Gate Control Keypad

Requirements Definition Document

RDD Version 1.0

Team 03

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1 Introduction

"Keypad Designers" is a software design group consisting of Krista Conley, Brandon Stringham, Tanner Hunt, Cody Crane, Amun Kharel, and Shreeman Gautam. This team is tasked with developing a keypad control system for a vehicular access gate.

The keypad has three distinct codes: one for an administrator, one for public services and one for general users. The keypad only deals with telling the gate when to open. The rest of the gate's functionality is handled by the gate controller. The keypad is also robust enough to withstand physical tampering and harsh weather conditions. The device is simple enough in design, a simple 12-digit keypad comprised of the digits zero through nine and the symbols # and *, such that it does not confuse users.

The keypad also has a simple display screen to communicate concise messages to the user. The keypad is large enough and is located at a position accessible by most vehicles and drivers. In conclusion, the keypad is a concise, robust, and convenient access point to the facility in which it is installed.

2 Objectives

Regarding the keypad system design, the team is looking to meet several objectives such as security, convenience, and consistency.

The first objective is security. The system does not allow in people who do not have the correct code. This objective leads to requirements such as changing codes periodically so that bystanders cannot watch the code and have access through the gate. The second objective is convenience. The system is quick and easy such that many users input their codes and get through the gate without incident. This objective leads to requirements such as a simple keypad with few keys, and a simple display that is not overwhelming.

The third objective is consistency. To avoid the scenario of users getting stuck outside in frustration, the system acts the same every time such that users can quickly enter through the gate. This objective requires that this team builds a simple product that is reliable and not overly complicated.

3 System Organization

This is a general overview of the keypad control system installed in a two-lane wide community access gate with an existing gate controller system installed.

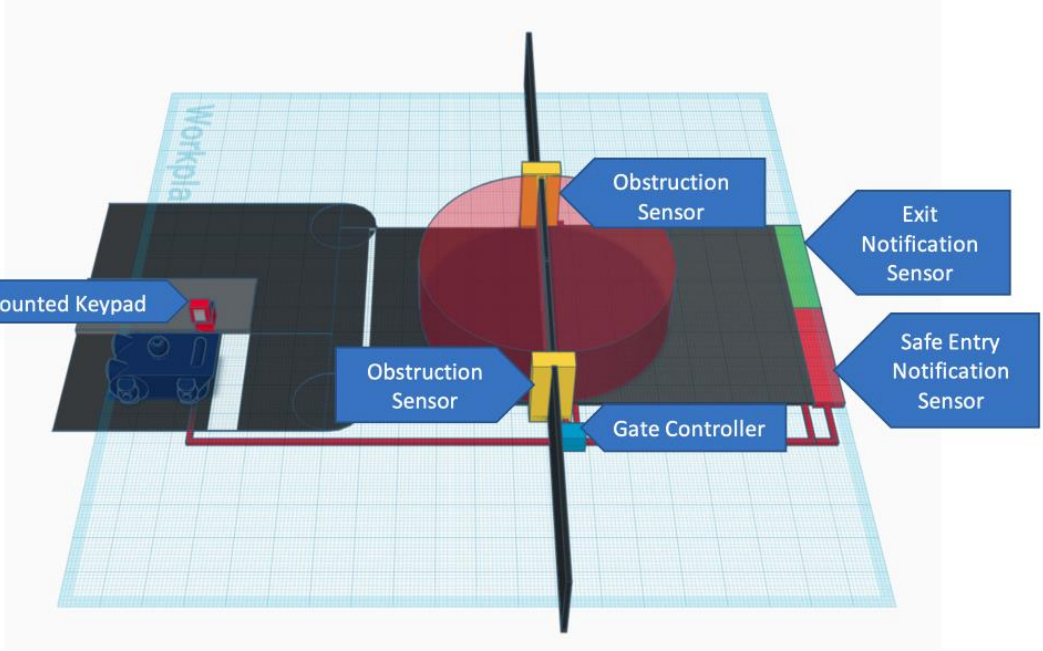

Figure 1 Component Overview

3.1 Keypad

The keypad is to be placed outside the gate. It is accessible from the driver side window of most vehicles attempting entry into the facility. Underground wiring is installed in order to facilitate one-way communication from the keypad to the gate controller.

3.2 Gate Controller

Due to the limited functionality of the keypad, the gate controller handles most of the gate operation, such as opening the gate for exiting vehicles and deciding when the gate can be safely closed without obstruction. These operations are facilitated via sensors and hardware that may be included in the gate controller system. Using Figure 1 as an example, the gate controller utilizes proximity sensors to detect obstructions and uses pressure sensors to get notified about entering or exiting vehicles.

4 Capabilities

The keypad consists of 12 buttons in a 4 by 3 grid: (1,2,3), (4,5,6), (4,8,9), (*,0, #). It is designed to open a gate by communicating with the gate controller and can be used with most facilities that need a secure entrance onto their property.

There are 3 codes: one for the administrator of the keypad system, one for the users, and one for public service personnel. The administrator and public service codes will not change. However, the user code can be changed by the administrator. To change the user code, the administrator needs to enter a new code that is different than the last 3 user codes.

The keypad has a timer such that, in the event of a user not finishing the code on time, it will reset after 15 seconds. Also, the keypad gives an error message to the user if the code is invalid.

The keypad system has the admin code, the current user code, the previous two user codes, and the code for public service personnel. The codes permanently saved such that if the keypad experiences power failure, the codes are not lost.

5 Constraints

The constraints for this project concern what the program cannot do, i.e. The bounds of the system.

- The communication is one-way, from the keypad to the gate. Therefore, any gate errors or malfunctions will not be revealed to the users.
- The keypad needs to work in inclement weather as per the objective of the team to ensure the safety of the users. Therefore, the keypad will be weatherized against wind, rain, snow, and lightning strikes.
- The keypad needs to work 24/7 so that the users can access the facility at any time.
- The keypad has a simple layout so that users of all age groups can access it easily.