

Motion Sensor Alarm System (MSAS)

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Outline

- Introduction
- System Overview
- System Component Description
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 - LCD
 - Motion Sensor
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- Demonstration

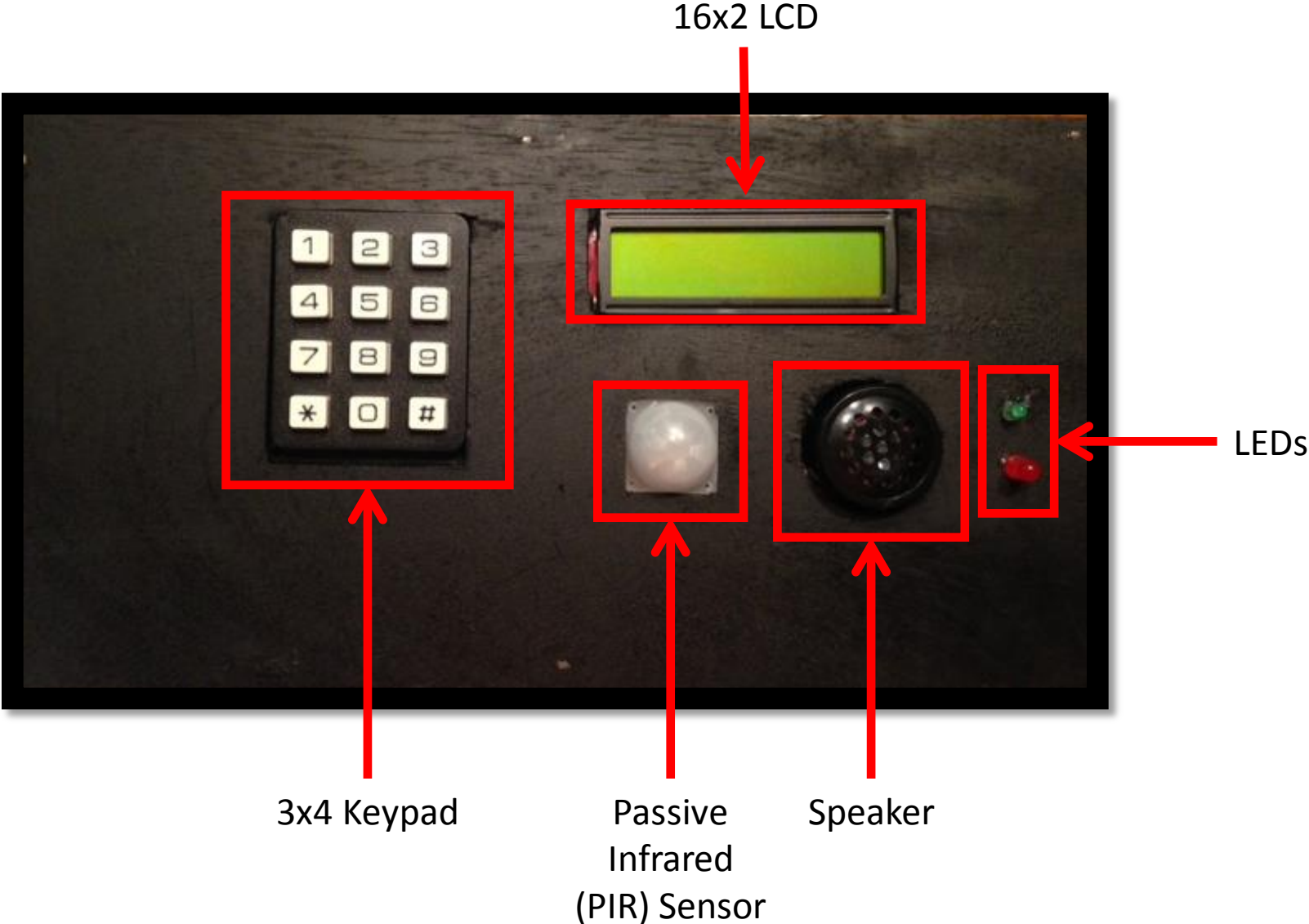
