十一、研究計畫中英文摘要：請就本計畫要點作一概述，並依本計畫性質自訂關鍵詞。

（二）計畫英文摘要。（五百字以內）

總計畫：**Developing the Core Technologies to Support Virtual Laboratory over Cloud Computing Platforms with User Authentication** With the rapidly improved information technologies and the widely used Internet services, Cloud computing becomes a new generation operating platform. Consequently, the security issue of access control becomes an important research topic of Cloud computing. The existing access control method for Cloud services are primary password-based; however, this method has drawbacks of passwords stolen. There is an urgent call for new security mechanism to improve the security level in additional to existing ones. There is another trend to deploy scientific experiments, such as network intrusion laboratory, over the Cloud in order to take the advantage of the elasticity of the underlying Cloud infrastructure. The idea of “Virtual labs” brings promise of letting students engage in experiments that cannot be done otherwise. However, we should consider how to avoid the experiment is out of control such as "DDOS attack". Therefore, monitoring state of both user and experiment is a useful approach before this to happen. This proposal comprises of three subprojects entitled “A Handheld Device Authentication Mechanism for Cloud Services” (Subproject I), “On the Design of a Cloud-based Virtual Labs Service with User’s Status Feedback and Quality Monitoring Features” (Subproject II), and “Supporting High Elasticity and Automatic Deployment in a Cloud Platform of Virtual Datacenter as a Service” (Subproject III). Subproject I, proposes the solution of the first issue, developing a new two-factor authentication system combining a behavioral-biometrics-based with password-based authentication mechanism. This subproject provides the authentication services to support both Subproject II and Subproject III. Subproject II, on the other hand, addresses the virtual lab issues and it also relies on the IaaS services provided by Subproject III.

Keywords: *Cloud platform; User authentication; Virtual laboratory,*

子計劃一：A handheld device authentication mechanism for Cloud services

With the rapidly improved information technologies and the widely used Internet services, Cloud computing becomes a new generation operating platform. Consequently, the security issue of access control becomes an important research topic of Cloud computing. The existing access control method for Cloud services are primary password-based; however, this method has drawbacks of passwords stolen. To resolve the drawbacks of text-passwords authentication method, Herzberg had proposed two-factor authentication method in 1964. In this sub-project, we propose a behavioral-biometrics-based authentication mechanism as the second factor since it is difficult to be forged. Based on our preliminary studies, we further adopt two smartphone sensors, namely orientation sensor and touchscreen, to the proposed mechanism for gaining better performance. In the following three years, we will separately adopt dynamics-based approach, histogram-based approach, and a hybrid approach to investigate the proposed authentication mechanism. Besides, a prototyping, namely MLock, will be implemented by applying the proposed mechanism. The providers of Cloud platform could integrate text-passwords authentication method with MLock to build a proprietary two-factor authentication mechanism for improving their security level.

Keywords: *Cloud security; Handheld device; Smartphone; Non-intrusive authentication mechanism; Two-factor authentication mechanism*