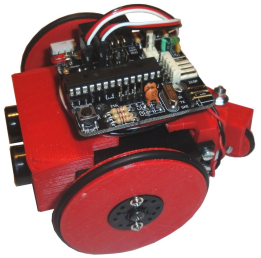


- Daniel Gonzalez (UC3M)
- PFC
- Director: Alberto Valero

http://www.thingiverse.com/thing:30805

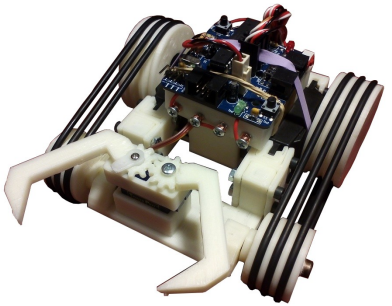
Rama Unitrack (III)

Miniskybot 1.0

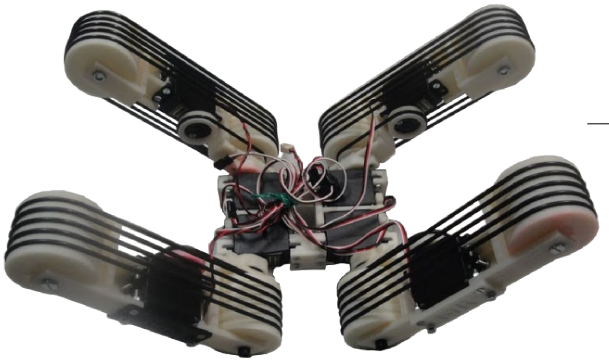


Unitrack

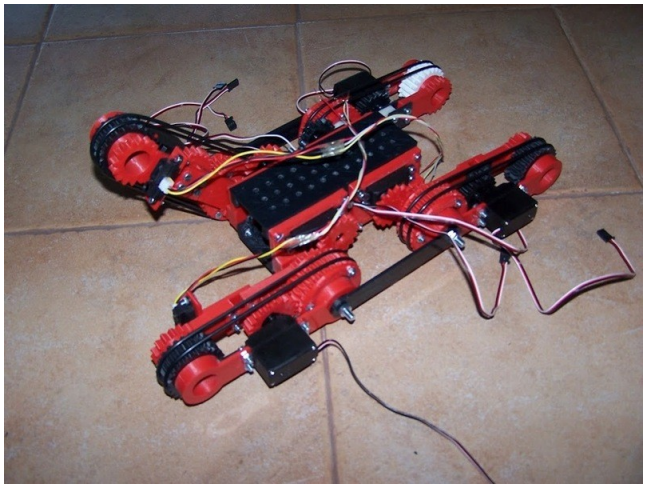
Rover



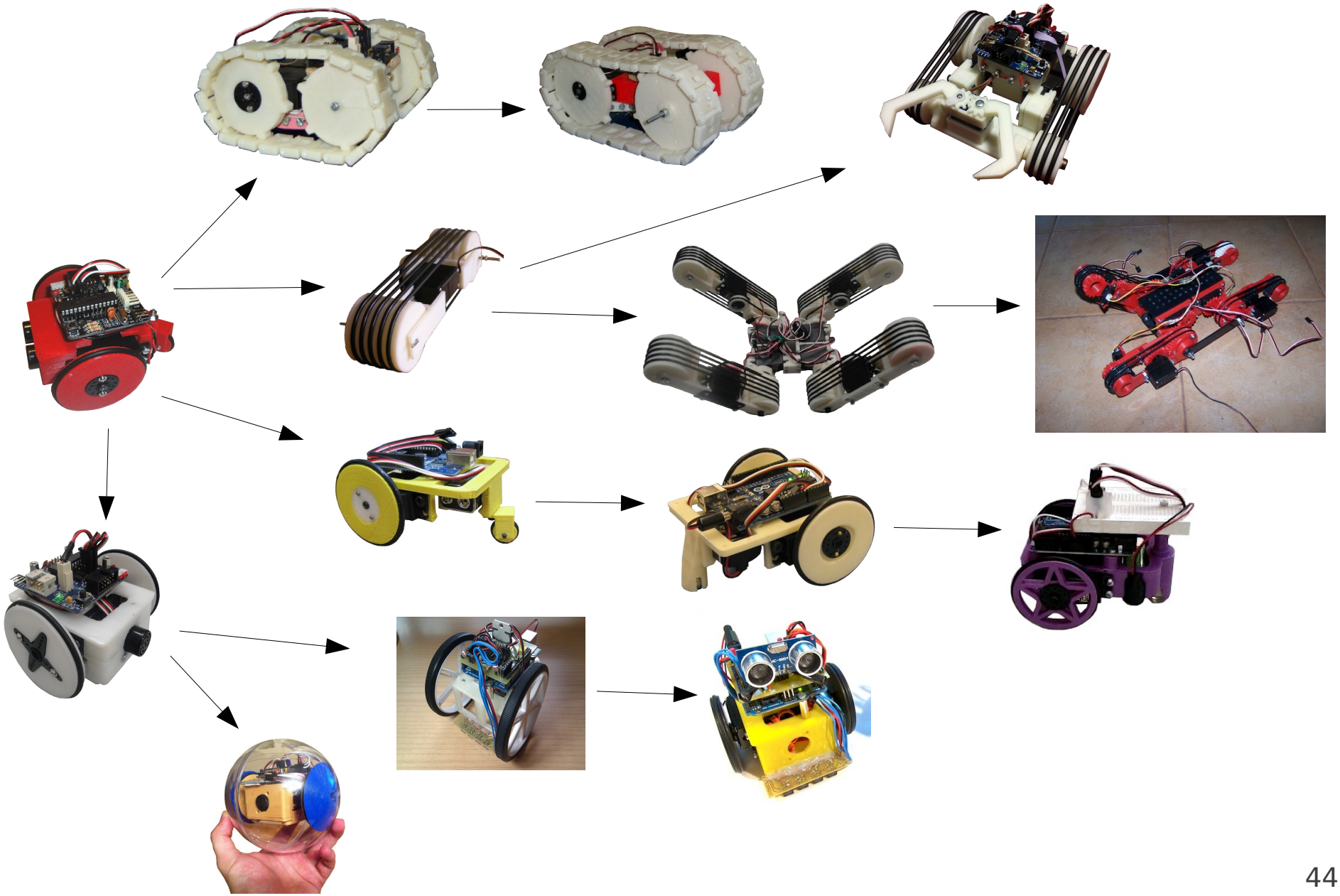
4-track



D-track

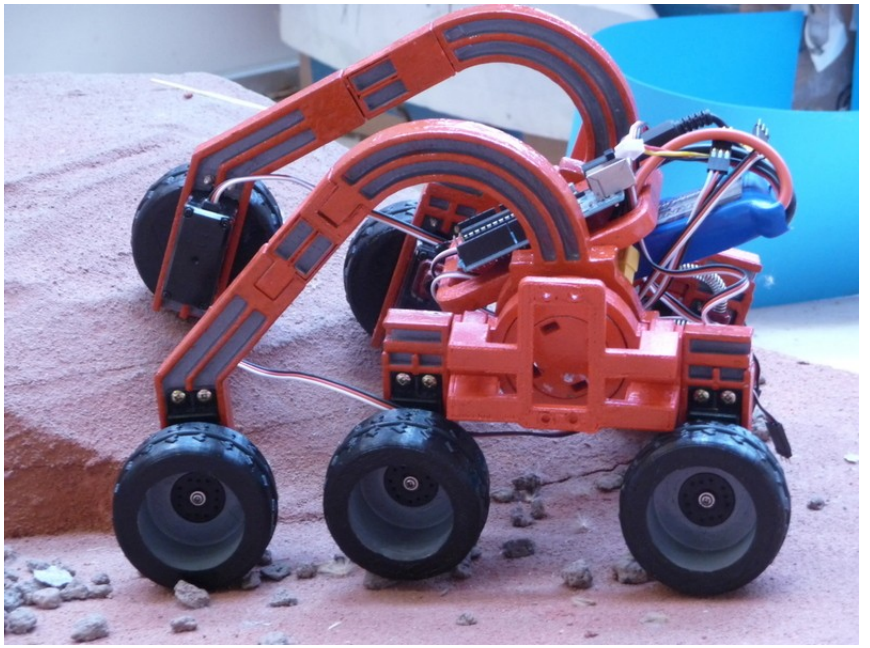


