

Workshop

Robótica y sistemas no tripulados para aplicaciones de seguridad

REDROM
RED DE ROBÓTICA Y MECATRÓNICA



Resultados del proyecto Europeo TIRAMISU en desminado humanitario



CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS



Héctor Montes, Roemi Fernández, Manuel Armada

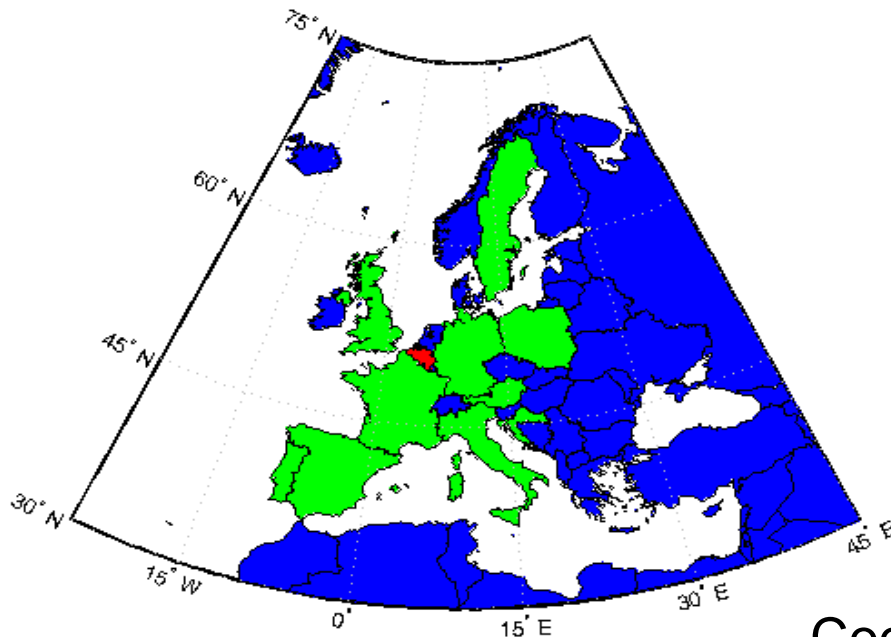
Madrid, 2 de diciembre de 2016



what is Tiramisu ?

Toolbox Implementation for Removal of Anti-personnel Mines,
Sub-munitions and UXO

Funded FP7 program (2012-2016)



