Abstract. For the recent decade, a number of password schemes have been developed for human user authentication as alternatives of traditional alphanumeric password. As an instance, we propose a grid-based password authentication scheme, which is inspired from [9] and [13]. Our scheme is resistant to shoulder-surfing attack even under the powerful adversary threat models, and also uses vibration signals as hidden challenges which are delivered through a secure channel to improve more on the practical security. To demonstrate the security of the proposed scheme, we present an analysis in terms of the expected number of random trials to log in without any knowledge about the password and the number of candidate passwords obtainable from observations.

Keywords: Shoulder-surfing, Graphical Password, Authentication

1 Introduction

The most common authentication method is the use of passwords. Users are asked to input the username and its corresponding pre-registered password. The basic assumption on this password authentication is that the password is securely shared and nobody but the user and the system knows the secret.

Traditional text-based passwords are widely used around the world in spite of its well-known drawbacks such as its poor memorability and the vulnerability to certain kinds of attacks. Moreover, a randomly given password is not better than the user-selected one in terms of both the memorability and the security [11].

As alternatives to the traditional password, a number of password schemes have been developed for the recent decade [12]. Developing a password scheme is divided into two parts: (i) the design of a password space and/or (ii) a password interface.

The focus of the former is to find a more memorable password space. The password space is highly related to the usability. Graphical passwords [4–6] are easier to memorize than text-based passwords.

The latter, the design of a password interface, is to improve the security in authentication processes while it provides an acceptable usability with users. Many kinds of attack methods target to the human user. Shoulder surfing is one...