

Programación de aplicaciones para drones en el entorno software JdeRobot



José M^a Cañas, José A. Fernández, Diego Jiménez, Jorge Vela

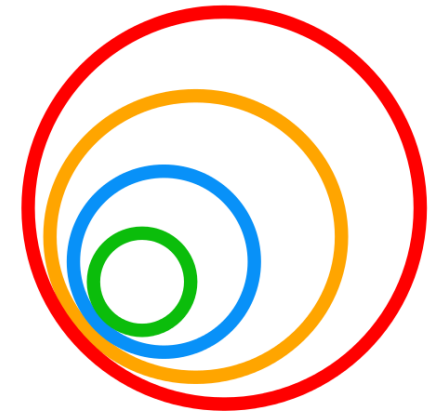
Introducción

- Usos militares
- Explosión de usos civiles
- Audiovisuales
- Inspección
- Seguridad
- Agricultura de precisión
- ...
- *Hardware + Software*



Entorno JdeRobot

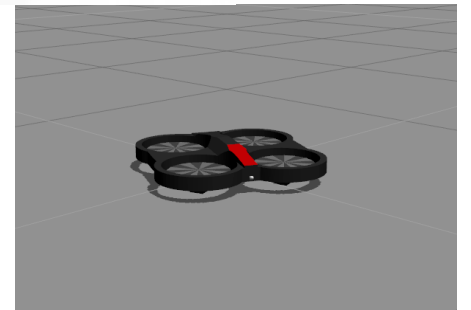
- Un drone como un robot
- Sensores, actuadores, PC
- Entorno software, libre
- Facilitar desarrollo de aplicaciones, inteligencia de los robots
- Compatible con ROS
- Drivers, herramientas



