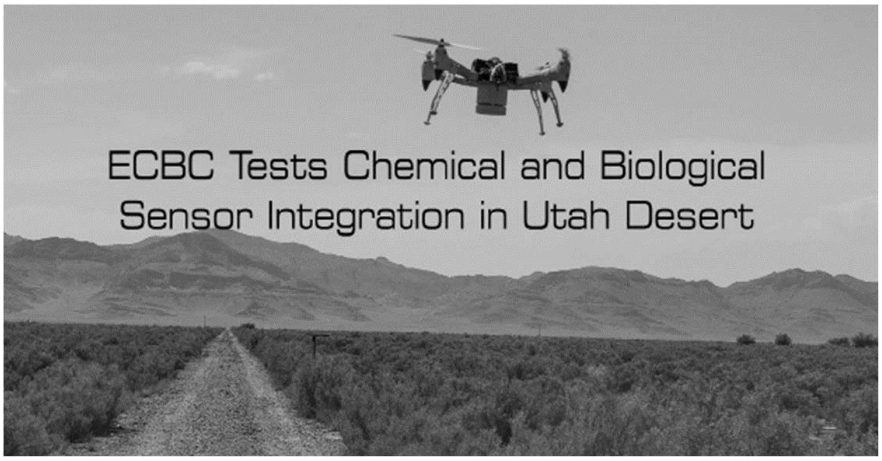

埃奇伍德化學生物中心(ECBC)在猶他沙漠進行化學生物感測器整合測試[1]

By Dr. Brian B. Feeney[2]

譯者簡介

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The U.S. Army Edgewood Chemical Biological Center (ECBC), Aberdeen Proving Ground, Maryland, joined with technology developers from Army, joint, and private-industry organizations, 15–26 August 2016, to test a new, integrated system of chemical and biological agent sensors at Dugway Proving Ground, West Desert Test Center, Utah. The test took place at a U.S. Army Test and Evaluation Command technology demonstration called the Sophos/Kydoimos (S/K) Challenge. The ECBC team participated after nearly a year of preparation. Scientists and engineers from ECBC developed an unmanned aerial vehicle called Deep Purple and modified an unmanned ground vehicle known as the Mobile Detection Assessment and Response System (MDARS) for the event. These systems operated as platforms for chemical and biological sensors, which were tested against a variety

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of simulant agents to determine whether the sensors could correctly identify the agents. ECBC scientists and engineers modified existing sensor packages to fit inside a container called the Array Configurable of Remote Network Sensors, which is affixed to the bottom of Deep Purple or mounted on the roof of MDARS. Those sensor packages include the Tactical Biological Generation II Detector (TACBIO) and the Joint Chemical Agent Detector. The TACBIO rapidly detects the presence of an airborne biological threat, and the Joint Chemical Agent Detector is an automatic chemical warfare agent detector.

位於馬里蘭州阿伯丁(Aberdeen)試驗場的美國陸軍埃奇伍德化學生物中心(Army Edgewood Chemical Biological Center, ECBC)，於 2016 年 8 月 15 至 26 日，與陸軍、聯合機構和私營企業組織的技術開發人員合作，在猶他州西部沙漠測試中心達格威試驗場，測試新型整合式化學與生物毒劑感測器系統。該測試是美國陸軍測評司令部執行的技術展示確認測試，測試代號為“Sophos/Kydoimos (S/K)挑戰”。埃奇伍德化學生物中心(後文簡稱 ECBC)團隊花了將近一年的時間準備這個技術展示確認測試。ECBC 的科學家和工程師為了這個測試，開發了一台稱為“Deep Purple”的無人駕駛飛行器，與修改了一輛稱為機動偵測評估與感應系統(MDARS)的無人駕駛地面載具。這兩個系統是化學和生物感測器運作的平台，對多種模擬劑進行測試，以確定感測器是否能正確辨識毒劑。ECBC 的科學家和工程師修改了現有感測器包裝，以便安裝在一個名為陣列配置遙控網絡感測器的集裝箱內，該集裝箱固定在“Deep Purple”無人駕駛飛行器的底部或安裝在機動偵測評估與感應系統(MDARS)無人駕駛地面載具的頂部。這些感測器組件包括第二代戰術生物偵測器(TACBIO)和聯合化學毒劑偵測器(JCAD)。第二代戰術生物偵測器(TACBIO)可以快速偵測到空氣中的生物戰劑威脅，聯合化學毒劑偵測器(JCAD)是一種自動化學戰劑偵測器。

In many ways, Deep Purple was the star of the show for ECBC. It is a carbon fiber quadcopter (also called a quadrotor helicopter) drone made with commercial, off-the-shelf parts. Deep Purple was developed in partnership with the Johns Hopkins Physics Laboratory for the Defense Threat Reduction Agency. It is unique because it is capable of carrying a 5-pound payload of sensors.

