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SMARTLOCK USING FINGERPRINT SENSOR

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ABSTRACT

Padlocks are being an essential part in our daily lives. It is used to save guard our properties especially when we are away. However, we often hear that the robbery rates in our community are in the increase although we carefully lock our properties using the padlocks. This is due to the weaknesses of our current padlocks that can be easily tampered and broken to gain access to our properties. As such are more secured and reliable padlocks are needed to protect our properties. Therefore, The Smartlock Using Fingerprint Sensor is designed and developed using the latest technology into the padlock. It uses fingerprint sensors for unlocking systems and also an alert system for the safety measures. The alarm system embedded in the padlock will be active and produce a high pitch sound when someone unauthorized attempted to unlock the padlock. This means that the possibility of the lock being broken will be minimized and security of our belongings will be upheld. A mini sized microcontroller is installed in to the padlocks which can save up to 10 different fingerprints in a single padlock which will be convenient for the household that has multiple numbers of family members or occupants.

Keywords: smartlock, fingerprint, sensor, microcontroller, alarm system

1. INTRODUCTION

Security of lives and properties has become a trending and major issues at recent times. As the level of urbanization increases, the crime rates are increasing too especially in the urban areas. As a matter of necessity, people are becoming more and more conscious and alert to security issues. People are more aware that relying on keys and padlocks to lock their properties does not give them assurance that their properties will not be invaded. Thus, many has moved to use passwords in doors and gates to increase their security level. However, this does not go well as the people has the tendency to forget their passwords or have passwords that easily can be guessed by the others (Emakpor & Esekhaigbe, 2020). As such, in order to overcome these problems, a biometric identification method was introduced. Biometric method identifies users based on behavioral or physical features instead of codes or key. These includes retina scans, palm or hand geometry, fingerprints, and iris scans and facial mapping (Akanbi, Ogundoyin, Akintola & Ameenah, 2020). Therefore, as a move to provide a more convenience and protected security system for our properties, we have initiated a Smartlock Using Fingerprint Sensor which embedded a padlock with fingerprint sensor and shock sensor for unlocking together with a alarm system which will be active when it is attempted to be unlocked by someone unauthorized. The main focus of this product is the fingerprint and unlocking mechanism whereby, up to 10 fingerprints can be registered to the padlock. A questionnaire-based survey was conducted among our target market which includes household, students and motorist in Permatang Pauh, Pulau Pinang area to test on this new innovation and the result of the

survey indicates that 57.9% of the respondents agree that this fingerprint padlocks can overcome their problem in securing their belongings from theft or robbery. Hence, we can conclude that people will be more buy this innovation when it is introduced in the market and it can lead to a profitable growth.

2. MATERIALS AND METHODS

2.1. Development of the product

In order to build the system, firstly the casing and the design for the padlock are designed using Autodesk Fusion 360. The designing process is divided into three parts which is firstly the inner part for the components, the enclosure and U-shape locking part. Based on the component size, the partition of each of the components are divided and arranged to fit the inner part. The component used are microcontroller, fingerprint sensor, vibrate sensor, locking mechanism and a buzzer. All of these components will be embedded into the internal part of the casing. Then, the U-shaped locking part are built with the standard specification of 7 mm of diameter. This diameter can fit most of the holes for the padlock even bigger or same size with the U-shape lock. The designing of the padlock will take into consideration the components height and the grip for both side of the casing. After completing the designing process, the design will be sent to the production team to make the real casing. The padlock will be produced using the stainless-steel materials, so that it will be more durable and prevent rusty. Succeeding, the molding process will be carried out, the production team will build the mold of the casing by melting the stainless-steel material and injected into the mold. The melted stainless steel will copy the shape of the mold and the cleaning process will be done to complete the casing production. Subsequently, the programming of the padlock is carried out using Arduino Nano as the microcontroller and C language programming together with Arduino IDE as the software for the programming. The fingerprint sensor will be programmed and setup to the interface with the padlock locking mechanism. All the fingerprints of the users will be registered and stored into the system as to enable the system to detect and analyze the scanned fingerprint in order to unlock the padlock. The vibrate sensor are set to trigger the buzzer if there is a shock or high movement to the padlocks.

2.2. Technical Specification

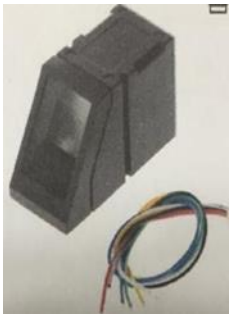
	Arduino Nano		Autodesk Fusion 360 Interface
	Fingerprint Sensor		Prototype of SmartLock

Figure 1. Smartlock Fingerprint Sensor

3. CONCLUSION

The innovation of Smartlock Fingerprint Sensor is a great benefit to the property owners. It can help them to safeguard their properties and lives from unwanted incidents. This design also can overcome the drawbacks of using the keys and manual padlocks by the owners. This also could reduce the frequent occurrences of break-ins and armed robbery.

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Kelulusan daripada pihak YBhg. Profesor dalam perkara ini amat dihargai.

Sekian, terima kasih.

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