24 Partners – 11 Countries

9 Academies

9 SME

2 RTO

1 NGO

1 IND

1 EU - CROMAC

PAB: 10 experts from GICHD,
UN, Field Stakeholders

EUB: 12 MAC

Coordinator: RMA

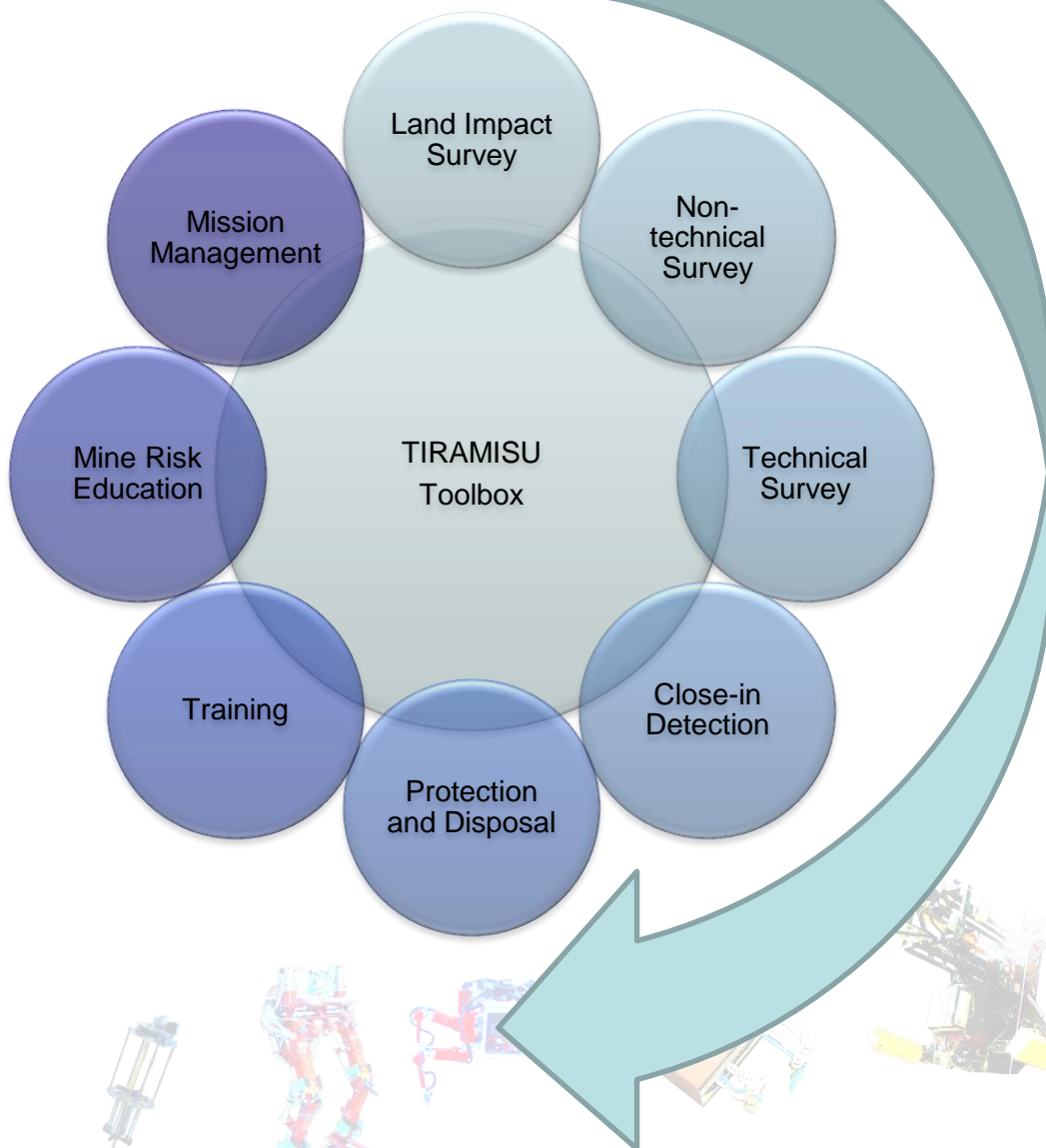


- El proyecto TIRAMISU se ha centrado en el desarrollo de diferentes componentes, los cuales pueden ser utilizados directamente por lo Centros de Acción contra las Minas para la remoción de minas.
- Por lo tanto, el objetivo principal de TIRAMISU es el de proporcionar herramientas para la realización de las siguientes acciones:
 - Mejorar la eficiencia y la rentabilidad en la limpieza de áreas civiles grandes infestadas con minas AP.
 - Integrar diversas herramientas modulares para la ayuda en el desminado humanitario.
 - Ser validadas por los usuarios en el campo de minas.
 - Ser respaldada por la formación y la asistencia técnica adecuada.





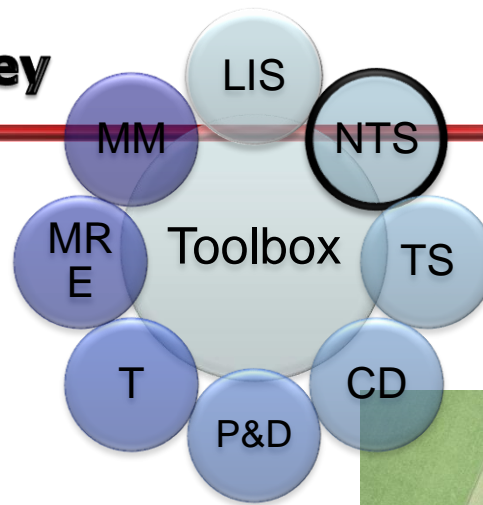
Tools for Which Activities?



Activities
Leading to
Land
Release



Non Technical Survey



Objective?

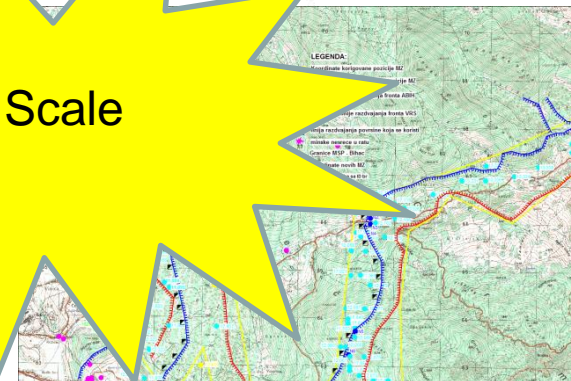
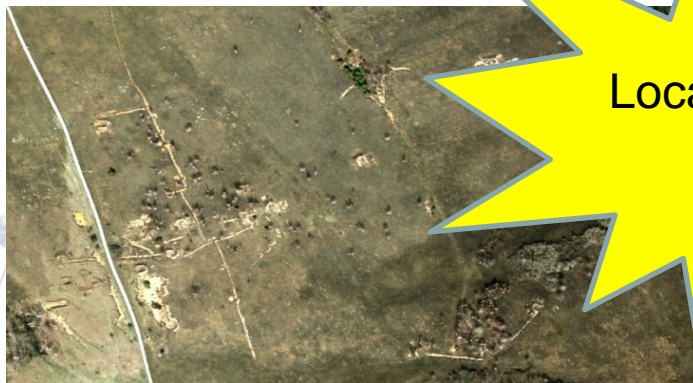
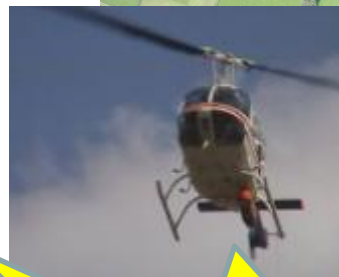
Confirm Hazardous Areas

How?

- Data gathering: RS, mine records,
- Indicators: absence/presence

Who?

IGEAT, RMA, DLR,
FGUNIZ, CTDI, EUSC, PLUS



Local Scale



CLOSE-IN DETECTION AND STAND-OFF DETECTION

Objective?

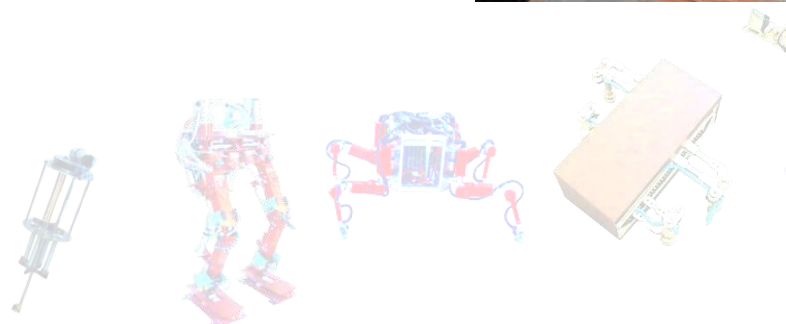
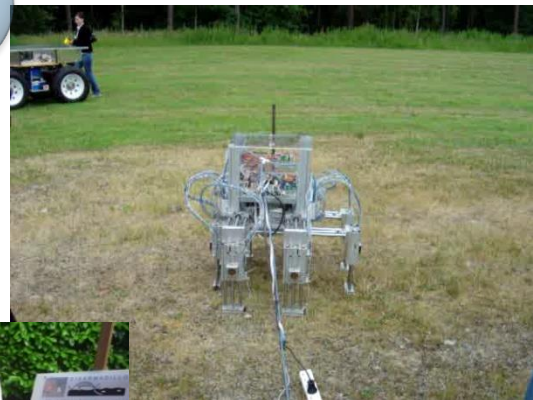
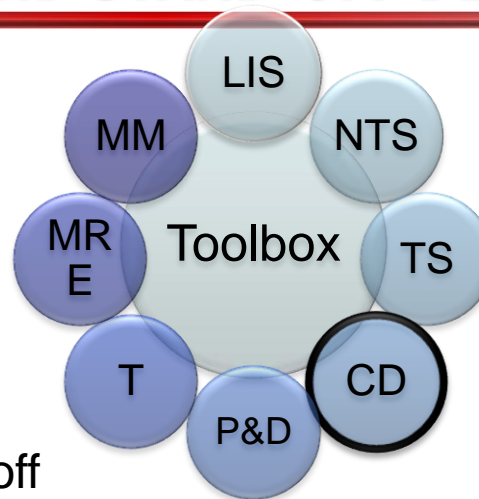
Precisely detect and localise

How?