Introduction

Introduction

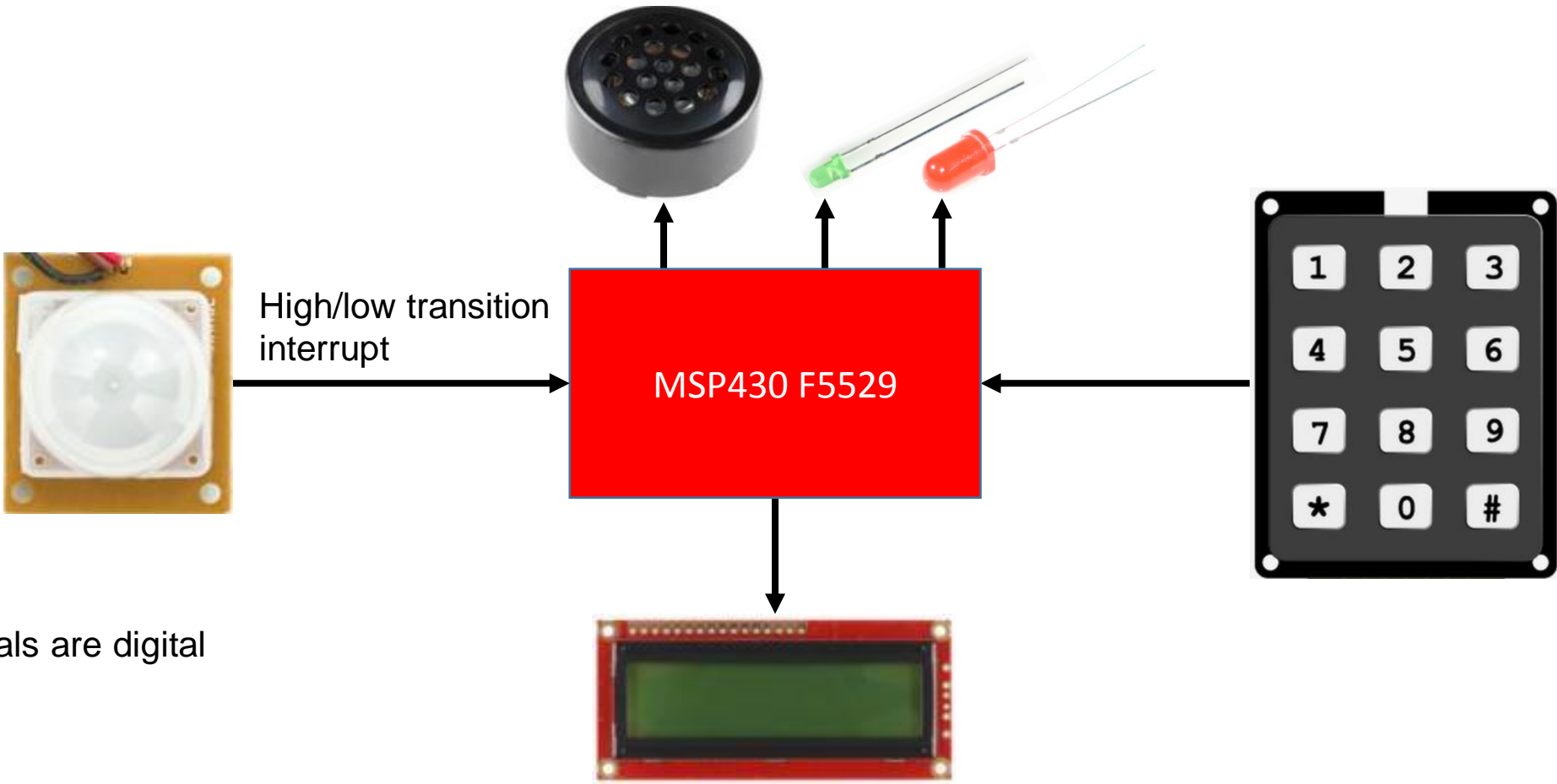
- Motivation
 - Security!
- Goal of system
 - Simple to use
 - Practical application
 - Cheap to produce
- Requirements
 - Can detect motion
 - Can be armed/disarmed via a secret PIN
 - Can display status
 - Can sound an alarm when motion detected

