



RAINBOW NEWSLETTER

ISSUE 11, DECEMBER 2022

RAINBOW is a Research and Innovation Action funded under the EU Horizon 2020 framework programme, focusing on developing an open, trusted **fog computing platform** facilitating the deployment, orchestration and management of scalable, heterogeneous and secure IoT services and cross-cloud apps.

RAINBOW ACTIVITIES

In the previous period RAINBOW organized and participated in a **series of events** aimed at showcasing its results as well as interacting with its target audience. These activities included three **webinars** dedicated to the project's demonstrations that covered the challenges faced in the examined use cases and how RAINBOW's involvement has positively impacted and improved the solutions developed to tackle these challenges:

- A webinar dedicated to Use Case 1 - *Human-Robot Collaboration in Industrial Ecosystems*
- A webinar dedicated to Use Case 2 - *Digital Transformation of Urban Mobility*
- A webinar dedicated to Use Case 3 - *Power Line Surveillance via Swarm of Drones*

Moreover, RAINBOW has organized two **hackathon-like activities** hosted at universities participating in the project. Finally, RAINBOW organized a **cloud computing session** hosted under the European Big Data Value Forum 2022 held in Prague.



Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 871403

PROJECT INFORMATION

TITLE: RAINBOW - *A fog platform for secured IoT services*

GRANT AGREEMENT NO: 871403

CALL ID: ICT-15-2019-2020

CALL TOPIC: Cloud Computing

START DATE: January 1st, 2020

END DATE: December 31st, 2022

COORDINATOR: UBITECH
Ubiquitous Solutions

Follow us in social media:



Facebook

@RainbowProjectH2020



Twitter

@RainbowH2020



LinkedIn

rainbow-project-h2020



Instagram

rainbow.2020.eu



YouTube

/channel/UCRcOGrlNaV9wWh6Bih11-KA

Look for our hashtags!

#RAINBOW_H2020

#FogComputing

#Industry40

#EdgeComputing

#secureIoT



<https://rainbow-h2020.eu>

USE CASE 1 WEBINAR

On Friday, 9th of December, 2022, **BIBA**, the RAINBOW partner leading the use case on **human-robot collaboration system in industrial ecosystems**, hosted a live webinar on the challenges and use of RAINBOW's platform in this application.

An introduction was given on the field of **human-robot interaction**, the various levels of interaction from co-existence and cooperation to actual collaboration, as well as the principles followed when design robotic systems to ensure **safe** and **productive** interaction in a **shared workspace**.



RAINBOW Use Case 1 Webinar: Human-Robot Collaboration in Industrial Ecosystems

THIS PROJECT HAS BEEN FUNDED BY THE EUROPEAN UNION'S RESEARCH AND INNOVATION PROGRAM "HORIZON 2020" UNDER GRANT AGREEMENT NO. 871403



Friday 9th of December 2022
14:00 CEST



<https://rainbow-h2020.eu/>

Co-Work in Power Transformer Assembly



09.12.2022

Human Robot Co-Work, M.Sc. Aaron Heuermann

BIBA



Speed and Separation Monitoring



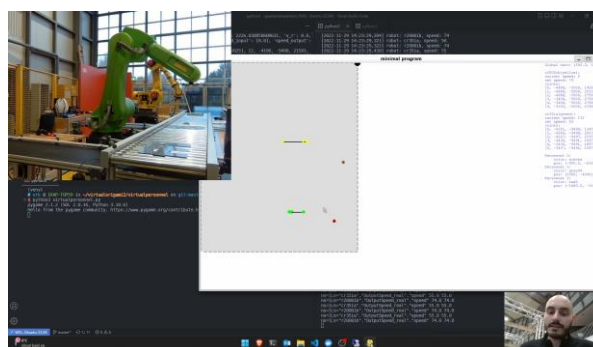
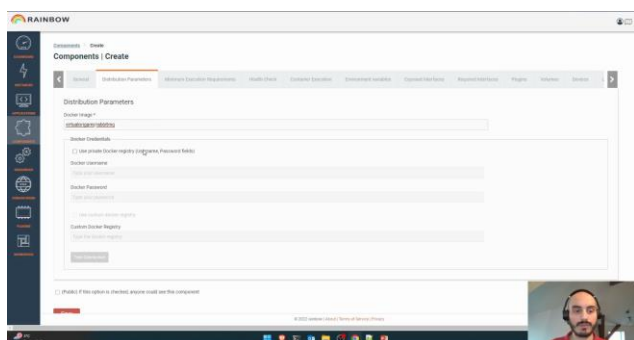
09.12.2022

Human Robot Co-Work, M.Sc. Aaron Heuermann

BIBA



A demonstration followed on how to use the **RAINBOW Dashboard** to perform the required setup and configuration steps in order to deploy RAINBOW's fog computing platform to support the use case applications. Finally, it was demonstrated how the deployed applications were controlling the robots present on the workspace based on the proximity of human workers.



