

KEYPAD Drivers

NTI TEAM

Software Requirement Specification Document

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1. Scope of Document

This document covers the functional and non-functional requirements of the KEYPAD software system..

1.1 Constraints

These Keypad modules are made of thin, flexible membrane material. The 4 x4 keypad module consists of 16 keys, these Keys are organized in a matrix of rows and columns. All these switches are connected to each other with a conductive trace. Normally there is no connection between rows and columns. When we will press a key, then a row and a column make contact.

2. Requirements Structure

2.1 non Functional requirments

2.2 functional requirments

2.1 Functional Requirements: -

- Control: To detecting a pressed key, the microcontroller grounds all rows by providing 1 to the output pins, and then it reads the columns. If the data read from columns is = 1111, it means no key has been pressed.
- When we will Pressing a button shorts one of the row lines to one of the column lines, allowing current to flow between them. For example, when key 'Button 1' is pressed, column 1 and row 1 are shorted.
- If the first column bit value is a zero, this means that the "Button1" key was pressed. For example, if C1 C2 C3 C4 = 0111, this means that a key in the C1 column has been pressed.
- Initialize KEYPAD.

2.2 Non-Functional Requirements:-

- a.Performance: Define the performance requirements, such as keypad buttons working after pull pressed to send data.

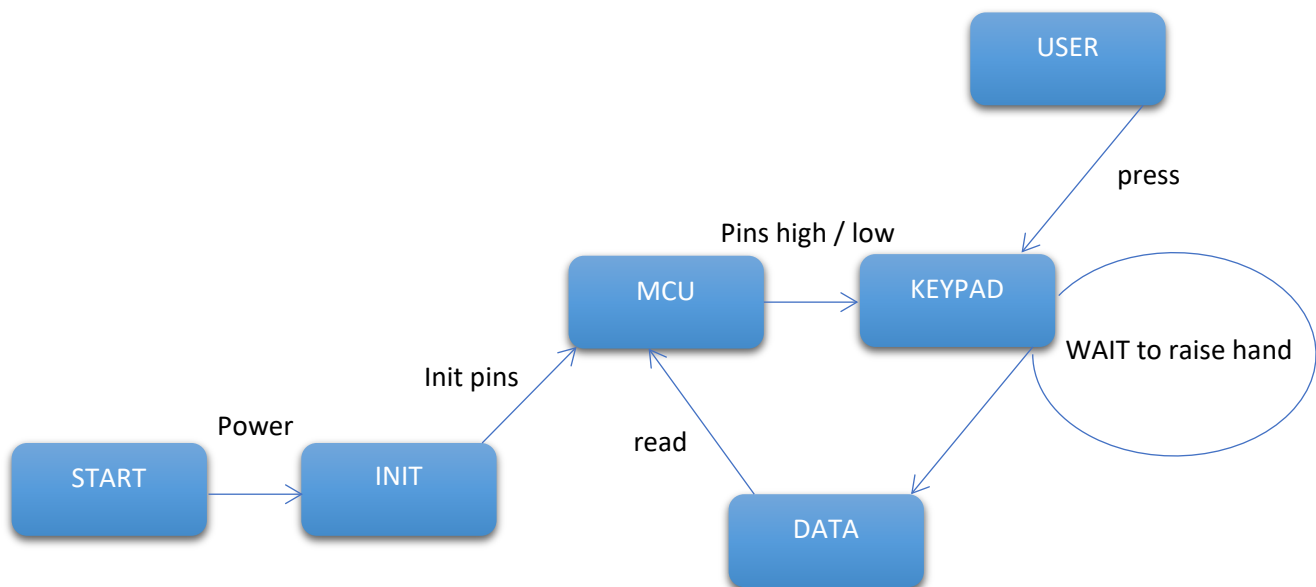
3. Functional Overview

Generally, we interface a single button, switch, or key with a microcontroller using a single DIO pins. However, if we want to interface several 9 or 12, or 16 keys, then it requires various microcontroller DIO pins. To save some of the microcontroller DIO pins, we can utilize a 4×4 keypad module. This module includes keys that are arranged within rows & columns. So, if we desire to interface 16 keys with a microcontroller then we need 16 DIO pins although if we utilize a 4×4 matrix keypad then we need the microcontroller's 8 DIO pins only. So this article discusses an overview of a **4×4 keypad module**, it's working & its Applications.