System Overview

The MSAS

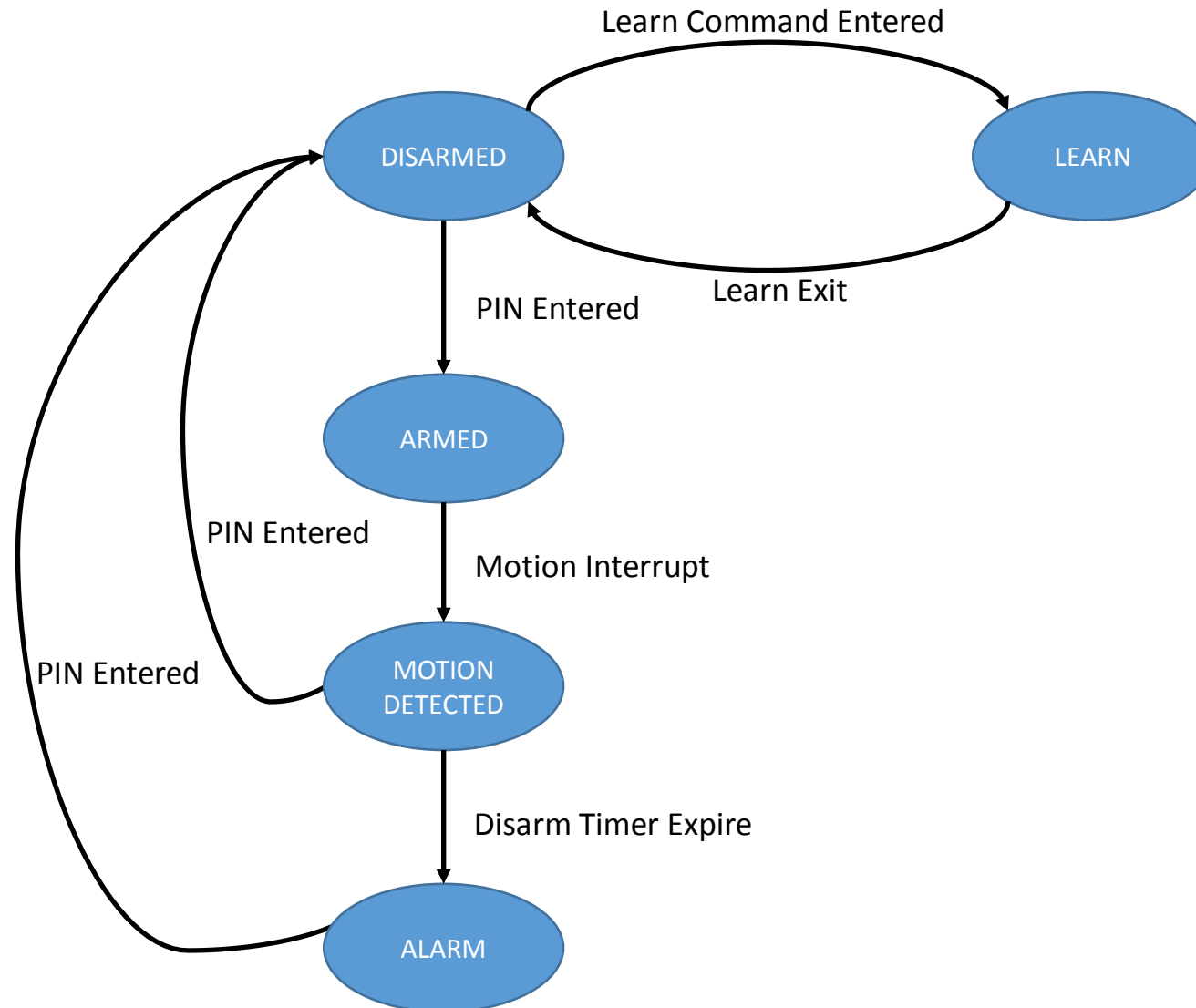


The MSAS cont'd

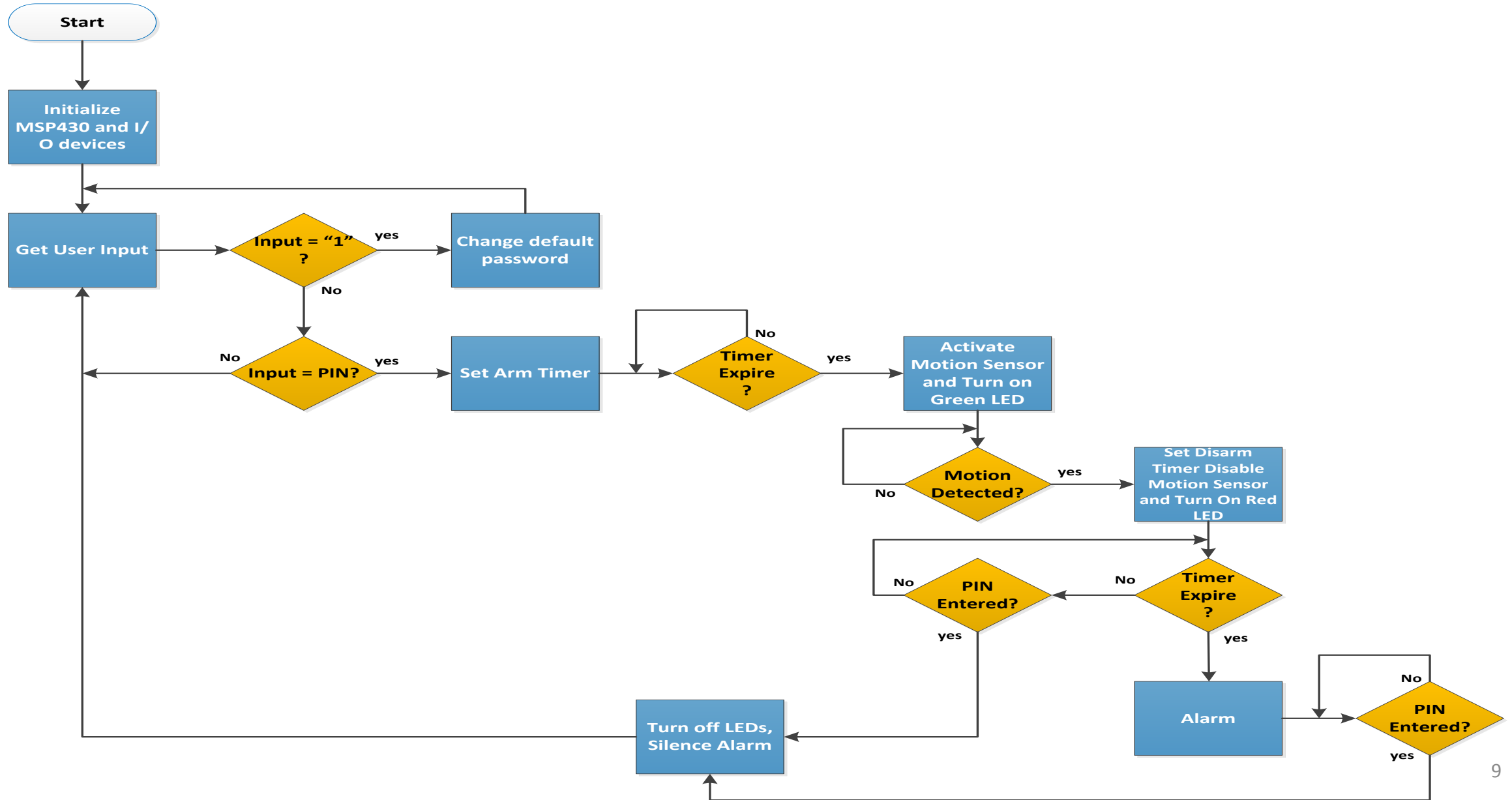


All signals are digital

System States

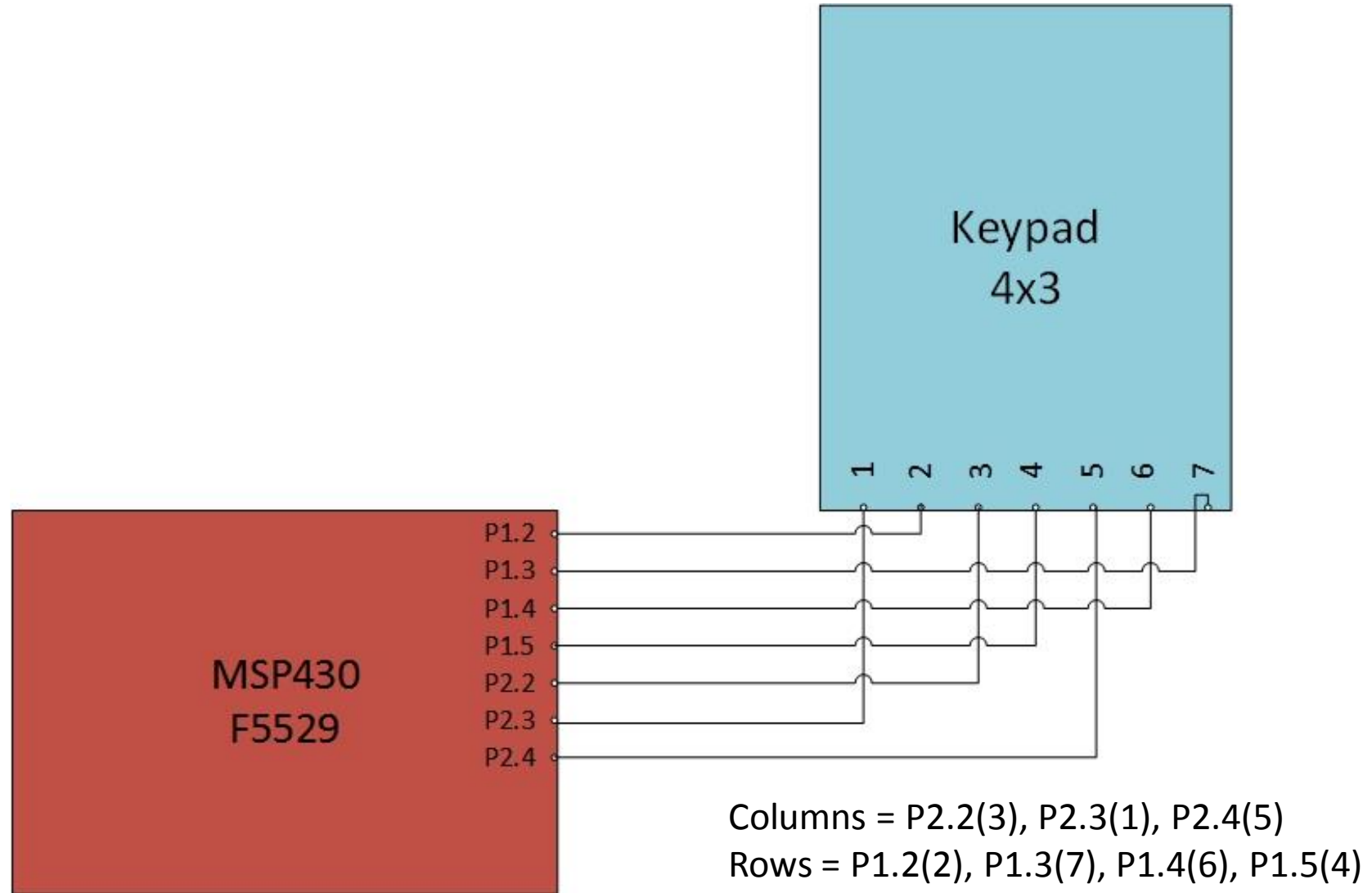