Una muestra del ecosistema



Mars Rover

VIDEO 9

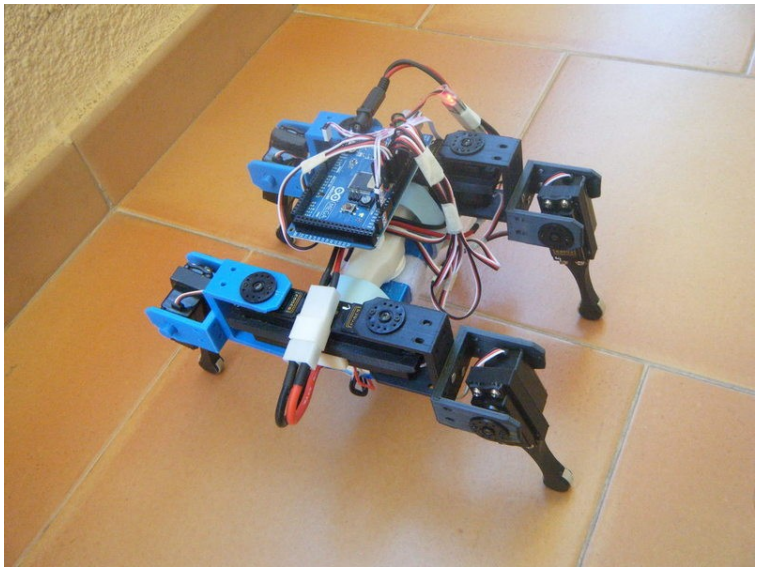


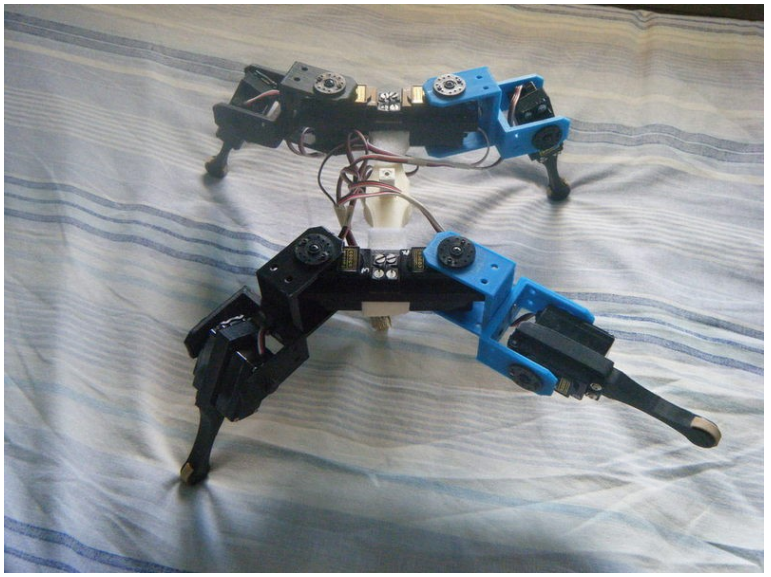
- 6 ruedas independientes
- Mario Almagro (UC3M) y Alberto Valero (UC3M)
- *OOML*