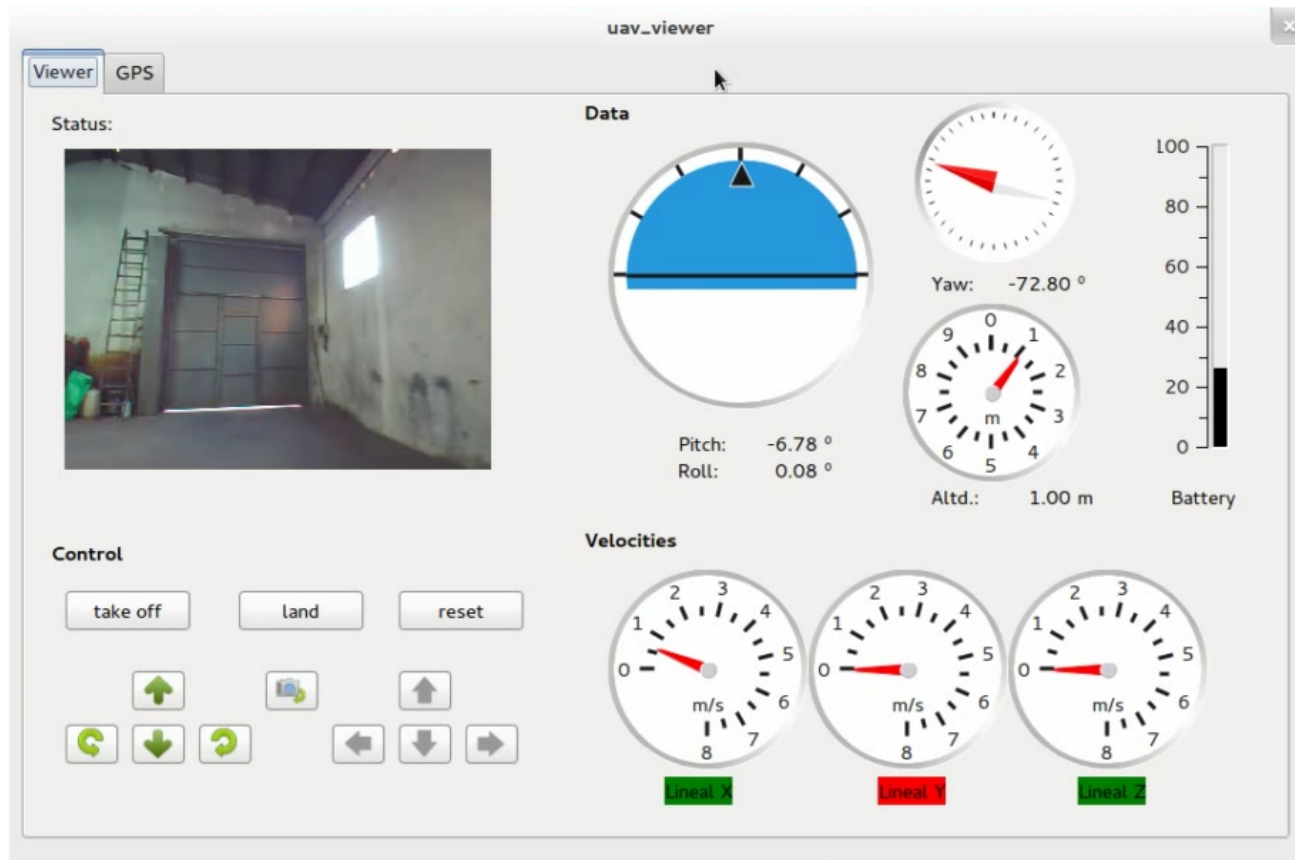
JdeRobot

Drivers

- Acceso de programas a los sensores y actuadores
- Cámaras, IMU, GPS...
- Motores
- *ArDrone2 Parrot*
- *SoloDrone 3DR*
- *Simulado Gazebo*



Herramientas: UAV-viewer



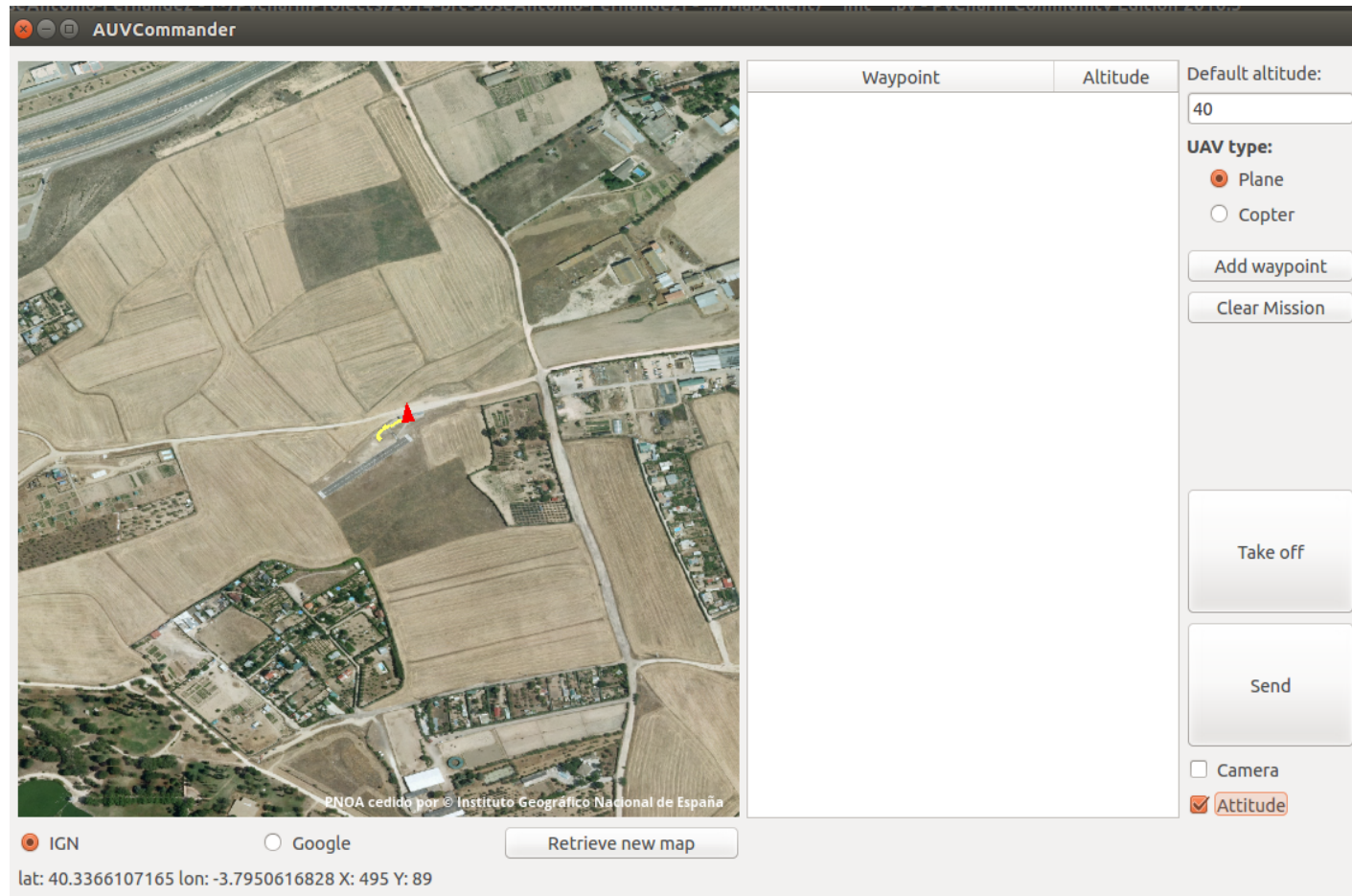
- Ver medidas de sensores a bordo
- Ordenar movimientos