從多方面觀察，“Deep Purple”無人駕駛飛行器是 ECBC 技術展示中璀璨的明星。它是一種碳纖維四軸飛行器(也稱為四旋翼直升機)無人機，由商用的現成零組件製成。“Deep Purple”無人駕駛飛行器是 ECBC 與約翰霍普金斯物理實驗室為了國防威脅降低機構共同合作開發的。它是獨一無二的，因為它能夠酬載 5 磅重的感測器。

The ECBC Advanced Design and Manufacturing Branch used its 3D printing capability with a number of innovations to assist in creating the drone. Hollow arms held the propellers and housed wires internally. The airframe used printed circuit boards rather than functionally inert carbon fiber to allow direct, real-time

communication between the payload and the drone operator. The information provided by the sensors would be relayed in real time to Soldiers in the field and mission command personnel up to 2 miles away.

ECBC 的先進設計和製造部門，利用 3D 列印技術和眾多創新技術協助製造這台無人機。無人機的中空支桿支撐螺旋槳，並且將線路都收納在支桿內部。機身使用印刷電路板而不是無功能的碳纖維，以利酬載和無人機操作員間直接、即時的通信。感測器提供的信息將即時傳遞給現場的士兵和距離達 2 英里外的任務指揮人員。

The testing took place at night to take advantage of just the right desert wind effects, which occur after 11 p.m. The team worked intently every night until 5 a.m. Upon each agent release, the drone lifted straight up, with green and red lights blinking, and headed off into the desert night to intercept the simulant agent cloud. Likewise, the unmanned ground vehicle traveled down dirt roads, following the vectors provided by a laser detection system operated from a nearby trailer.

測試都是在晚上進行，以利用在晚上 11 點以後才發生的適宜沙漠風向。每天晚上工作團隊總是相當密集地工作到凌晨 5 點。當每次毒劑釋放後，閃爍著綠燈和紅燈的無人機垂直飛起，進入沙漠之夜幕中攔截模擬毒劑雲。同樣地，無人駕駛地面載具依照附近拖車搭載的雷射探測系統提供的座標，沿著泥土路行進攔截模擬毒劑雲。

ECBC team leader and principal investigator, Mr. Alan Samuels, Ph.D., stated that the S/K Challenge provided an opportunity to test how reliably and responsively Deep Purple , MDARS, and the sensors operate as chemical and biological early warning sensor technologies. He explained that the chemical sensors mounted on Deep Purple intercepted the cloud and identified the simulants; however, TACBIO was too large for Deep Purple and worked only on MDARS. It needed to be miniaturized. He added that the S/K Challenge proved its value to ECBC by revealing what worked well and what needed work. Information learned this year will be applied to testing next year.

ECBC 團隊負責人兼首席研究員 Alan Samuels 博士表示，“S/K 挑戰”提供了一個機會，可以測試“Deep Purple”無人駕駛飛行器、機動偵測評估與感應系統(MDARS)無人駕駛地面載具與感測器，如何可靠和有效地作為化學和生物早期預警感測器技術。他解釋說，安裝在“Deep Purple”無人駕駛飛行器的化學感測器可攔截到模擬劑雲，並辨識出模擬劑；然而，第二代戰術生物偵測器(TACBIO)對於“Deep Purple”無人駕駛飛行器來說太大了，只能在機動偵測評估與感應系統(MDARS)無人駕駛地面載具上工作。因此生物偵測器須要小型化。他補充說，“S/K 挑戰”證明了它對 ECBC 的價值，揭示出那些工作良好與後續需要什麼工作。今年所學到的經驗將被運用在明年的測試。

According to Mr. Russell Bartholomew, one of the event organizers and a test

officer at the newly established Bio-Testing Branch at ECBC, the annual S/K Challenge offers participants a low-cost opportunity to operate technology that is under development in a collaborative environment. He explained that it is a cost-sharing event that attracts participants from Department of Defense organizations, private industry, and international partners. They work together using individual technologies in concert, and the U.S. Army Test and Evaluation Command reviews the available technologies and their development progress.