System Process Flow

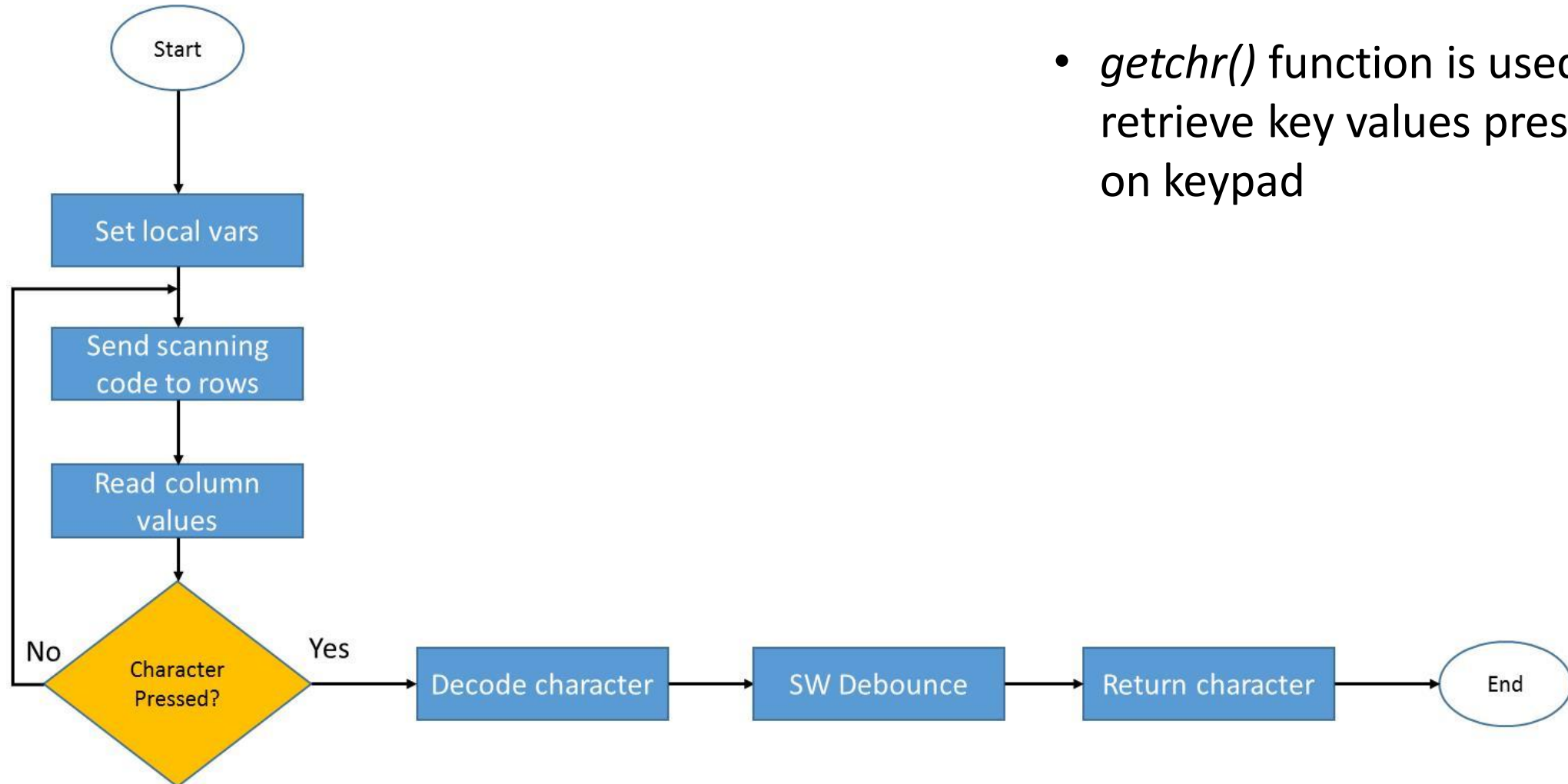


System Component Description

Component – Keypad Hardware

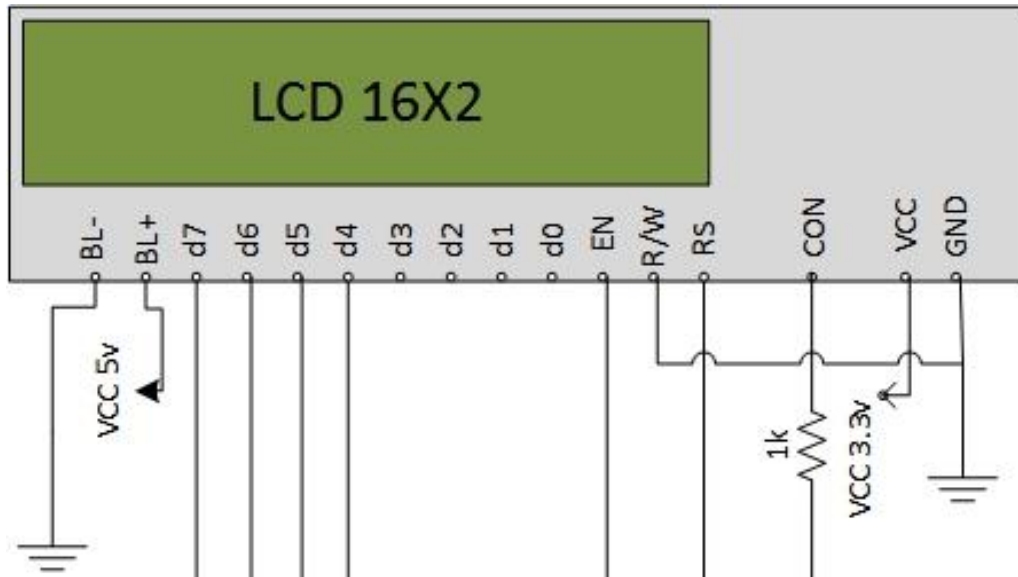


Component – Keypad Software



