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基于PXI的压力信号数据采集系统软件

**软件需求规格说明书**

**广州虹科电子科技有限公司研发部**

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# 引言

## 目的

本文档的编写目的在于明确系统范围和用户功能的需求，以及作为验收标准进行存档

## 适用范围

说明：

a. 本软件只适用于基于PXI的压力信号数据采集系统；

b. 本软件的主要功能为控制继电器按照需求文档中的逻辑进行动作，并且控制数据采集板卡采集用户要求的数据，按照需求文档中的格式存储；

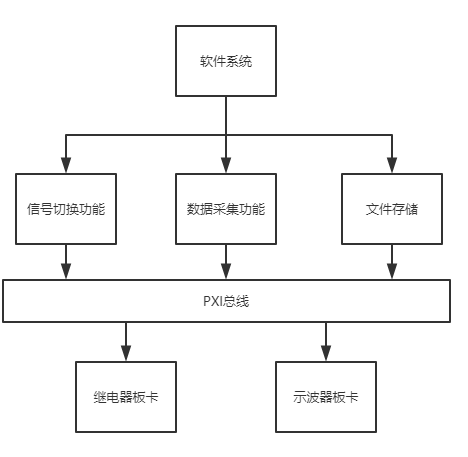
## 系统硬件

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| --- | --- | --- | --- |
| **硬件型号** | **硬件数量** | **硬件类型** | **硬件厂商** |
| PXIe-1082 | 1 | PXI机箱 | NI |
| PXIe-5105 | 1 | 示波器卡 | NI |
| 40-533B-032 | 1 | 开关卡 | Pickering |

# 系统概述

## 产品描述

该软件主要用来控制系统硬件实现信号采集，具体包括继电器按照特定逻辑切换，示波器板卡按照特定的速率采集，文件存储系统按照特定的要求存储文件等功能。



## 产品功能

1. 信号通道切换
2. 信号采集
3. 文件储存

## 一般约束

1. 该软件仅适配于该文档中列出的硬件
2. 软件适用于windows平台
3. 软件基于Labview开发

# 功能性需求分类

## 信号通道切换

### 3.1.1 模式一

方形阵列模式：现有上下2排传感器，称上排为1排，下排为2排。其中1排共有X个传感器，2排共有Y个传感器，且假设1排传感器负责激励信号，2排传感器负责接收信号。则1排的X个传感器从第1个传感器到第X个传感器轮流进行激励，每个传感器激励时，2排的Y个传感器从第1个到第N个传感器轮流进行接收信号。例如：刚开始时，由1排的第1个传感器激励信号，然后2排的传感器轮流接收信号并保存（此时应共有Y个EXCEL信号数据文件被保存下来）；然后由1排的第2个传感器激励信号，再次由2排的传感器轮流接收信号（此时应共有Y+Y=2Y个EXCEL信号数据文件被保存下来），以此类推，全部传感器完成激励-接收时，应共有X\*Y个EXCEL信号数据文件被保存。

需求详解：

1、第一排每次只会闭合一条通路，用于激励，这条通路的编号为X，X为从1到X的最大值自增，X最大值可设置，X的最大值即为第一排传感器的个数

2、第二排同一时间只会闭合一条通路，即为单条通路扫描模式，结束位置编号为Y，Y为可设置参数，Y为第二排传感器个数，。

3、扫描时间间隔为可选选项，其最小时间应当不低于数据采集和存储的时间

4、逻辑示意图，√表示闭合通道，每一图表示一个时刻

例如：S1-S16为矩阵上接的传感器，当前设置第一排传感器为8：第二排传感器也为8，即X=8,Y=8。√表示闭合通道

第一轮：

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 采集 |  |  |  |  |  |  |  |  | √ |  |  |  |  |  |  |  |

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|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 采集 |  |  |  |  |  |  |  |  |  | √ |  |  |  |  |  |  |

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|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 采集 |  |  |  |  |  |  |  |  |  |  | √ |  |  |  |  |  |

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第二轮：

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|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 |  | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 采集 |  |  |  |  |  |  |  |  | √ |  |  |  |  |  |  |  |

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|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 |  | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 采集 |  |  |  |  |  |  |  |  |  | √ |  |  |  |  |  |  |

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|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 |  | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 采集 |  |  |  |  |  |  |  |  |  |  | √ |  |  |  |  |  |

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最后一轮：

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|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 |  |  |  |  |  |  |  | √ |  |  |  |  |  |  |  |  |
| 采集 |  |  |  |  |  |  |  |  | √ |  |  |  |  |  |  |  |

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|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 |  |  |  |  |  |  |  | √ |  |  |  |  |  |  |  |  |
| 采集 |  |  |  |  |  |  |  |  |  | √ |  |  |  |  |  |  |

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### 3.1.2 模式二

圆形阵列模式：现有一排共N个传感器，每个传感器轮流激励信号，此时其余的传感器轮流接收信号。例如：刚开始时，由第1个传感器进行激励，第2到第N个传感器轮流进行接收信号并保存，此时应共有N-1个EXCEL文件被保存；然后由第2个传感器进行激励，第1个传感器以及第3个到第N个传感器轮流进行接收信号，此时应共有2\*（N-1）个Excel文件被保存；以此类推，由第n（1<n<N）个传感器激励激励时，第1个到第n-1个传感器以及第n+1个到第N个传感器轮流进行接收信；一直到由第N个传感器进行激励，第1个到第N-1个传感器轮流接收。当全部完成激励-接收时，应共有N\*(N-1)个Excel文件被保存下来。

需求分析：

1. 传感器总个数为N，N为可设置的值
2. 激励通道从1开始到N递增。
3. 扫描时间间隔为可选选项，其最小时间应当不低于数据采集和存储的时间
4. 逻辑示意图，√表示闭合通道，每一图表示一个时刻

例如：S1-S16为矩阵上接的传感器，N设置为16：

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|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 采集 |  | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 采集 |  |  | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |

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|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 采集 |  |  |  | √ |  |  |  |  |  |  |  |  |  |  |  |  |

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|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 |  | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 采集 | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 |  | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 采集 |  |  | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |

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|  | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 |
| 激励 |  | √ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 采集 |  |  |  | √ |  |  |  |  |  |  |  |  |  |  |  |  |

## 数据采集

数据采集主要是在被触发后进行采集

1. 触发电压幅值V为可设置值

## 数据存储

将采集到的数据存储到硬盘中

1. 需要保存CH1和CH2的信号
2. 保存格式为CSV格式
3. 需要保存时间信息，信号点之间的时间间隔

# 产品的非功能性需求

## 软件界面

## 硬件接口

软件应有设置硬件接口的位置，并且可以将接口固话，在没有改动的情况下每次打开不需要重复设置。

## 图形显示

软件应可以显示当前的开关闭合状态以及数据保存是否成功

## 软件设置

软件可以对相关参数进行设置，例如保存文档的类型，保存位置以及名称等。

# 附录A：需求确认

|  |  |  |  |
| --- | --- | --- | --- |
| **功能验收标准** | | | |
| **功能** | **详细描述** |  | |
| 1.继电器逻辑 | 继电器可以按照需求书约定动作切换   1. 阵列切换 2. 圆形切换 |  |
| 2.数据采集 | 按照需求书约定，可以设置触发并且正常采集 |  |
| 3.数据保存 | 按照需求书约定，可以将数据保存为特定的格式和文件类型 |  |
| 4.软件界面 | 按照需求书约定，软件拥有正常的显示和设置界面 |  |