http://www.thingiverse.com/thing:29576

Cuadrúpedo: AT-AS

VIDEO 10



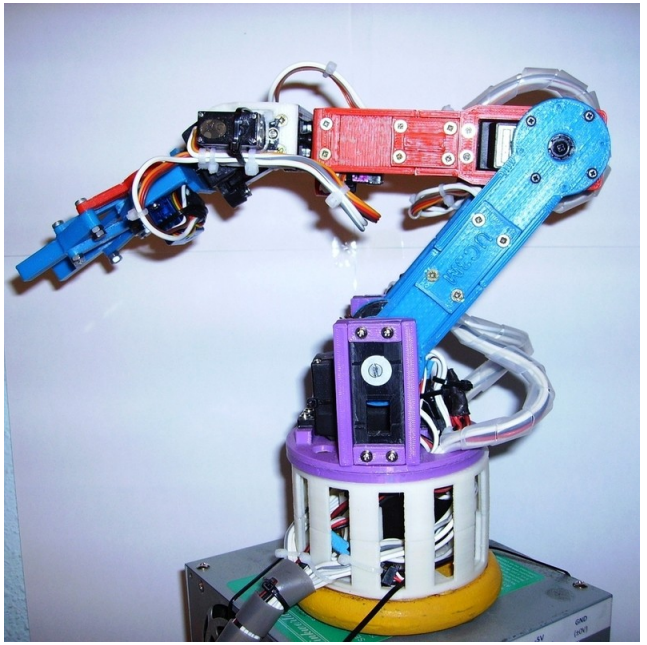


- Ana del Prado (UC3M)
- *OOML*

http://www.thingiverse.com/thing:30088

Brazo robótico

VIDEO 11

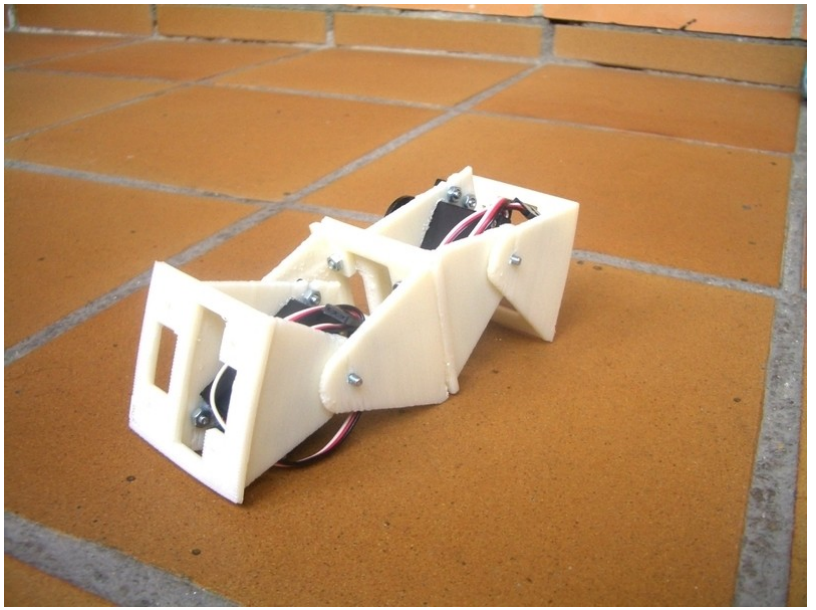


- Angel de Castro (UC3M)
- Director: Alberto Valero
- 6 DOF!!!