Herramientas: WebTools



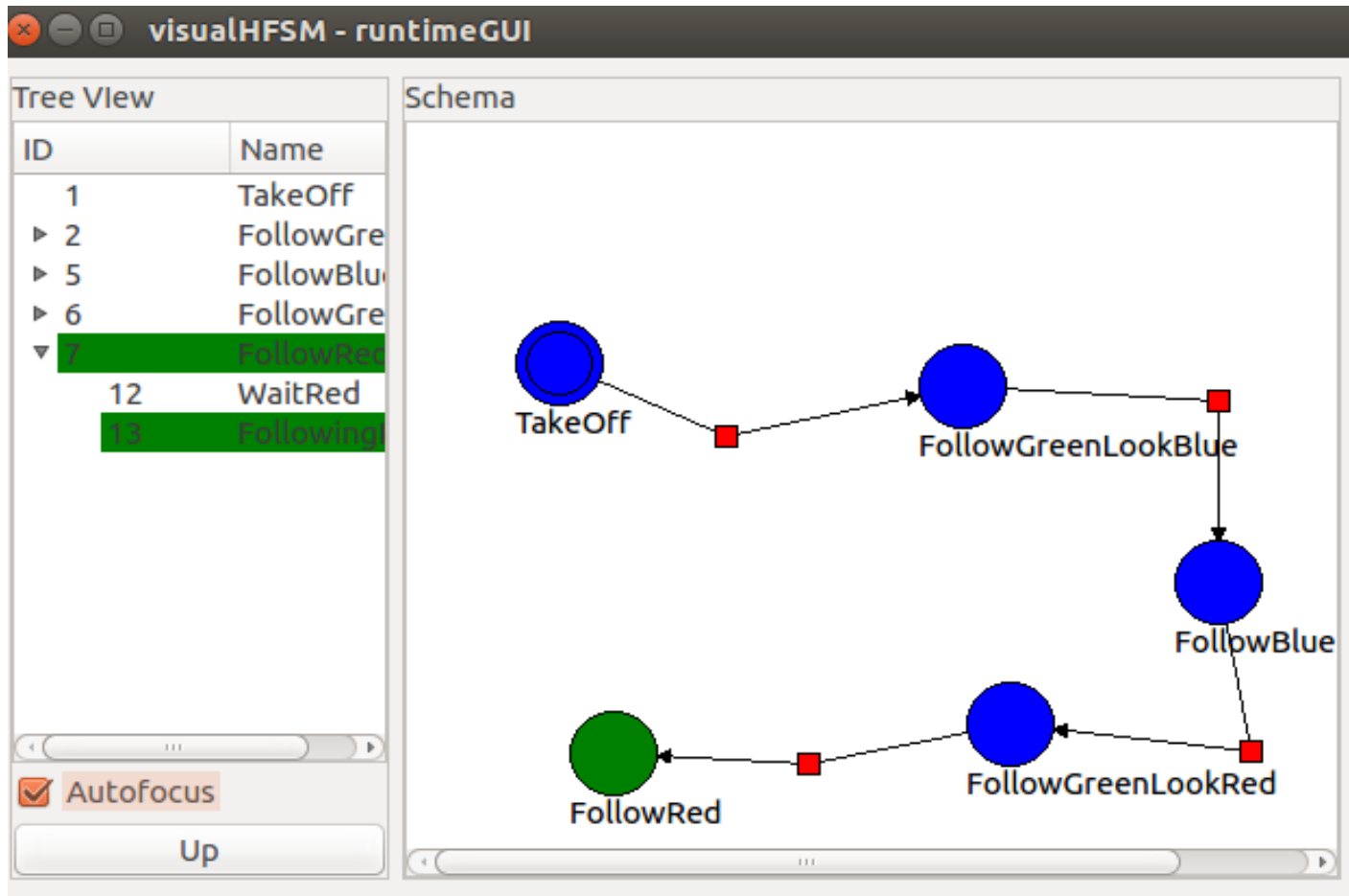
- Sensores y teleoperación desde teléfono