根據 ECBC 新成立的生物測試分部的事件策劃人兼測試官 Russell Bartholomew 先生的說法，年度"S/K 挑戰"在協同合作的環境中使用正在開發的技術，為參與者提供了一個低成本的機會。他解釋說，這是一項費用分攤事件，吸引了國防部機構、私營企業和國際合作夥伴的參與者。他們使用個別技術共同合作，同時美國陸軍測試評估司令部審查可用技術及其發展進度。

The ability of ECBC scientists to remotely direct the Deep Purple and MDARS platforms and collect incoming data from the sensors in a single information-sharing system was just as much a demonstration of new, cutting-edge technology as operating the autonomous drones. It is a system-of-systems; every part must communicate with every other part so that it works as an integrated system, said Mr. Steven Lagan, a team member from ECBC Modeling, Simulation, and Analysis Branch. The location and movement data of the simulant cloud collected by stationary sensors can be sent to sensor-mounted vehicles, he added. The sensors then communicate the identity of the agent through a common operating language, and the data is shared with the participants and, under actual conditions, with the chain of command.

ECBC 的科學家能夠遠距操控"Deep Purple"無人駕駛飛行器和機動偵測評估與感應系統(MDARS)平台，並在單一信息共享系統中收集來自感測器的傳入數據，就像操作自動無人機一樣，展示了新的尖端技術。ECBC 模式模擬與分析部門的團隊成員 Steven Lagan 先生說，這是各系統間作業環境平台，每個部分都必須與其他部分進行交流，以便作為一個集成系統工作。他補充說，定點感測器收集的模擬劑雲的位置和運動數據可以發送到裝有偵測器的移動式載具上。然後，感測器藉由共同操作語言傳遞毒劑的辨識結果，同時數據與參與者共享，並且在實際狀況下與指揮鏈共享。

Creating a common language that could be used by all participants and the sensors was a project of just as great a magnitude as creating and perfecting the drones and unmanned vehicles. Mr. Max Bottiger, a team member at the ECBC Battlefield Information Branch, indicated that the team was working with different components from across the country. Team members wrote the programs and invented portions of software code that were compatible with the Army common operating language to make it work together.

創建可供所有參與者和感測器使用的共用語言，與創建和完備無人機和無

人駕駛載具，都是同樣重要的計畫項目。ECBC 戰場資訊部門團隊成員 Max Bottiger 先生表示，該團隊正在與來自全國各地的不同單位合作。團隊成員撰編了與陸軍通用操作語言兼容的程式與發明部分軟體代碼，以利相互協同合作。

ECBC Director Joseph Corriveau, Ph.D., attended the technology demonstration. “A diverse set of professionals working together made this happen. Not only the brightest people from private industry and other Army and joint organizations, but scientists and engineers from many different branches, divisions, and directorates within ECBC,” he said. “There is a huge push from the Department of Defense to get on the forefront of this technology. This shows that we are collaborating to position ourselves well ahead of the rest of the world in chemical-biological defense,” he remarked.

ECBC 主任 Joseph Corriveau 博士參加此次技術展示確認測試。他說，“技術展示確認測試活動能夠順利進行，都歸功於來自四面八方專業人士的合作。這不只包括從私人企業與其他陸軍聯合機構來的最優秀人才，還有來自 ECBC 內許多不同分支機構、部門和指揮部的科學家和工程師”。並提示“國防部走在最前端，大力推動這項技術。這表明我們正在一起合作，使我們自己在化學生物防禦領域，領先於世界其他地區。”

The ECBC Director holds Deep Purple, which proved its ability to intercept a chemical agent simulant cloud and identify the simulant.
ECBC 主任拿著“Deep Purple”無人駕駛飛行器，驗證其具備攔截化學模擬劑雲與辨識化學模擬劑的能力

An interdisciplinary team of ECBC scientists and engineers receives data on a simulated chemical agent release and direct unmanned aerial and ground vehicles carrying sensors to intercept and identify the release.

ECBC 科學家和工程師的跨學科團隊接收有關模擬化學毒劑釋放的數據，並指揮攜帶感測器的無人駕駛飛行器和地面載具進行攔截和辨識釋放的模擬化學毒劑。