- Metal & GPR: Array, Stand-off
- Chemical and biological sensors (Honeybeed)
- Intelligent prodder

Who?

ISR, RMA, DLR, USTAN, CSIC, NOVELTIS, VALLON, IDS, DIMEC, PIERRE





Mine Risk Education

Objective?

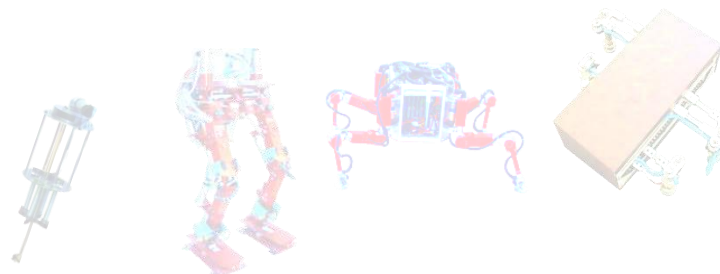
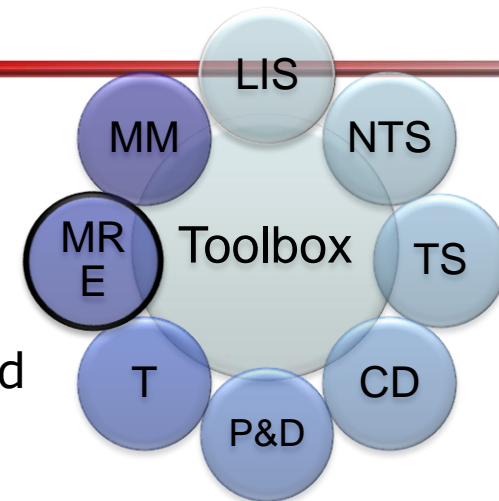
Reduce the risk of injury from mines and UXO

How?

- Computer database and games
- Theatre play = social event

Who?