Herramientas: UAV-Commander



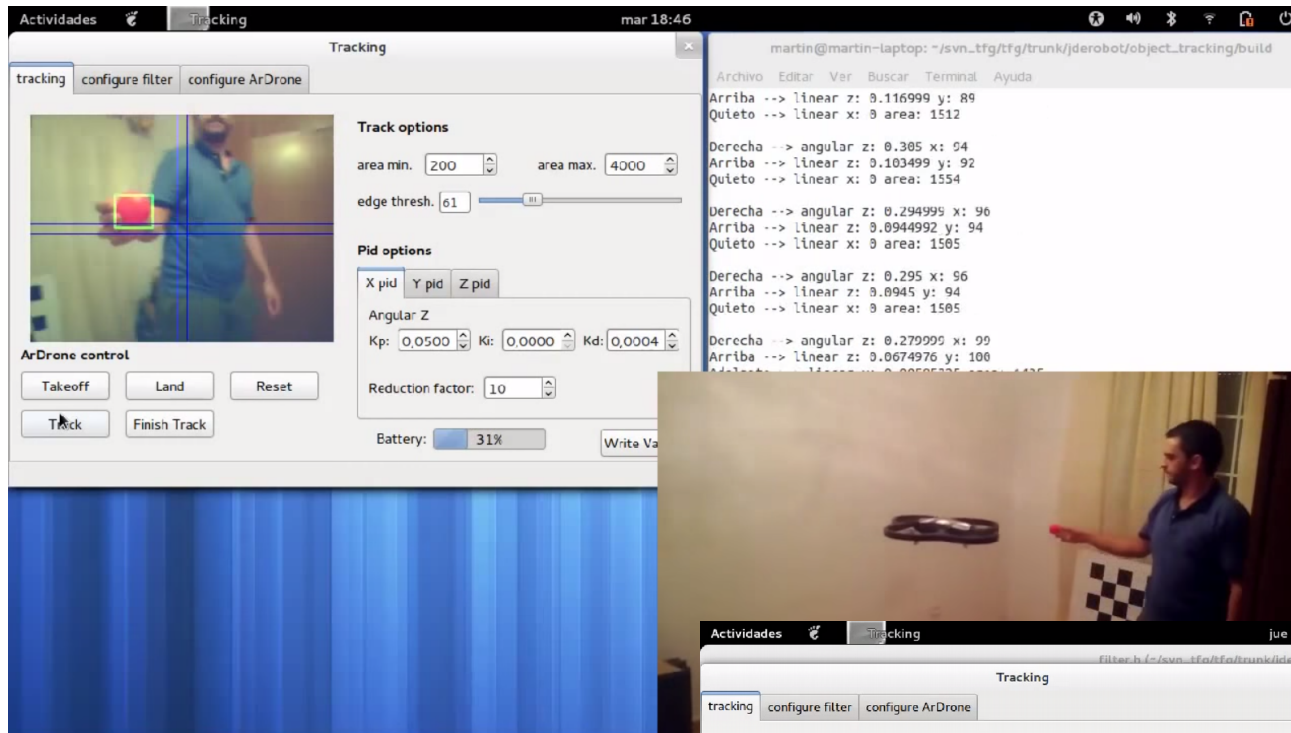
- Trayectoria en un mapa georeferenciado
- Secuencia de puntos de paso, GPS