The webinar material is freely available online at: <https://rainbow-h2020.eu/webinars/>

USE CASE 2 WEBINAR

On Tuesday, 6th of December, 2022, **CRF**, the RAINBOW partner leading the use case on the **digital transformation of urban mobility**, together with **LINKS** and **POLITO** hosted a live webinar on the challenges and use of RAINBOW's platform in this application.

The aim of the use case was to explore **urban fog mobility** scenarios and ecosystems. The webinar demonstrated "**Animal On The Road**", the hazardous location notification system for urban areas that was deployed for the use case.

RAINBOW USE CASE 2 WEBINAR: DIGITAL TRANSFORMATION OF URBAN MOBILITY



Tuesday 6th of December 2022
14:00-16:00 CET

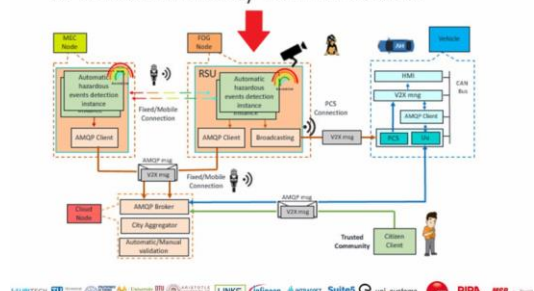


<https://rainbow-h2020.eu/>

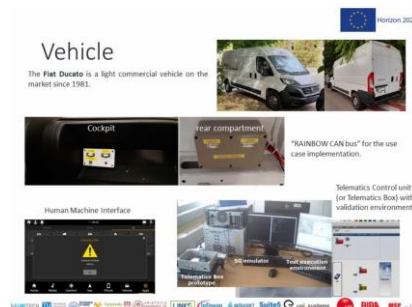
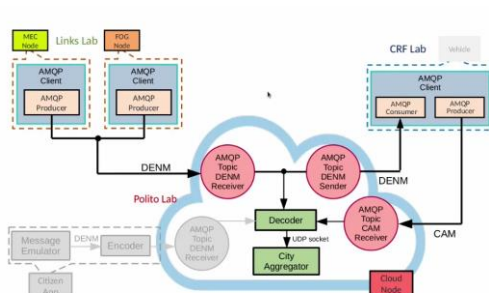
THIS PROJECT HAS BEEN FUNDED BY THE EUROPEAN UNION'S RESEARCH AND INNOVATION PROGRAM "HORIZON 2020" UNDER GRAND AGREEMENT NO. 871403



Architecture: Digital Transformation of Urban Mobility Demonstrator



Detailed sessions covered all subsystems composing the scenario as well as their integration with the RAINBOW platform: (i) **Road Side Unit** architecture; (ii) RAINBOW orchestration capabilities and components adopted; (iii) **Cloud** architecture and **City Aggregator**; (iv) **Connected Vehicles** architecture. The benefits introduced by RAINBOW in the form of the **automatic system performance tuning with SLOs** were also explained and discussed.



The webinar material is freely available online at: <https://rainbow-h2020.eu/webinars/>



USE CASE 3 WEBINAR

On Friday, 2nd of December, 2022, **MSP**, the RAINBOW partner leading the use case on **power line surveillance via swarm of drones**, hosted a live webinar summarizing the application and outcomes of this demonstrator.

The webinar presented the background of large-scale drone missions, the current limitations and challenges associated with these operations, and the solutions that were designed by **integrating drone systems with RAINBOW services**.

<https://rainbow-h2020.eu/>
@RainbowH2020



Use Case 3 Webinar:

Power Line Surveillance via Swarm of Drones

02.12.2022

MSP INNTECH LTD.
www.uov.com.pl/en



Use Case 3: Drone Demonstrator



Introduction - Use Case Problem Statement

The use-case concerns operations, which are carried out by unmanned aerial vehicles (planes or copters) and due to the size of the project require multiple flight missions.

Examples of such operations:

Large area project – eg. photogrammetric (surveying) projects

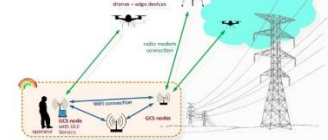
Linear project – eg. power lines inspections, railroads monitoring, watercourses surveys, etc.



Use Case 3: Drone Demonstrator



Introduction - Proposed Solution



The GCS node, in cooperation with other nodes and with the appropriate RAINBOW services, performs several functions:

- prepares the master mission plan
- based on the master mission and current data from the implementation of the missions of individual drones, as well as on the current results of the photo quality control, it plans an individual flight plan for the copter
- uploads flight plan for the drone before its taking-off or transmits modifications of the flight plan to the drone being in the air



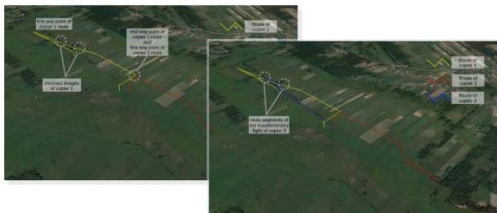
Next, the architecture of the integrated system along with the **benefits coming from the RAINBOW solution** and the support provided by automatic system performance tuning with the SLOs were discussed. Finally, the use case testing and characteristics were presented along with the results of the validation phase.