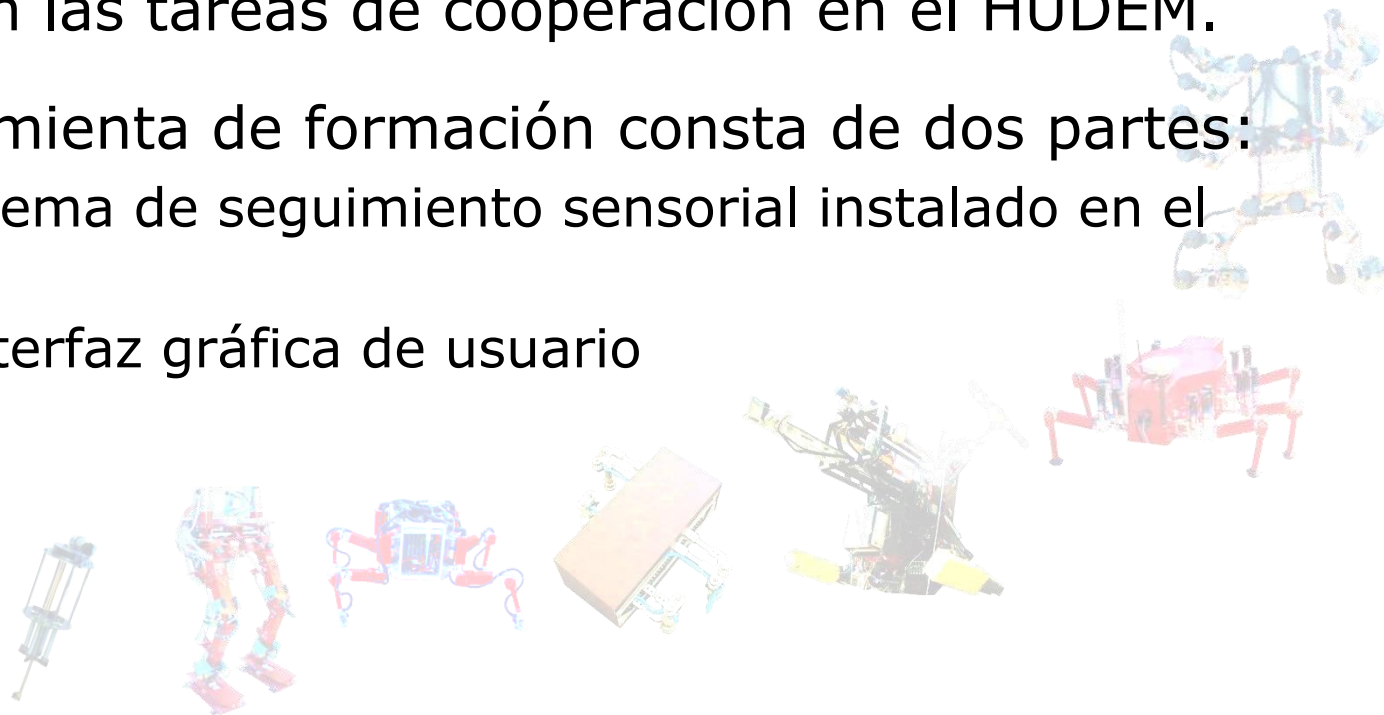
SNAIL-AID, PIERRE,
BRIMATECH, IMM, RMA





Herramienta de entrenamiento con HDD

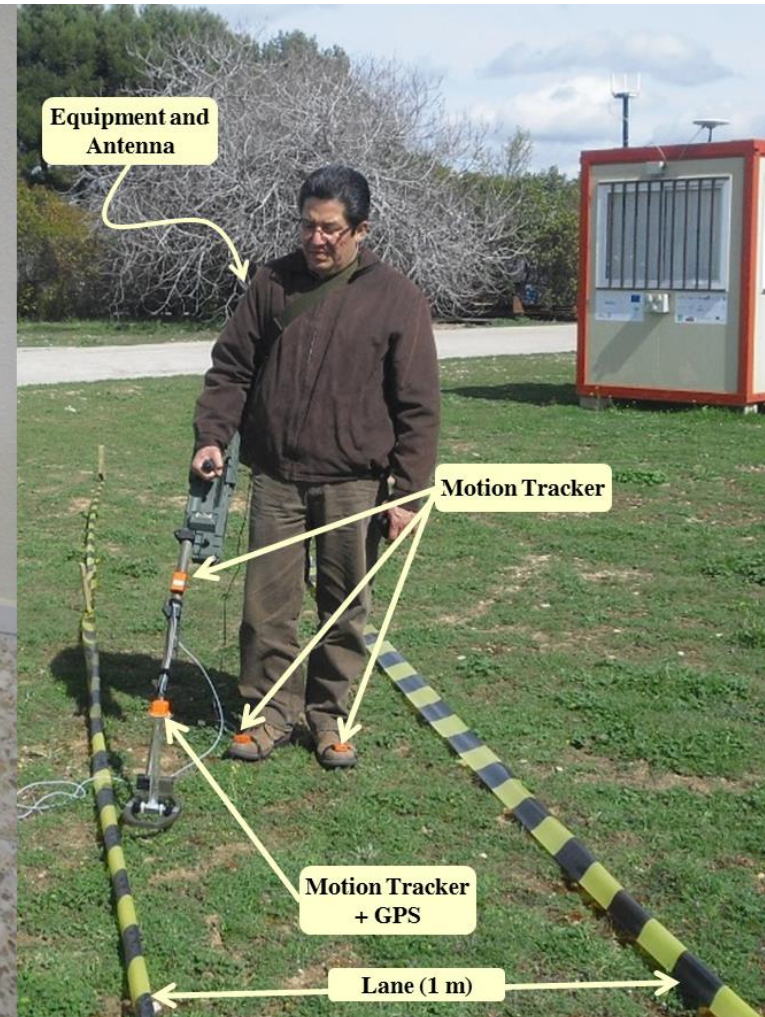
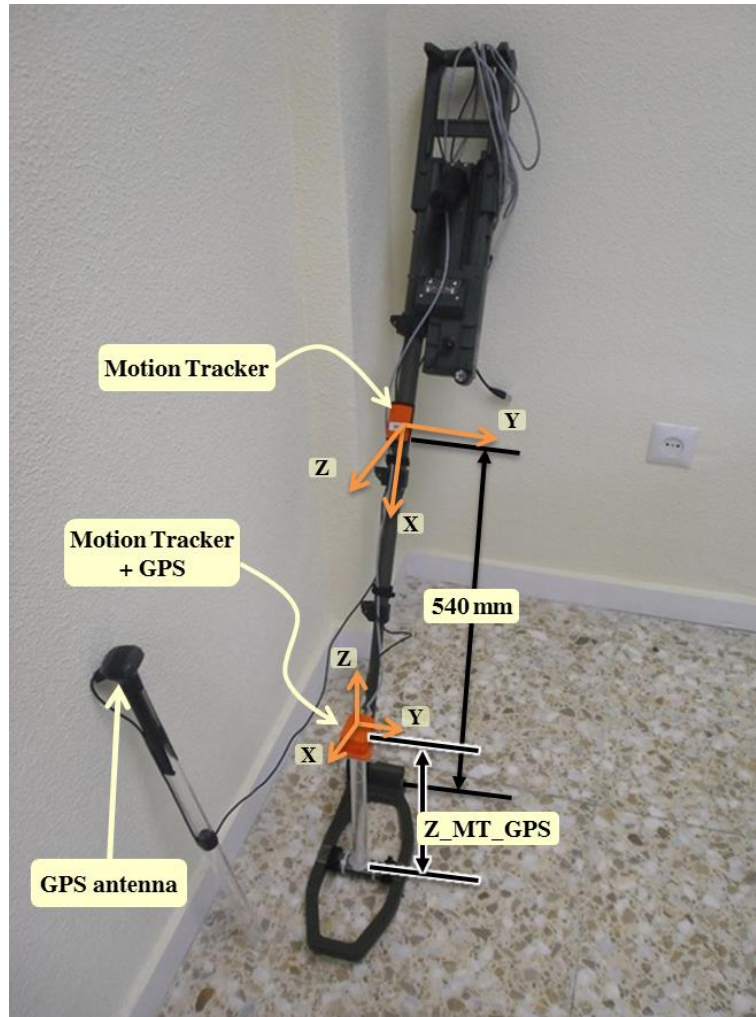
- Se ha desarrollado una herramienta de formación para mejorar el uso de los HDD para aplicaciones en HUDEM.
- La idea principal está basada en la de proporcionar una formación mejorada a los aprendices que se inician en las tareas de cooperación en el HUDEM.
- La herramienta de formación consta de dos partes:
 - Un sistema de seguimiento sensorial instalado en el HDD.
 - Una interfaz gráfica de usuario





