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PROSPECTS OF THE DEVELOPMENT OF UNMANNED AERIAL VEHICLES (UAVs)

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Abstract. *This article outlines the current state of research and development for autonomous unmanned aircraft for civil use. Specifically, the history of UAVs for civil use, research and development in the world, and the topics and prospects for the control and operation of autonomous UAVs for civil use are defined. The perspectives for the use of unmanned aerial vehicles (UAVs) are addressed, programs due to the formation and problems preventing the use of UAVs are listed, and ways of increasing competitiveness are taken into account. This article provides an overview of research involving the advancement of UAV technology for the management of UAV production. Technologies, structures and procedures are researched and studied. As well as potential needs and recommendations for the implementation and deployment of UAV technology, the shortcomings of current UAVs for civil production management will be addressed.*

Key words: *UAV, surveillance, reconnaissance, ground system, unmanned flight devices, data, technical characteristics, artificial intelligence*

INTRODUCTION. The number of publications on unmanned aerial vehicles (UAVs) has recently increased. Since the early 1990s, there has been interest in this aircraft in the world. Every year the number of countries involved in UAV development is growing. Countries are developing UAVs on their own projects or participate in international programs. The experience of military conflicts of the past decade has shown that the success of combat operations largely depends on their information supply, in which reconnaissance UAVs play an important role. At present and for the foreseeable future, UAVs will continue to be used militarily, although they also have prospects in the civilian sector.

Currently, the development and mass production of UAVs are engaged in companies in many countries around the world. The greatest success in this field has been achieved by companies from the USA, Israel, Russia, France, Germany and Canada. They work on the UAV in Australia, Austria, Belgium, Brazil, Bulgaria, Holland, India, Iraq, Iran, Spain, Italy, China, United Arab Emirates, Poland, Portugal, Serbia, Montenegro, Singapore, Thailand, Taiwan, Tunisia, Turkey, Ukraine, Philippines, Finland, Croatia, Czech Republic, Sri Lanka, Switzerland, South Africa, South Korea and Japan [1, 2]. The unmanned aerial vehicles can be used for a wide variety of tasks: conducting round-the-clock air reconnaissance in real time using television and infrared equipment, suppressing stationary and mobile targets by means of combat unit, setting active and passive interference, imitation of false targets, correction of artillery fire, laser illumination of ground targets, etc. [3]. The UAV application area covers distances from 10 to 4,000 km, altitudes from 50 to 20,000 m, flight time from a few minutes to several months, takeoff weight from 0.2 to

40,000 kg. Historical analysis of works on UAV shows that they did not appear suddenly. Work on them began during the First World War. In 1930s the first samples of remotely piloted aircraft appeared, in 1940s - the first cruise missiles, in 1950s - unmanned scouts, in 1960s - long-range cruise missiles with nuclear warhead. In 1970s, research works on UAVs were started, in 1980s, strategic land-based, sea-based and air-based cruise missiles were adopted for service, in 1990, unmanned aerial vehicles with high altitude and duration of flight, designed for long-term surveillance and use in reconnaissance and strike systems. At the beginning of the 21st century, work began on combat UAVs capable of striking ground targets. The following tasks are set for the UAVs of single use: to increase the accuracy of hitting the target, to increase the flight range, the probability of overcoming the air defense and missile defense during military operations, to create conventional combat units with high destructive effect, to expand the range of objects of defeat, the possibility of correcting the flight mission during the flight, the associated use of single-use UAVs. to conduct intelligence. Tasks UAV multiple applications: high reliability and survivability, long duration and range of the flight, high flight, technical and economic performance, ability to conduct complex reconnaissance with real-time data transmission time, etc.