- *getchr()* function is used to retrieve key values pressed on keypad

Component – LCD Hardware



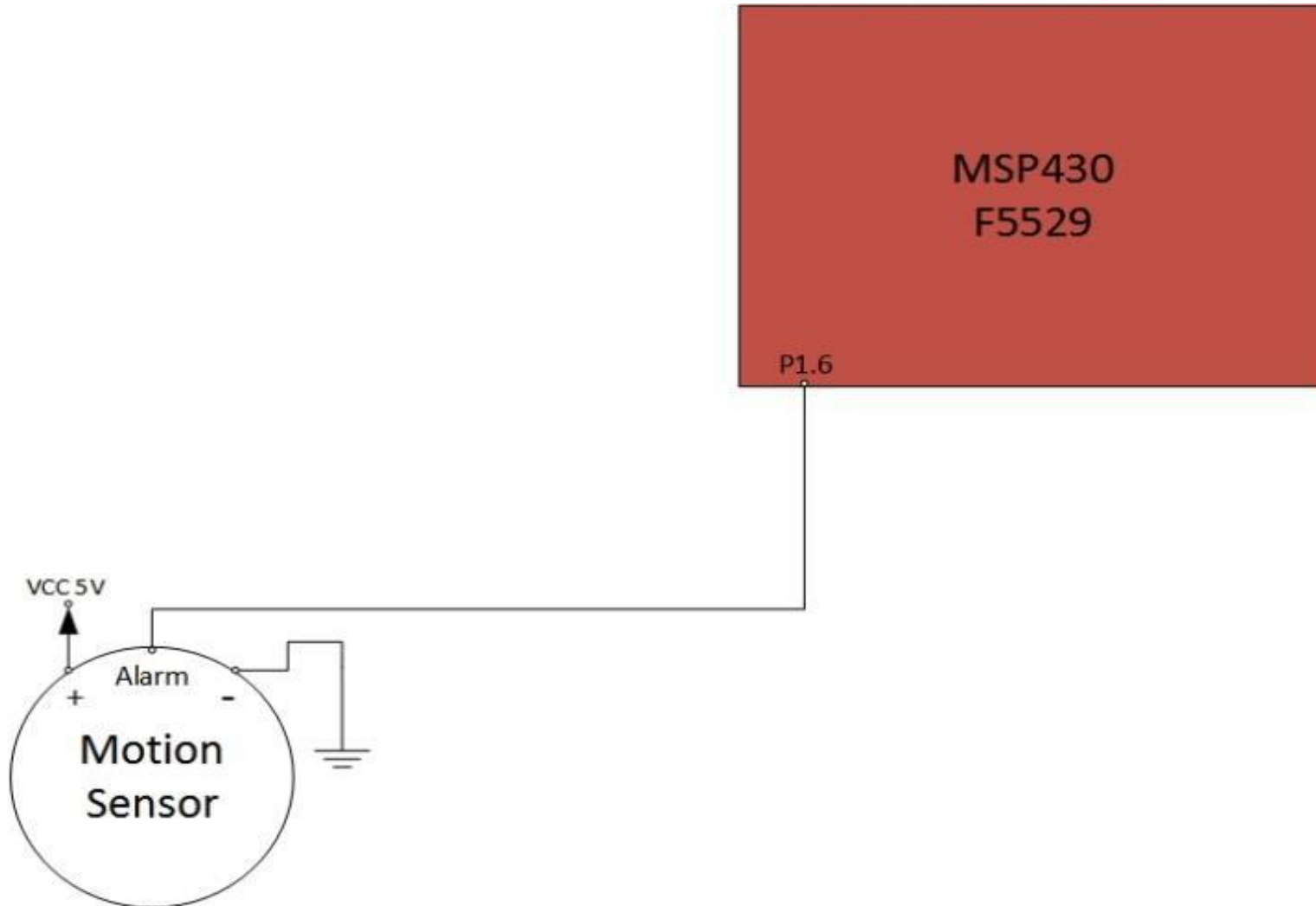
- Built in ST7066 controller
- 3.3 volts power supply
- 1k resistor for contrast pin
- 5 volts for back light
- 4-bit data-bus interface
d4,d5,d6,d7



Component – LCD Software

- Used 4-bit data-bus interface operating mode
- Contains 16, 5x8 dot characters in each row
- Functions Used from the library
 - The `LcdInit()` function:
Initializing the LCD.
 - The `LcdClear()` function:
Clear all characters.
 - The `LcdSetText(char * text, int x, int y)` function:
Write characters in specific position (x=row , y= column).