Herramientas: VisualStates



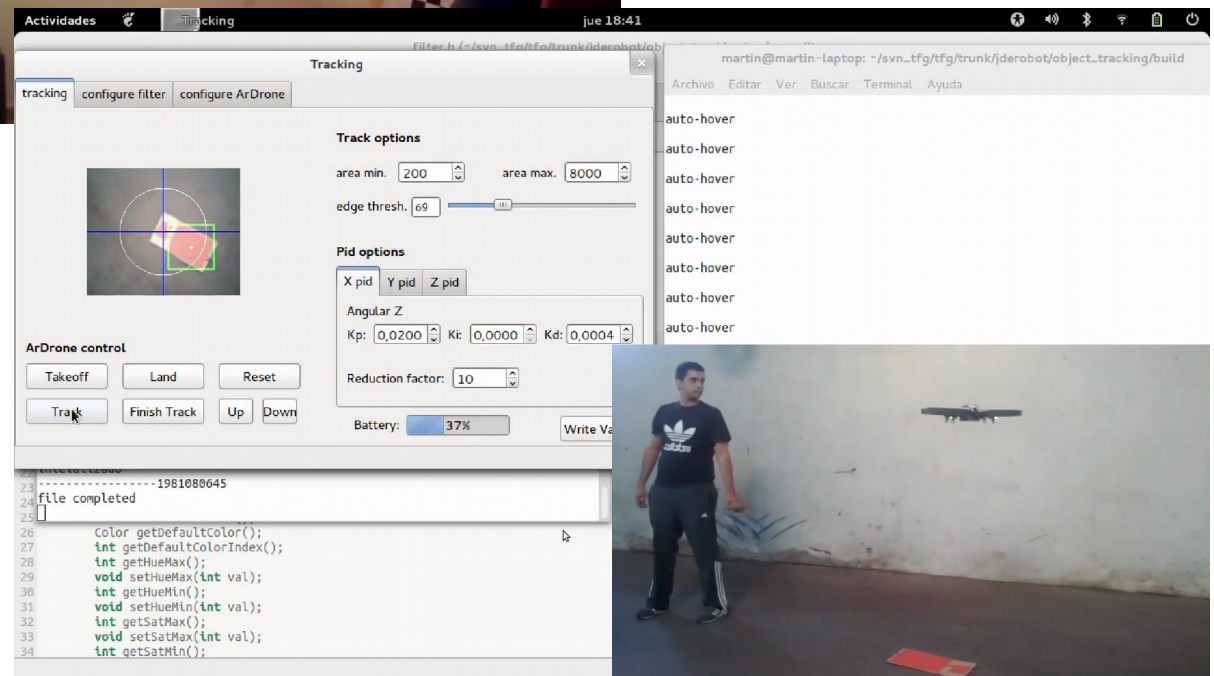
- Programar la inteligencia del drone, comportamiento
- Estados y transiciones