UAV HISTORY. Firefighting aid, police monitoring of civil unrest and crime scenes, disaster response intelligence [2], border security [3], traffic surveillance and regulation [4,5] and archaeological research [6] are common civil applications for UAVs. Since the 1980s, unmanned aerial vehicles have been developed and used for agricultural crop pollination. Unmanned aerial vehicles have been widely used since then, and particularly in the last decade, to take aerial photographs and obtain images of crop fields to facilitate crop management. UAVs usually fly at low altitudes to collect remote sensing data, in addition to the remote sensing of high-altitude flights from manned aircraft. Most agricultural UAVs are mini-models of fixed wing or rotary wing aircraft characterized by low cost, low value and low cost for the purpose of remote sensing at low altitudes (LA). Velocity, low ceiling height, low weight, low payload and short stamina [7, 8]. Kites, balloons, gliders and motorized waxes were also used for agricultural photography of LARS [9-15], in addition to fixed wing airplanes or helicopters. LARS UAVs usually operate on petrol methanol, but some operate on electricity from rechargeable batteries or solar power. UAVs using rechargeable batteries tend to only help short runs [7,8,16], and solar-powered vehicles have the ability to have a longer service life [16]. The Pesticide Spraying UAVs have a higher payload but can tolerate a longer flight [17] compared to the UAVs for agricultural LARS. Firefighting aid, police monitoring of civil unrest and crime scenes, disaster response intelligence [2], border security [3], traffic surveillance and regulation [4,5] and archaeological research [6] are common civil applications for UAVs. Since the 1980s, unmanned aerial vehicles have been developed and used for agricultural crop pollination. In order to facilitate crop management, unmanned aerial vehicles have been widely used since then, and particularly in the last decade, to take aerial photographs and obtain images of crop fields. The majority of agricultural UAVs for low altitude (LA) remote sensing are mini-models of fixed wing or rotary wing aircraft characterized by low cost, low cost and low cost, speed, low ceiling height, low weight, low payload and short endurance [7, 8]. Kites, balloons, gliders and motorized waxes were also used for agricultural photography of LARS [9-15], in addition to fixed wing airplanes or helicopters. LARS UAVs usually operate on petrol methanol, but some operate on electricity from rechargeable batteries or solar power. UAVs using rechargeable batteries tend to only help short runs [7, 8, 16], and solar-powered vehicles have the ability to have a longer service life [16]. The Pesticide Spraying UAVs have a higher payload but can tolerate a longer flight [17] compared to the UAVs for agricultural LARS.

PROSPECT OF THE FUTURE DEVELOPMENT. Rapidly developing technology has become both a boon and a curse on entrepreneurs. While it expanded business opportunities, it turned out that some market positions were quickly becoming obsolete due to improved navigation and flight software. The industry now began to select the most profitable business plans, and survival tactics included shifting the company's focus, including finding new target customers. Airware, the highest paid startup, originally developed cloud software and autopilot systems for agricultural drones. They had to fly over land and collect data on crop condition, assess field humidity and pest availability. But most farmers are not yet in a position to use such information, and companies need to look for new ways to use their drones.

UAVs have been established in the past, especially during the last decade. Generally, it can be stated that the WTO will play a major role in armed conflicts of the 21st century using conventional means of defeat. At the same time, local wars and regional military conflicts show the growing role of UAVs, a promising type of military equipment used for various military tasks: from the strategic and operational level to the tactical level, including flights in the interests of individual servicemen. The newly designed UAVs with new systematic architecture, construction methods, sensors and algorithms will be optimized and adopted for various uses in the next ten years or so.

The composition of laboratory should facilities for modeling and debugging (Figure 1) includes hardware based on a real digital control system and software in the form of mathematical models of flight dynamics and specialized control software. The complex should also supplement with necessary control and verification equipment (rotary table, aneroid-membrane test equipment, etc.) and measuring equipment.

