

Addressing the Covid-19 Pandemic with Responsible Research and Innovation

Website: <https://www.ucg.ac.me/projekti/13/777>

Country: Montenegro

Geographical focus: Montenegro

Scientific field/Thematic focus: Cross-thematic/Interdisciplinary, Medical and Health Sciences

What is the good practice about?

Responsible research in Montenegro and connecting science, society and the economy has been especially proven during crises of the Covid-19 pandemic. It is extremely important to create a system that is ready to respond to unexpected situations and crises at any moment. During this process, it was noticed that the potentials of the community are great and that they should be used to the maximum to improve the life of our society.

Why is this initiative needed?

The initial idea was to design a mask, but research has shown that the filter and the part set for breathing affect the filament's temperature. Therefore, a bracelet with the frames of the Montenegrin map was designed as a better option, which will change the colour of the map if the person wearing it has a fever. The idea was for this 3D-printed product to be a true representative of Montenegrin innovations on the topic of COVID-19 and a good brand for Montenegro, both in terms of spreading innovations and in terms of good practices of connecting science and industry.

The second part of the research was completed in December 2020, and scientists came up with the idea to reduce the consumption of filament during 3D printing. The reason was primarily the crisis that occurred due to the pandemic, and the shortage of press materials. This problem was not easy to solve, because the borders were closed and there was a shortage of materials everywhere, and as there is no production of filament in Montenegro, the only way that was possible while there was a stock of materials is model optimization and subsequent heat treatment of the printed element savings.

As a result of the successfully conducted research and all project activities, bracelets with temperature-sensitive indicators were created and ways to save filaments for 3D printing were discovered, and scientific papers were created and published in renowned scientific journals.

What are the main objectives and activities?

The project "3DP Research and Innovation for Covid-19" (3DPRI) of the Faculty of Electrical Engineering, the University of Montenegro in cooperation with the Science and Technology Park of Montenegro, Clinical Center, and the Vrije University of Brussels were approved by the Montenegrin Ministry of



Science. During the project, a combination of scientific research and 3D technology created a special bracelet with temperature-sensitive filament, which made Montenegro recognizable in the fight against the COVID-19 pandemic. An integral part of the project was the printing of a temperature-sensitive indicator on the bracelet itself so that anyone close to the person wearing the bracelet could know if the person has a fever. 3D printing can be used to solve more complex problems and design new efficient products, all of which are accompanied by detailed research, testing, and analysis. For that reason, the Faculty of Electrical Engineering of the University of Montenegro, in coordination with the Science and Technology Park of Montenegro and the Clinical Center of Montenegro, decided to work together on the design of a new product. The new product consisted of regular PLA filament (3D printing material, plastic) and temperature-dependent PLA filament that changes colour depending on the temperature.



Who is involved?

The project involved academia, industry, government and society.

Can this good practice be replicated?

Making 3D-printing tools available to innovators in "fab labs" and strengthening a "maker community" in the region of the Western Balkans and motivating the innovation stakeholders in universities and other societal sectors is an important activity in the Western Balkans and Montenegro provided one example that can be replicated in other economies.

Further links:

- ⇒ Science and Technology Park website: <https://www.ntpark.me/2020/12/08/crnogorski-naucnici-osmislili-narukvicu-koja-mijenja-boju-kod-povisene-temperature/>
- ⇒ University of Montenegro website: <https://www.ucg.ac.me/projekti/13/777>
- ⇒ News about projects chosen by the Ministry of Science Montenegro: <https://senat.me/me/ministarstvo-nauke-200-000-eura-za-pet-covid-19-projekata/>
- ⇒ Scientific paper on this topic in MDPI: <https://www.mdpi.com/2076-3417/11/1/419>

Relevant RRI keys: Open science, public engagement

Type of practice: Making, strengthening cooperation

Target groups: S&T park, university, students, people on the street

