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From Annoying and Invasive Buzzer to a Useful Tool – Drones to Assist People

4.11.2022 - Kramar Vadim, Koskela Marjut, Kaartinen Heidi

Another drone in the sky! Is it filming me? Where do my pictures go? Will it suddenly drop on my head and kill me? These may be thoughts that pop into mind when one sees a drone in the sky. Drones are often seen as toys that may be purchased from supermarkets or annoying nuisances flying above. They are actually much more than that: The majority of applications of drones are serious and, without a doubt, useful. When operating drones, safety is essential. To maximise safety and prevent misuse, any operations of drones, including the consumer ones, are strongly regulated at the EU level. In the hands of experienced and educated operators, drones are valuable tools.

Let's have a look at how drones can be used for public safety. There are already some excellent cases in which the drone has been vital. Lately, in the wildfires of Kalajoki, drones have been used where action was needed. When the fire had been stabilised, the drones were used to scout the possible changes in its state [1]. (Image 1.)



IMAGE 1. A drone footage of the forest fire (Image: John Towner/unsplash.com).

The Finnish police are among the world's most active users of drones. They use drones as tools to support their actions and make the workplace safer. Around 500 trained pilots in the Finnish police force operate with more than 220 drones. In recent years, police drones have been used thousands of times for operative activities [2].

Other uses for drones have been identified in health care, where drones can be used for delivering goods or medication [3]. Drones with thermal cameras (image 2) can be used for locating lost persons in such terrains as boglands or forests or areas of natural disasters. There is already a good history of using drones for Arctic research [4].



IMAGE 2. National PRIORITY project trialled the search operation in a forest with a thermal camera attached to a drone (Image: Pentti Eteläaho/Centria 2020).

The drones can also be used on accident scenes for evaluating the status on-site, even before the first rescue units have arrived. This information may be invaluable for better planning the mission and targeting the right resources for the accident site [5]. (Image 3.)



IMAGE 3. Drone testing at Callio, Pyhäsalmi mine (Image: Heidi Kaartinen/Centria 2021).

From challenges to solutions: Universities' joint contribution to the future

The professional applications of drones often imply their missions in a challenging environment and under critical circumstances. Due to the geographical location of Finland, many professional drone operations take place in severe weather conditions. Those affect the operating range and the aerial properties of drones significantly. Due to the highest demand for safety, all those challenges bring food to research activities worldwide [6] [7]. Finnish universities contribute actively to drone innovations.

The European drone regulations set strict rules for all operations with drones [8] [9]. All the operators of the drones with cameras must be registered in national registers. No operator can fly a drone without passing the education and completing a test unless the drone is an absolute toy without any camera and weighing under 250 grams. Using drones beyond the line of sight is even more heavily regulated. The recently published U-space regulatory framework handles using drones in an urban environment. The jungle of drone rules is thick, but it can be tackled with proper communication and education [10] [11].

How do we make the best out of the drones? There is a significant number of research projects in Finland and around the world that continue to prove and contribute to the usefulness of drone technologies, such as AA3D [12], RoboMesh [13], DroLo [14], Flying Forward 2020 [15], AiRMOUR [16], HYFLIERS [17], 5G!Drones [18] and many others. Those kinds of projects respond to the needs of the business world and private persons. They share information with the target business groups and grow knowledge for the drone operators.

The majority of drone applications are driven by high demand from the business world. The drone application areas are widening and getting more sophisticated and unique along with the development of technologies. That exposes an increased need for professionals that have the required skill set [19] [20]. Currently, the demand for skillful professionals in the drone field is much higher than the labour market can offer [21].

Nevertheless, the general public and particularly the young generation are not always aware of how drones are changing our lives, how people can be involved, and what they can do with drones. Drone-related education is already offered: the challenge for higher

education organisations is to provide up-to-date education and raise awareness about the opportunities.

An unmanned aircraft system, or UAS, is an unmanned aircraft, which also includes the equipment to control it remotely. Such sets are often referred to as Unmanned Aerial Vehicles (UAVs), Remotely Piloted Aircraft Systems (RPAS) and are commonly known as drones.

The UAS (Drone) University Collaboration Network (UCNDrone) takes those challenges into account and contributes to the field of drone demand and supply. UCNDrone started as a national project to create a network of Finnish higher educational institutions focusing on drone technologies and applications' education and RDI activities. The network members have their strengths, based on which they will identify national and international development targets to develop education and research. In terms of education, this means identifying the competencies needed by businesses and developing education according to the needs. In research, strengthening the collaboration with networks and stakeholders will create the conditions for joint projects and more effective research in Finland and the European Union.

Nevertheless, the network of academic partners is to be expanded by inviting all the other Finnish higher education institutions to join. The plan is to develop collaborative processes and activities through which Finnish academic partners will together contribute to the UAS domain development in Finland for at least five years after the project time. In Finland, several networks contribute to the development of the drone field, which just proves how complicated the area is.

About UCNDrone network of Finnish Universities

- The network started as the project funded by the Ministry of Education, Science and Culture of Finland. The project ends in January 2023
- The network is supported through a collaborative effort of three universities, Oulu, Helsinki, Turku, and seven Universities of Applied Sciences, Centria, Metropolia, Savonia, XAMK, Tampere, Turku and Oulu
- The Finnish UAS Portal will be available to serve Finnish and international UAS stakeholders:
<http://www.uas-finland.eu/>

For more information about joining the network, please contact Kimmo Paajanen,
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The ideas of UCNDrone appeared as the result of activities of Rethinking Autonomy and Safety innovation ecosystem and service platform for autonomous systems R&D (RAAS) [22], led by VTT Technical Research Centre of Finland. Many UCNDrone partners are active members of that ecosystem. All the UCNDrone members have joined Finnish UAV Ecosystem (FUAVE) [23] as Academic Members.

UCNDrone aims to unite all the higher education organisations in Finland to consolidate the academic effort to educate professionals that will take the applications of drones further. Among the UCNDrone network, action plans are organising nationwide studies on UAS education and research needs and establishing the Finnish UAS Portal to benefit Finnish and international UAS stakeholders.

Drones for a better life

Ideas of sci-fi movies are becoming a reality soon, and in the future, there will be more and more flying devices in the air. That is not only scientists and businessmen who bring the future closer. All the members of society who express interest, experiment and innovate with new artefacts or expose a demanding request, but more importantly – positively look into the future, without fear but with hope – turn the fiction into reality. Universities can assist in gaining fundamental and applied knowledge. In the hands of skilful and educated operators, drones are safe tools, and they provide new ways to create added value in different areas of life.

Drones are not to harm – they are to help!

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Tiivistelmä: Ideas of sci-fi movies are becoming a reality soon, and in the future, there will be more and more flying devices in the air. In the hands of skillful and educated operators, drones are safe tools, and they provide new ways to create added value in different areas of life. Drones are not to harm – they are to help!