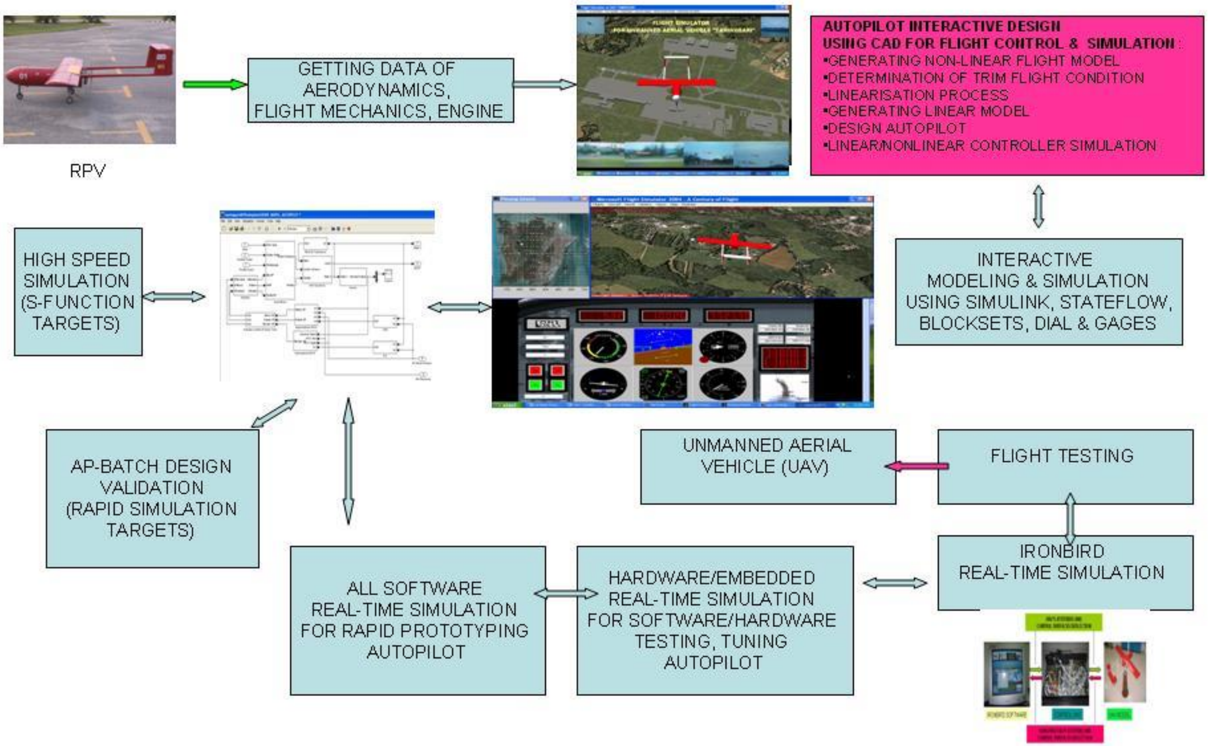

Figure 1 - Computer modeling and a MAVLink tool

CONCLUSION. Summing up the prospects of UAV use, it should be noted that in Uzbekistan, already actively working enterprises to create a UAV. In our opinion, Uzbek manufacturers should continue to win the drone market in Uzbekistan and in the world, develop and produce UAVs capable of creating competition for the devices of such manufacturers as http://quadrocoptery.ru/3d-robotics-3dr/3D Robotics (America), DJI Innovations (China) and other advanced companies in the world. Unmanned aerial vehicles are also actively used in the agricultural sector to collect information on crop area, aerial survey, and chemical treatment of sprouts. Maintaining and maintaining UAVs is cheaper than similar costs for manned aviation. After all, planes and helicopters need to maintain pilot safety and security systems. Specialists, who manage and maintain the planes and helicopters, should undergo training, retraining, medical commission. The time and financial costs of drones are incommensurably lower. Opportunities to use drones, as well as other devices, are very limited by the technical characteristics, which can improve the competitiveness and strengthen the UAV market. In our opinion, the special such direction as artificial intelligence development deserves attention. Appearance of aboard autonomous AI systems will allow Unmanned Flight Devices to make independent decisions about the execution of the mission and will prevent the danger of interference, interception of control and radio detection by the enemy.

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