Herramienta de entrenamiento con HDD

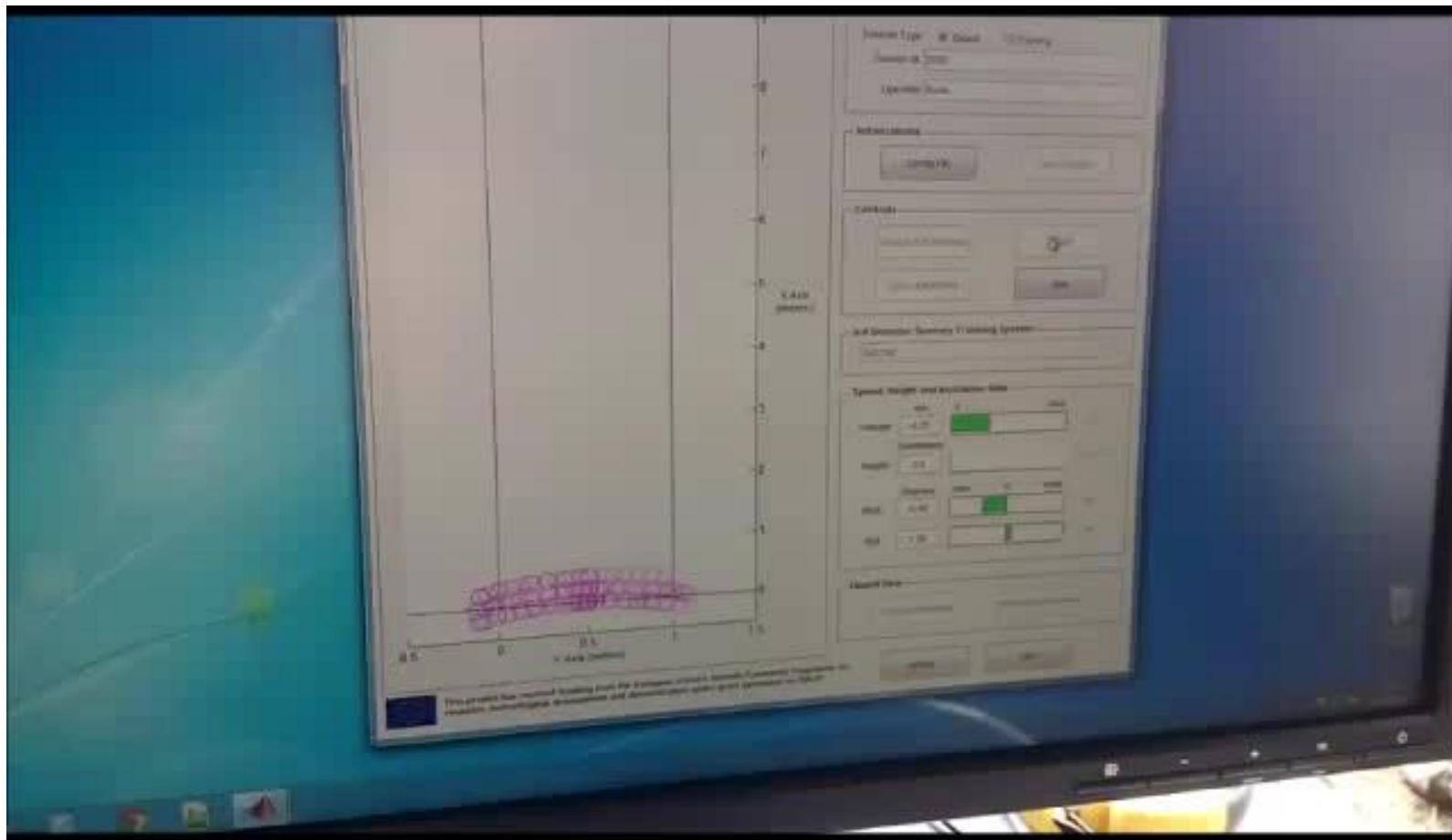
- Sistema de seguimiento sensorial





Herramienta de entrenamiento con HDD

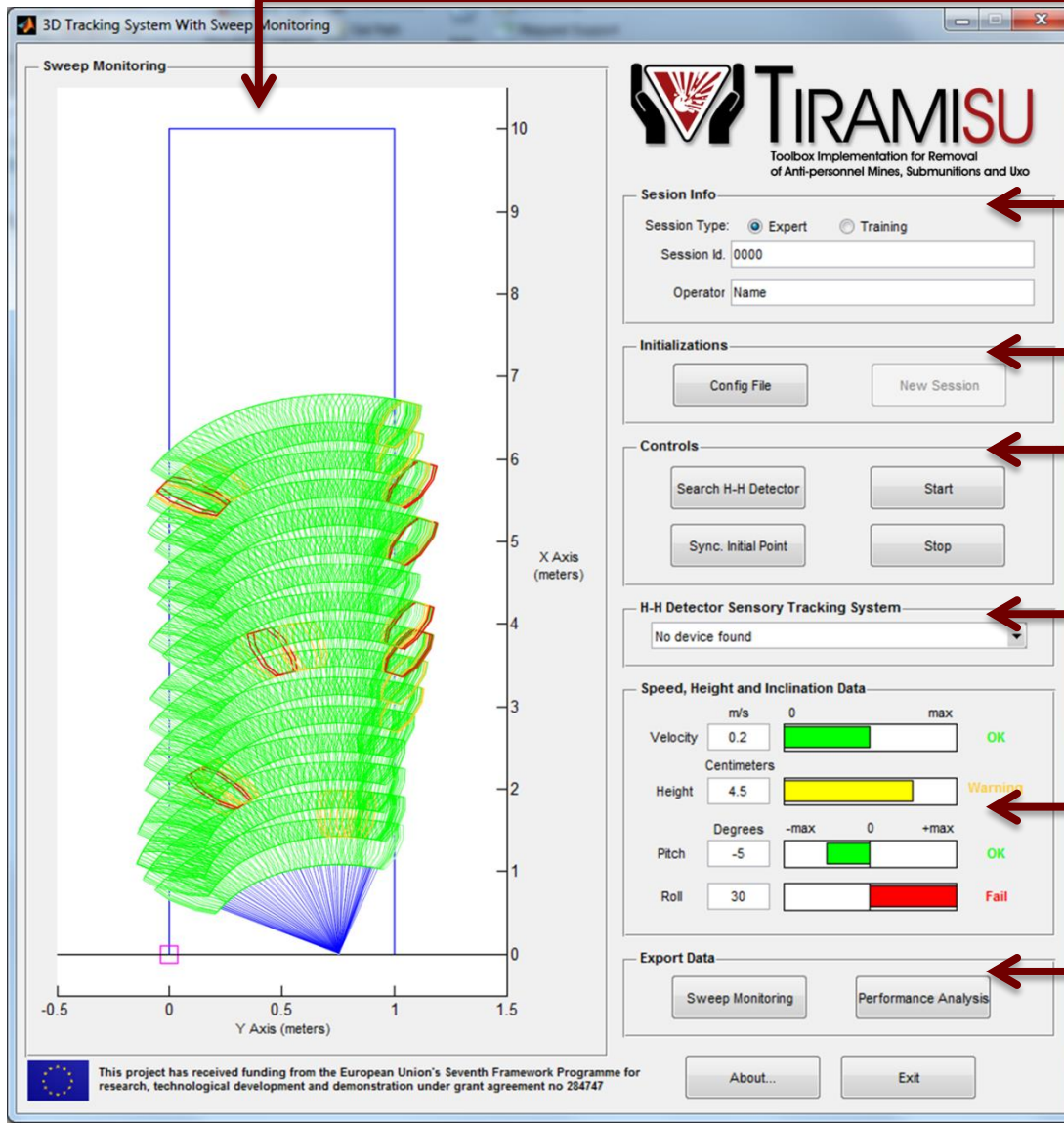
- Ensayo experimental en exteriores





Herramienta de entrenamiento con HDD

- Interfaz gráfica de usuario



Monitorización
de barrido

Sesión Info.

Inicialización

Controles

HHD – Sistema
de seguimiento

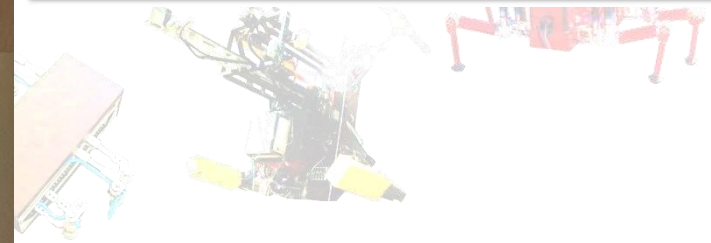