http://www.thingiverse.com/thing:30163

Robots modulares

VIDEO 12



- Módulos REPY1
- Gusanos y serpientes robóticos

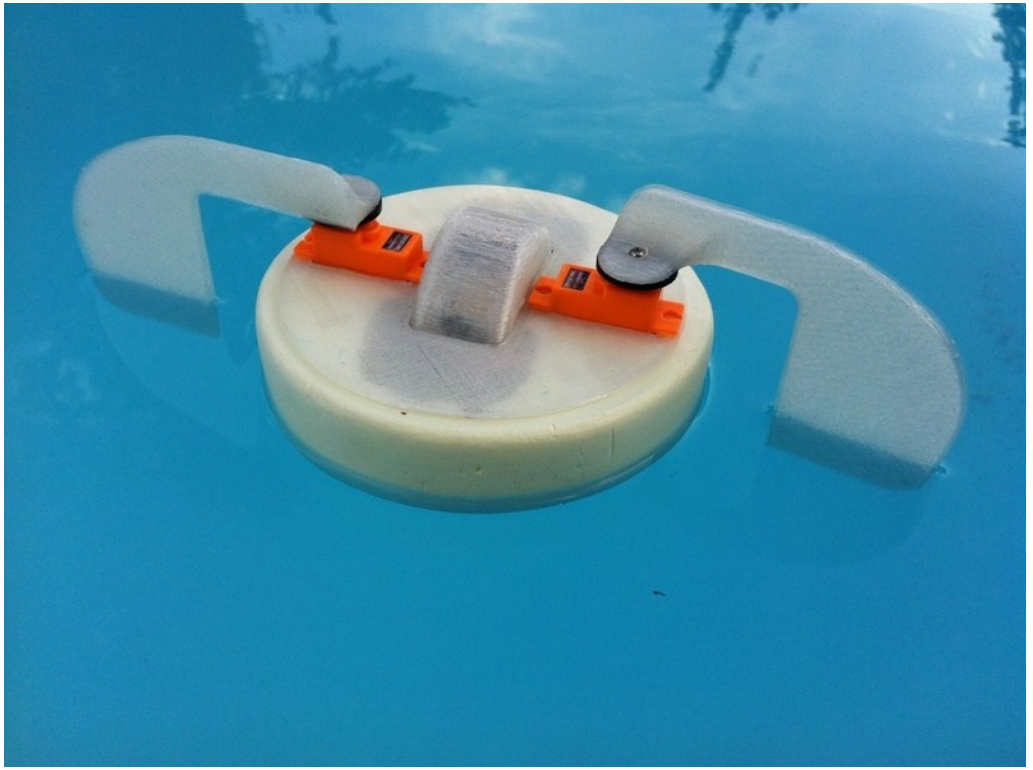
- ArduSnake

http://www.thingiverse.com/thing:13442

http://www.thingiverse.com/thing:21401

Water oscillator

VIDEO 13



- Miguel Angel de Frutos (UPM)
- ¡¡Robot acuático!!

http://www.thingiverse.com/thing:30163

Índice

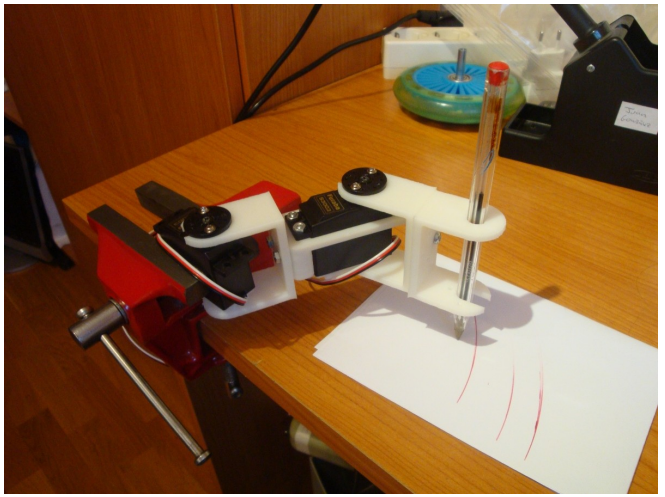
juan@iearobotics.com

Conclusiones

- Los **Printbots** funcionan!
- Telecopia, evolución y diversificación
- Sí es posible que aparezcan **comunidades** de desarrollo de Robots
- Geniales para actividades educativas e investigación

Trabajos futuros

- Desarrollo de nuevos paradigmas de diseño mecánico
- Aplicaciones de alto nivel para “Generar robots”
- *RoboDRAW!*

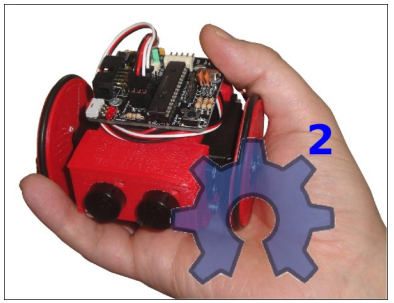


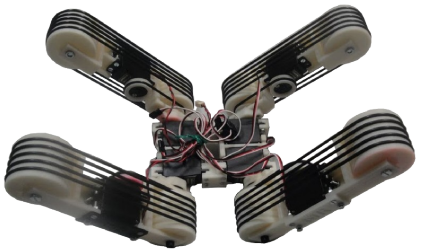
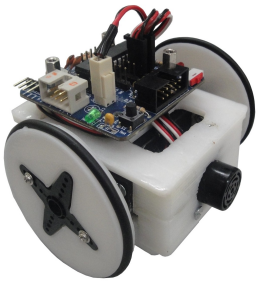
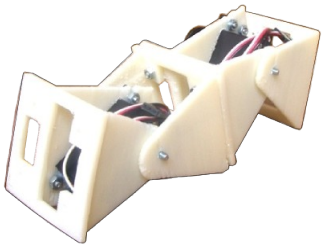
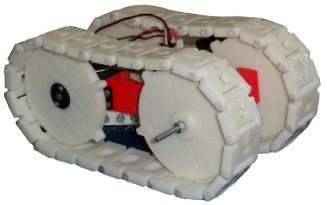
Que el plástico os acompañe...

¡Muchas gracias!

:-)

PRINTBOTS:
Robots Libres e Imprimibles

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Alberto Valero Gómez (UC3M)

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Universidad Carlos III de Madrid

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