Component – Motion Sensor Hardware

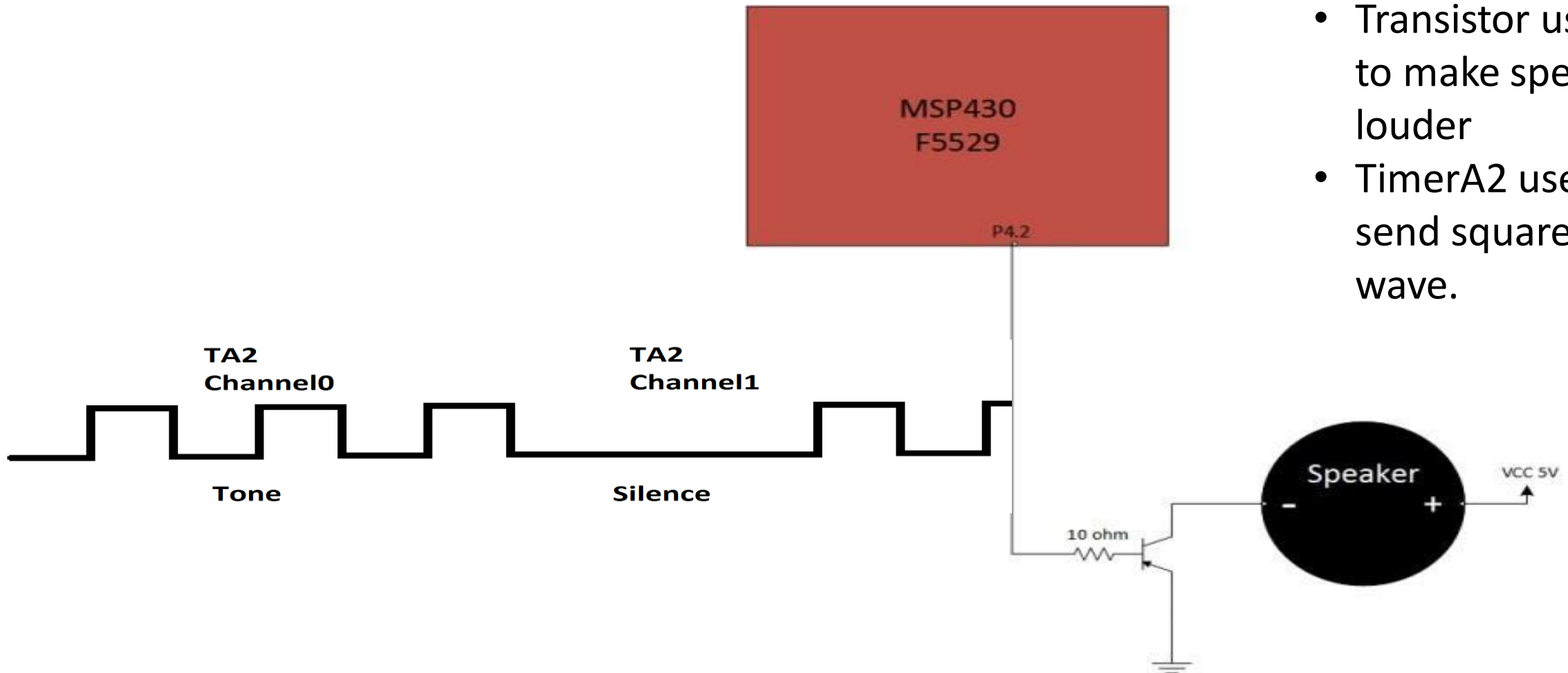


- Works from 5 to 12 volts
- Internal pull-up resistor for alarm pin
- Takes 1-2 seconds for the sensor to get a snapshot.
- Reads **logic high** when motion not detected
- Reads **logic low** when motion detected

Component – Motion Sensor Software

- The motion sensor used is a PIR (Passive Infrared Motion Detector).
- The sensor detects sudden changes in the infrared energy it receive.
- Functions Used
 - The `initMotionSensor()` function.
 - The `enableMotionSensor()` function.
 - The `disableMotionSensor()` function.

Component – Speaker Hardware



- Transistor used to make speaker louder
- TimerA2 used to send square wave.

Component – Speaker Software

- Timers Used
 - Timer A2 channel 0 is used to toggle the pin connected to the speaker
 - Each time compare channel 0 interrupt is triggered, pin 4.2 is toggled, generating an audible tone
 - Timer A2 channel 1 is used to generate a repetitive tone-silence pattern in the alarm
- Functions Used
 - *alarm()*
 - *shutup()*

Results

Results

- Results
 - All components were successfully completed, tested and integrated into one logical unit
- Lessons Learned
 - Big picture thinking – Don't let details distract you!
 - Time management – Allow more time for system integration and finalization!

Demonstration