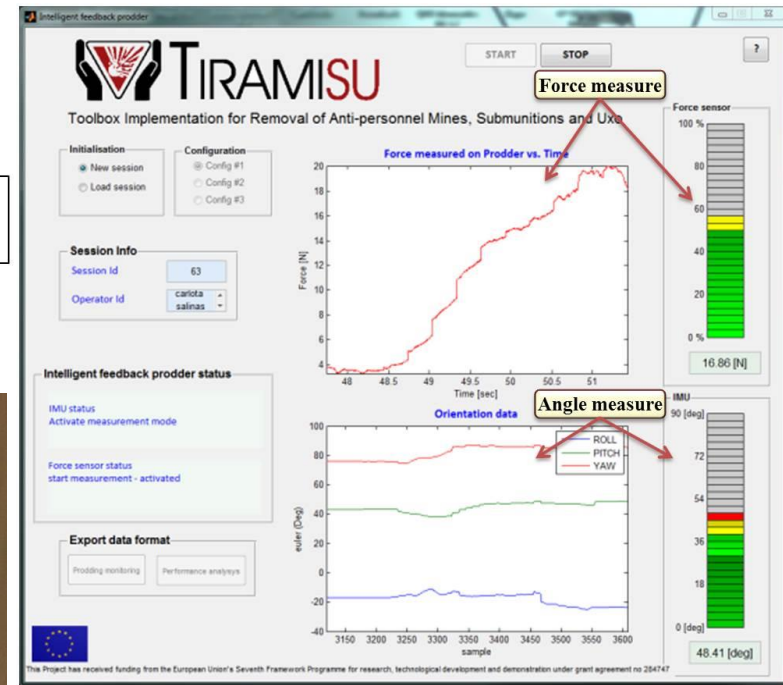
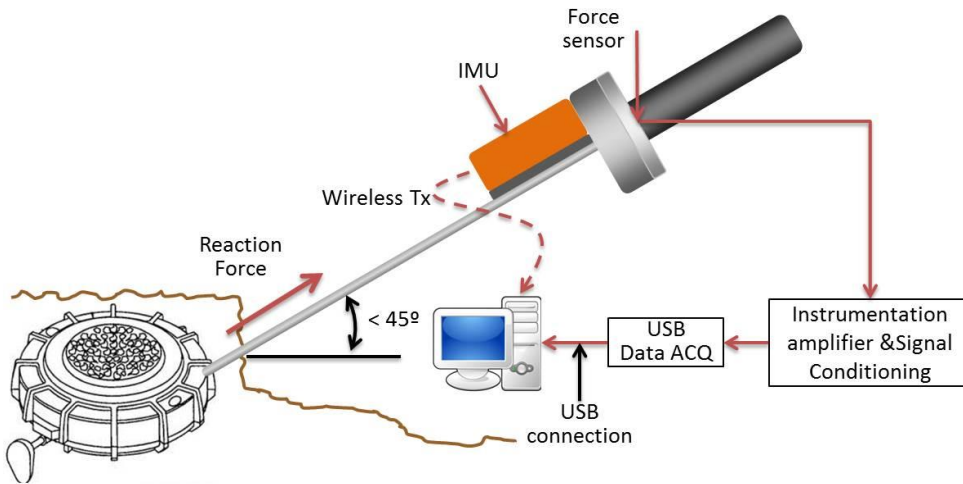
Data de velocidad,
altura e inclinación

Exportar data



Herramienta de entrenamiento con *Prodder*

- Módulos que componen el prodder inteligente





Herramienta de entrenamiento con *Prodder*

- Ensayo experimental en el laboratorio





Desarrollo de e-tutores para HUDEM

- E-tutor → *Advanced General and Non-Technical Survey*
 - Ocho lecciones
 - Test

