

GKIC Steps up Digital Empowerment Efforts for Urban Development

By Mao Xinhui

GKIC (Great Knowledge and Innovation Community) is home to more than 4,000 companies, 70-plus platforms, and 150,000 knowledge workers. How to further promote the free flow of various innovation elements in this innovation park and provide a steady stream of driving forces for urban transformation and development?

The park provides a stage, the government builds a platform, enterprises are the main players, and citizens are important participants and experiencers... Recently, the "Digital Creators" and GKIC Digital Empowerment Workshop co-sponsored by AECOM and MetroDataTech was held in the park. More than 60 elites from different industries and universities participated in this two-week long event, carrying out an unprecedented cross-industry cooperation.

The workshop covered a wide range of topics including smart noise early warning system, smart shared parking system, Smart GKIC Buildings and Enterprise Easy Connect, future community scenario integration platform, office building asset estimation and securities trading platform, etc....From identifying problems to generating solutions, the participants carried out online and offline learning and brainstorming to explore a series of digital solutions for future cities. During the oral defense and presentation session of the day, 10 teams put forward a rich variety of scenario research and technical program design topics about economic digitalization, life digitalization, governance digitalization, public space assetization, and digitalization of future community and scenarios.

The digital transformation of cities requires joint efforts from the government, citizens, and the market. The city is the home field, enterprises are the main players, and citizens are important participants and experiencers. Many of the 10 solution projects selected this time were inspired by people's daily life. "Have you ever had this experience? You stayed up late the previous night doing your work and the next morning you wanted to have a good rest. But suddenly you heard loud noise from your neighbors decorating their house; or you were in a meeting, and the construction site nearby started its work, and everyone in the meeting could hardly hear each other. The list goes on and on. These problems are difficult to solve because it's hard for relevant authorities to carry out real-time supervision and control." To rid citizens of these bad experience in the future, Huo Bingling and her friends designed a smart noise forecast system.

Based on surveys among surrounding residents and noise data collected in communities, Huo's team developed a noise warning platform for residents, enterprises, construction sites, and property management departments to predict potential victims of noise, regulate

construction work time, enable real-time monitoring by regulatory authorities, and improve the effectiveness of urban noise control.

The team consists of both professionals with several years of work experience and college students. Before the workshop, they were complete strangers to each other. After the workshop, they became an innovative team. "The workshop organizers provided a lot of support to us, including online courses and face-to-face training. At the same time, they prepared a rich database for our project. If we need information, we can also ask the organizers," said Huo Bingling.

"GKIC boasts of rich university resources, a solid industrial foundation and vibrant community atmosphere. The digital empowerment workshop helped form a linkage mechanism among governments, industries, parks, and affiliated enterprises, and to upgrade the digital "3-District Linkage" mechanism based on the digital elements promoted by the government, universities, enterprises, and communities," said Wang Xuan, head of the Information Section of the Science and Technology Commission of Yangpu District and one of the judges of this event. From those innovative projects selected, Wang saw a bright future for the digital transformation of the city. It's reported that subsequently the workshop organizers will further deepen those projects, help them connect with investors and customers, and explore the possibility of project implementation.

In 2020, the total annual revenue of GKIC exceeded 280 billion yuan, with dominant industries such as business services, information services, and design services, as well as emerging industries like smart medical services.

"The trend of digital transformation has given us a lot of motivation and brought us many challenges," said AECOM, an international giant in the engineering design industry and one of the organizers of this event. "We feel more strongly that be it urban development or industry development, the biggest challenge lies not in the depth of technology and service, but horizontal integration of different technical areas. How will they integrate? I think the integration underpins the breakthrough development of both the industry and the city. Many problems faced by cities may not be solved by a single technical field, but by solutions across technical fields," said Liu Hongzhi, senior vice president of AECOM Asia, sharing his insights on why it is necessary to invest a lot of resources to encourage and support this kind of cross-field innovations.

Liu added that the ultimate goal is to build a platform and an ecosystem in GKIC where the elements of innovation can flow freely, and enterprises can connect to appropriate resources when needed. To achieve this goal, the external "catfish" needs to be introduced into the innovation pool to create the "catfish effect".



Their Graduation Design "Goes to Sky"

By Mao Xinhui & Tongji

Starting, sliding, accelerating and leapfrogging... Amidst blossoming summer flowers, graduation season comes around, and a group of students from Tongji University make the graduation design "go to sky". Recently, a student team from the School of Aeronautics and Mechanics Tongji University developed a bionic flying fish drone and successfully tested flying.

"Bionic drone is a kind of aircraft that 'learns from nature'. After natural selection and evolution for hundreds of millions of years, creatures in nature boast excellent characteristics, such as efficient aerodynamic shape, reliable internal structure and unique environmental perception system, etc." said Shen Haijun, Instructor and Professor of the School of Aeronautics and Mechanics Tongji University, and these excellent characteristics exert considerable reference value for human sci-tech development and product design. In order to avoid natural enemies, flying fish have evolved the ability of gliding on the water at high speed, which is a great wonder in nature.

According to the calculation data of research group, flying fish features excellent aerodynamic

performance; with rapid flow velocity on the surface of fish body, a low-pressure area is generated, providing sufficient lift for the flying fish. Due to the interference of airflow between pectoral and pelvic fins, the flying fish can gain extra lift. "This has revealed the secret for flying fish to glide for a long time."

The simulation results also show that the flying fish's stall angle of attack can attain up to 30°, surpassing many modern airplanes and demonstrating exceptional anti-stall capability. Moreover, the maximum lift-drag ratio can reach 25, achieving such a surprisingly high aerodynamic efficiency.

Shen Haijun has been researching profiling aircraft for many years, and collected thousands of original aircraft models in his tiny aircraft laboratory. For the purpose of obtaining aerodynamic shape of flying fish, the research team headed for Hainan, purchased 4 live flying fish, then measured and three-dimensionally scanned the flying fish.

The research group also leveraged computational fluid mechanics software to perform theoretical simulation and analysis of flying fish on a large workstation. After months of calculation and data

collation, teachers and students finally obtained a range of aerodynamic performance data such as flying fish airplane surface pressure, flow field, pressure field, lift/drag/lift-drag ratio and stability curve, etc.

In terms of production, the design of bionic flying fish airplane required the structure and manufacturing process to be as simple as possible and light enough. Therefore, teachers and students set the plane as detachable modules when designing the structure. The flying fish airplane consisted of more than 100 parts, and each part was designed with lightened holes to control the total weight of airplane. Assembling parts, fixing glues, laying masks, polishing, pasting camouflage skins, installing power devices and control systems...Eventually, the airplane was accomplished.

This flying fish airplane has a wingspan of 1.5 meters, a body length of 1.8 meters and a tailwheel landing gear layout, installed with two-blade high-efficiency propeller and powered by high-power motor and lithium battery.

"It is thrilling to develop a bionic flying fish airplane and let it fly into the sky. This work reveals magical charm of bionic flight." said a student.