Use Case 3: Drone Demonstrator



Use Case Scenarios, Results and Conclusions – Use Cases Scenarios

Use Case:
Performing supplementary flights due to acquiring defective data.



Use Case 3: Drone Demonstrator



Use Case Scenarios, Results and Conclusions

MSP-KPI-02: increase of productive flight distance per drone

The drone does not need to return to the starting point for landing – the control over a drone can be handed over to another ground station node and land near it. This reduces the length of unproductive parts of the mission.

Expected value: 50%
Achieved value: 100%

Comment:

Transferring control over flying drone from one GCS to the next, while the drone flies, allows for continuation of the mission when the radio link between the drone and GCS vanishes. In this way, the full capabilities of the drone can be used without interruptions due to VLOS range or radio link limitations. The result of the demonstrator was achieved by maximizing possibilities given by the drone system used for tests.

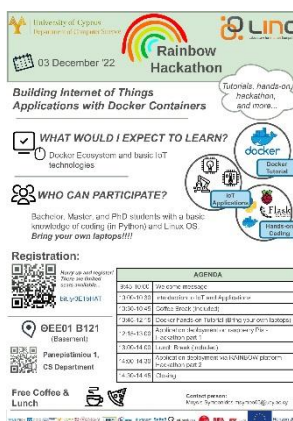


The webinar material is freely available online at: <https://rainbow-h2020.eu/webinars/>

RAINBOW HACKATHONS

On Saturday, 3rd of December, 2022 the RAINBOW members, **University of Cyprus** (UCY) and **Aristotle University of Thessaloniki** (AUTH), organized and hosted two in-person hackathon activities, titled *"Building IoT applications with Docker containers"* and *"Building optimized IoT applications for distributed environments"*, respectively. These activities were addressed at undergraduate and post-graduate computer science students from the two universities and aimed at demonstrating how RAINBOW services can **facilitate the development of IoT applications** in order to **tackle Fog Computing challenges**.

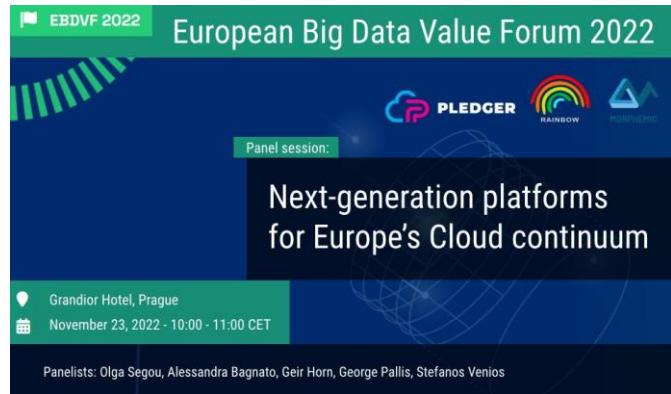
Motivated by the provided challenge as well as the capabilities offered by the RAINBOW platform, the teams were encouraged into developing their own unique solutions by tackling any technical barriers after they have understood the scope and the potential of the offered tools and technologies. Students benefitted by being introduced to the complete pipeline of the development and deployment of modern IoT applications while getting themselves familiarized with the use of docker technology and with RAINBOW's advanced Fog Computing features.





EUROPEAN BIG DATA VALUE FORUM

On November 23, 2022, during the **European Big Data Value Forum 2022**, **RAINBOW** together with the cloud computing projects **PLEDGER** and **MORPHEMIC**, hosted a panel session titled *"Next-generation platforms for Europe's Cloud continuum"*. The session offered motivating discussions along with key take-away ideas with regards to the opportunities provided through the **cutting-edge Edge, Fog, Cloud Continuum solutions** developed by the 3 projects. It explored how next-generation cloud platforms can contribute in the **data-driven digital transformation** of the European innovation ecosystem. It identified the cloud technologies that impact the emergence and effectiveness of novel businesses services and opened **collaboration among key stakeholders** to encourage synergies that can further **increase the adoption** of the latest cloud developments offered by the 3 projects.



@RainbowProjectH2020



@RainbowH2020



rainbow-project-h2020



rainbow.2020.eu



/channel/UCRcOGrIN
aV9wWh6Bih11-KA



Visit our website and subscribe to our newsletter to receive it in your email!

<https://rainbow-h2020.eu/contact-us/>