The screenshot displays the TIRAMISU e-tutor interface. On the left, a vertical menu includes 'About this course', 'Overview', 'Structure', 'Authors', 'Acronyms', and 'Start Course'. The main content area features the TIRAMISU logo and the course title 'Advanced General and Non-Technical Survey' in a large, stylized font. Below the title is a collage of images related to hazardous materials, including a helicopter, a map, and various containers. A text box below the collage states: 'E-tutor to support capacity building for training in the process of assigning and delimiting the Suspected Hazardous Areas'. A button labeled 'Click on Start Course in the left-hand menu to start learning' is positioned below the text. The bottom right corner of the main area shows 'Version 1.0 - TIRAMISU 2013'. On the right side, there is a 'MY STATUS' section with a 'PROFILE' box (Username: ref, Password: 1234), a 'STATUS' box (Lesson 1-8), and a 'FINAL TEST' button. Below this is a 'Question 2:' section with a multiple-choice question: 'What processes involve physical intervention?'. The options are: 'Clearance' (checked), 'Advanced General Survey' (unchecked), 'Non Technical Survey' (checked), and 'Technical Survey' (checked). A 'Save' button is located at the bottom right of the status section.



Desarrollo de e-tutores para HUDEM

- E-tutor → *Antipersonnel Landmines Identification*



G A M

Charact.

Arming

Neutraliz.

Disarming

Test

Guest

TIRAMISU Sub-e-tutor 5: VS-50

Welcome to the fifth sub-e-tutor. This sub-e-tutor will provide you with a good knowledge about the VS-50. You will learn its characteristics and different procedures related to arming, neutralization and disarming. As well as the theory, there are some videos which help you to understand how the mine works.

This sub-e-tutor is divided into 4 modules:

1. Characteristics
2. Arming procedure
3. Neutralization procedure
4. Disarming procedure



TIRAMISU



The Steel Insert is inserted by force in the Pressure Pad.

- Air Bag
- Charge Locator
- Cocking Block
- Cover Plate
- Detonator Plug
- Detonator Plug Gasket
- Flexible Rubber Sac
- Lower Mine Body
- M41 Stab Detonator
- Pressure Pad
- Spacer Ring
- Pressure Pad Retaining Ring
- Steel Insert
- Safety Pin
- Stirrup
- Safety Pin Housing
- Striker
- Striker Spring

Navigation: < > || >>> R R1 R2



G A M

Charact.

Arming

Neutraliz.

Disarming

Test

Guest

TIRAMISU Sub-e-tutor 4 Valmara 69

Welcome to the fourth sub-e-tutor. This sub-e-tutor will provide you with a good knowledge about the Valmara 69. You will learn its characteristics and different procedures related to arming, neutralization and disarming. As well as the theory, there are some videos which help you to understand how the mine works.

This sub-e-tutor is divided into 4 modules:

1. Characteristics
2. Arming procedure
3. Neutralization procedure
4. Disarming procedure



TIRAMISU



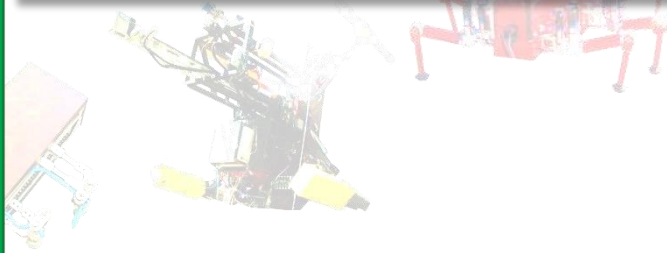
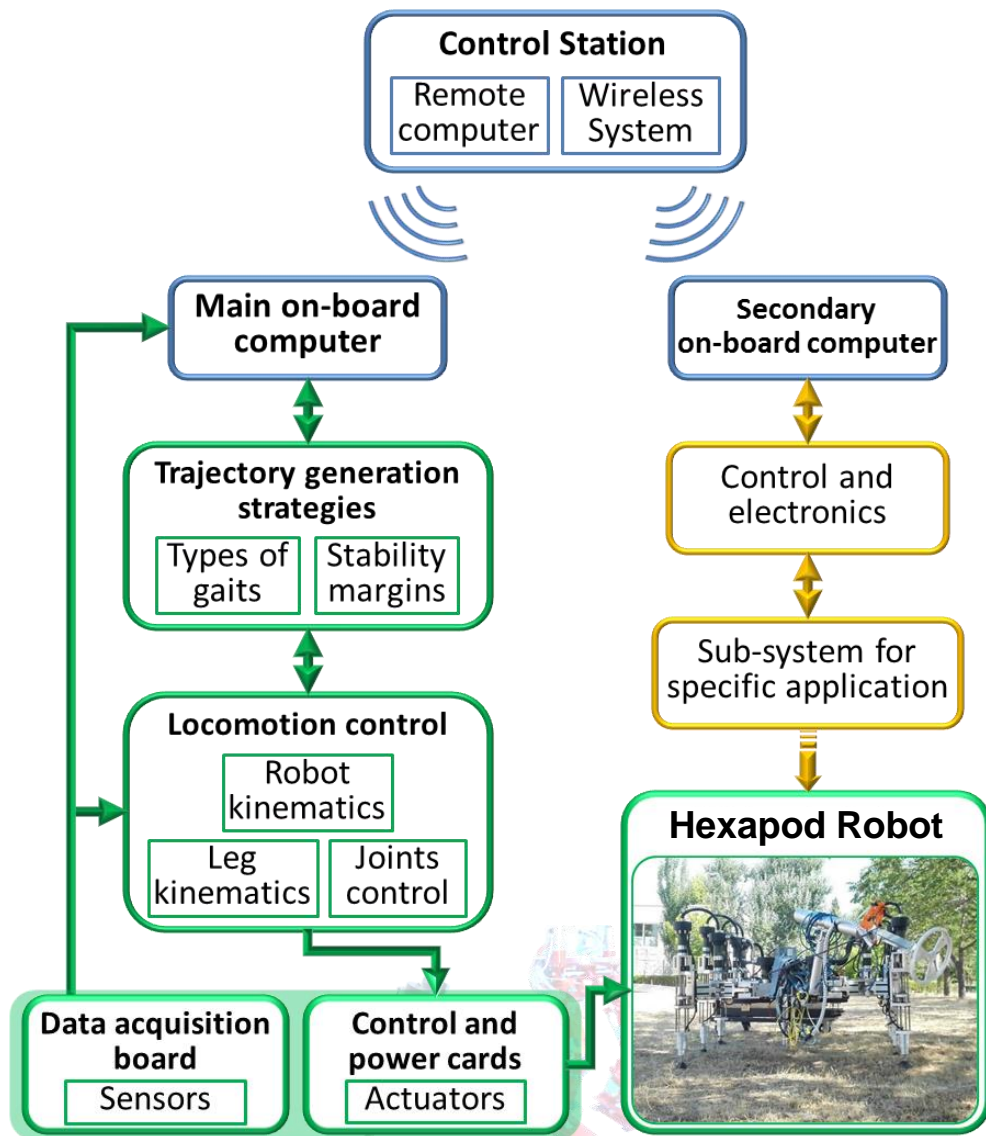
- 5 Prong Fuze
- Dome Nut
- Forked Safety Clip
- Fragmentation Canister
- Fragmentation Canister Cover
- Fuze Well Gasket
- Mine O-Ring
- Mortar Projector Sleeve
- Mortar Projector Sleeve Cap
- Striker Housing
- Striker Housing Cap
- Vertical Prong
- Vertical Prong Tension Spring