Aplicaciones: seguir objetos



The interface shows the 'Tracking' application running on a Linux system. It features a video feed of a person in a blue shirt. The 'Track options' panel includes sliders for 'area min.' (200), 'area max.' (4000), and 'edge thresh.' (61). The 'Pid options' panel has tabs for 'X pid', 'Y pid', and 'Z pid', with 'Angular Z' selected. Parameters for 'Angular Z' are 'Kp: 0,0500', 'Ki: 0,0000', and 'Kd: 0,0004'. The 'Reduction factor' is set to 10. The 'ArDrone control' panel includes buttons for 'Takeoff', 'Land', 'Reset', 'Track', and 'Finish Track'. The 'Battery' level is shown as 31%. A terminal window displays tracking data in Spanish:

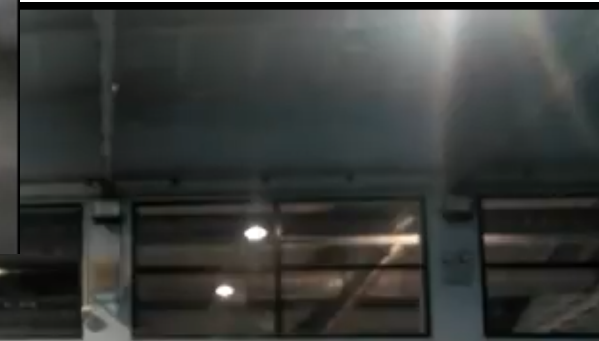
```
martin@martin-laptop: ~/svn_tfg/tfg/trunk/jderobot/object_tracking/build
Archivo Editar Ver Buscar Terminal Ayuda
Arriba --> linear z: 0.116999 y: 89
Quieto --> linear x: 0 area: 1512
Derecha --> angular z: 0.305 x: 94
Arriba --> linear z: 0.103499 y: 92
Quieto --> linear x: 0 area: 1554
Derecha --> angular z: 0.294999 x: 96
Arriba --> linear z: 0.0944992 y: 94
Quieto --> linear x: 0 area: 1505
Derecha --> angular z: 0.295 x: 96
Arriba --> linear z: 0.0945 y: 94
Quieto --> linear x: 0 area: 1505
Derecha --> angular z: 0.279999 x: 99
Arriba --> linear z: 0.0674976 y: 100
```