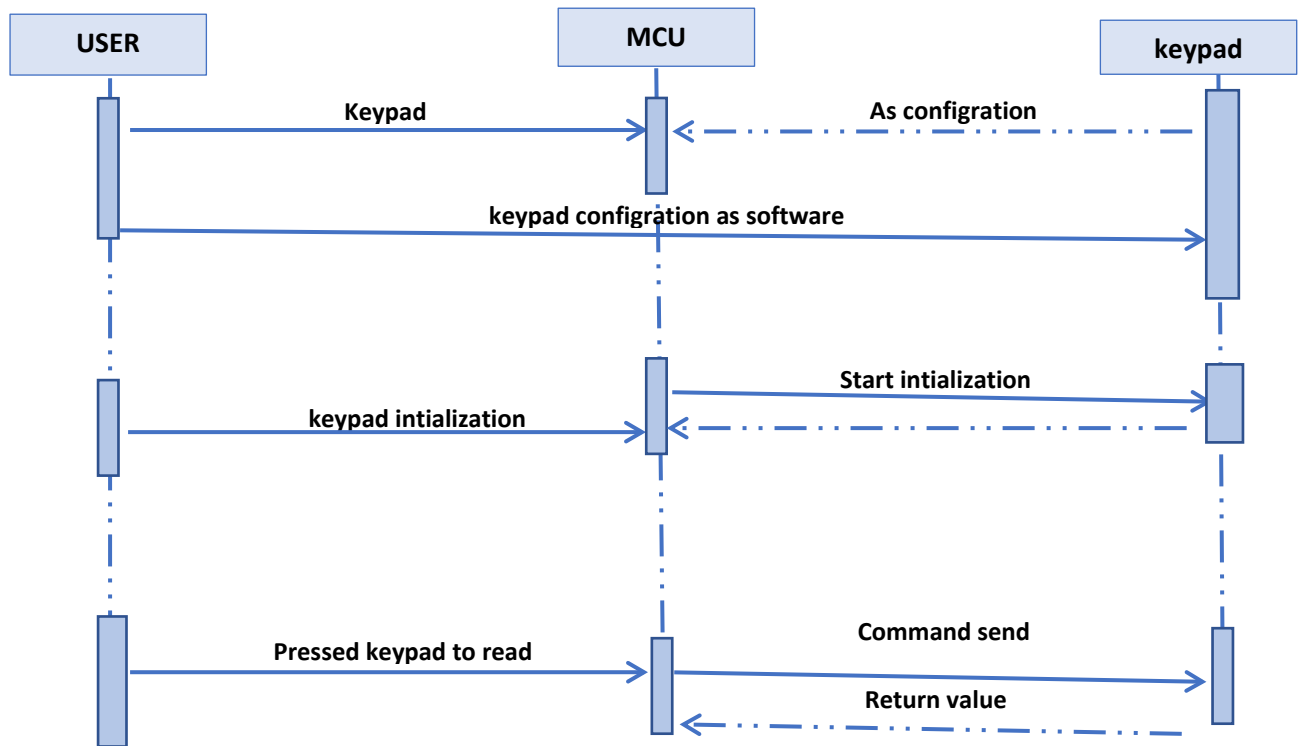
What is a 4×4 Keypad Module?

The 4×4 keypad module is an input device, used to provide input value within a project. This module includes a total of 16 keys which provide 16 input values. These matrix keypad modules are made with flexible membranes & thin material. The 16 keys in this module are arranged in a matrix of columns & rows. All these are linked to each other through a conductive trace. Generally, there is no link in this keypad between rows & columns. Once we push any key in the matrix keypad, then a row & a column in this keypad will make contact, or else; there is no link in the matrix keypad between rows & columns.

4. State Machine



5. Sequence diagram



6. References

1. AVR Microcontroller Datasheets.