Navigation: < > || >>> R R1 R2



Descripción del robot hexápodo para HUDEM

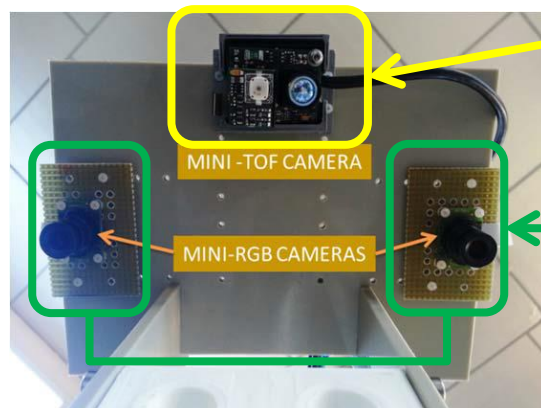
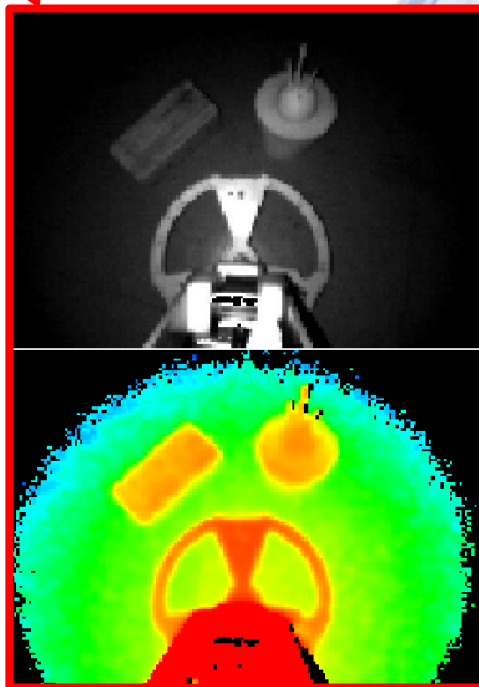
- Arquitectura de control del robot hexápodo





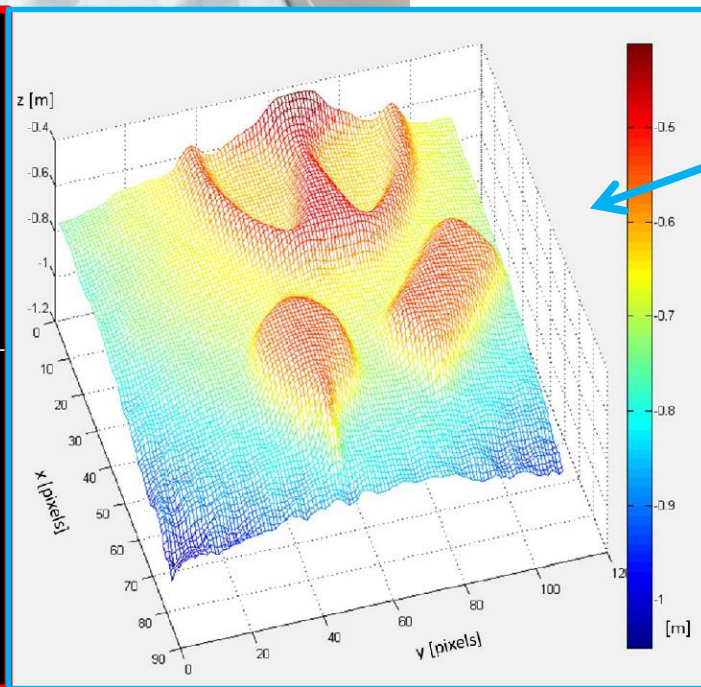
Set de cámaras instaladas en el manipulador

Imagen de
amplitud y de
rango de la
mini-ToF

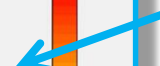


Cámara mini-ToF

Cámara mini-RGB



Mapeo de la
superficie del
terreno.





HEX en exteriores

- Prueba experimental de un modo de caminar en exteriores.





Conclusiones

- Esta presentación ha resumido los principales trabajos y resultados generales llevados a cabo por el dentro del Proyecto TIRAMISU.
- Se han diseñado, desarrollado, y validado varias herramientas que se proponen utilizar en diversas tareas para la ayuda en el desminado humanitario.



¡Gracias por su atención!