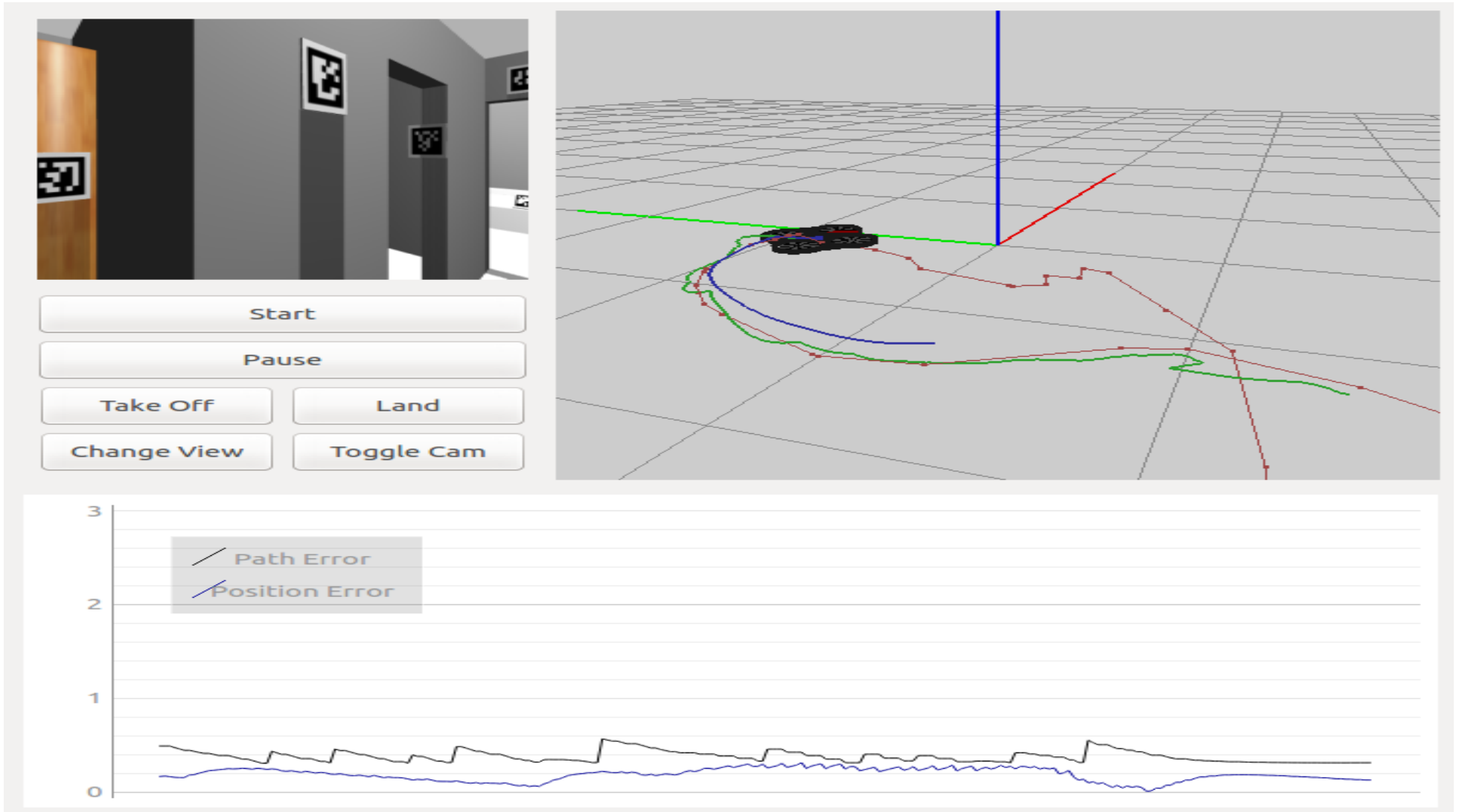
The interface shows the 'Tracking' application running on a Linux system. It features a video feed of a drone tracking a red object. The 'Track options' panel includes sliders for 'area min.' (200), 'area max.' (8000), and 'edge thresh.' (69). The 'Pid options' panel has tabs for 'X pid', 'Y pid', and 'Z pid', with 'Angular Z' selected. Parameters for 'Angular Z' are 'Kp: 0,0200', 'Ki: 0,0000', and 'Kd: 0,0004'. The 'Reduction factor' is set to 10. The 'ArDrone control' panel includes buttons for 'Takeoff', 'Land', 'Reset', 'Track', 'Finish Track', 'Up', and 'Down'. The 'Battery' level is shown as 37%. A terminal window displays tracking data in Spanish:

```
martin@martin-laptop: ~/svn_tfg/tfg/trunk/jderobot/object_tracking/build
Archivo Editar Ver Buscar Terminal Ayuda
auto-hover
auto-hover
auto-hover
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auto-hover
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auto-hover
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auto-hover
auto-hover
auto-hover
file completed
26     Color getDefaultColor();
27     int getDefaultColorIndex();
28     int getHueMax();
29     void setHueMax(int val);
30     int getHueMin();
31     void setHueMin(int val);
32     int getSatMax();
33     void setSatMax(int val);
34     int getSatMin();
```

Aplicaciones: aterrizaje visual



Aplicaciones: seguir trayectoria



Conclusiones

- Drones son robots aéreos: hw y sw
- Entorno software facilita su programación, su inteligencia: *<http://jderobot.org>*
- Sw da control completo de comportamiento
- Drivers, herramientas, aplicaciones

- Autolocalización visual SLAM, interiores
- Programación con Scratch