Adc Data Collector
Component Design Document

1 Description

This is the ADC data collector component. It periodically collects data values from the Raspberry Pi Pico's ADC and reports them as data products.

2 Requirements

No requirements have been specified for this component.

3 Design

3.1 At a Glance

Below is a list of useful parameters and statistics that give a quick look into the makeup of the component.

- **Execution** - *passive*
- **Number of Connectors** - 3
- **Number of Invokee Connectors** - 1
- **Number of Invoker Connectors** - 2
- **Number of Generic Connectors** - *None*
- **Number of Generic Types** - *None*
- **Number of Unconstrained Arrayed Connectors** - *None*
- **Number of Commands** - *None*
- **Number of Parameters** - *None*
- **Number of Events** - *None*
- **Number of Faults** - *None*
- **Number of Data Products** - 3
- **Number of Data Dependencies** - *None*
- **Number of Packets** - *None*

3.2 Diagram

Figure 1: Adc Data Collector component diagram.

3.3 Connectors

Below are tables listing the component's connectors.

3.3.1 Invokee Connectors

The following is a list of the component's *invokee* connectors:

Table 1: Adc Data Collector Invokee Connectors

Name	Kind	Type	Return_Type	Count
Tick_T_Recv_Sync	recv_sync	Tick.T	-	1

Connector Descriptions:
- **Tick_T_Recv_Sync** - The schedule invokee connector

3.3.2 Invoker Connectors

The following is a list of the component's *invoker* connectors:

Table 2: Adc Data Collector Invoker Connectors

Name	Kind	Type	Return_Type	Count
Data_Product_T_Send	send	Data_Product.T	-	1
Sys_Time_T_Get	get	-	Sys_Time.T	1

Connector Descriptions:
- **Data_Product_T_Send** - The data product invoker connector
- **Sys_Time_T_Get** - The system time is retrieved via this connector.

3.4 Interrupts

This component contains no interrupts.

3.5 Initialization

Below are details on how the component should be initialized in an assembly.

3.5.1 Component Instantiation

This component contains no instantiation parameters in its discriminant.

3.5.2 Component Base Initialization

This component contains no base class initialization, meaning there is no `init_Base` subprogram for this component.

3.5.3 Component Set ID Bases

This component contains commands, events, packets, faults, or data products that require a base identifier to be set at initialization. The `set_Id_Bases` procedure must be called with the following parameters:

Table 3: Adc Data Collector Set Id Bases Parameters

Name	Type
Data_Product_Id_Base	Data_Product_Types.Data_Product_Id_Base

Parameter Descriptions:
- **Data_Product_Id_Base** - The value at which the component's data product identifiers begin.

3.5.4 Component Map Data Dependencies

This component contains no data dependencies.

3.5.5 Component Implementation Initialization

This component contains no implementation class initialization, meaning there is no `init` subprogram for this component.

3.6 Commands

The Adc Data Collector component has no commands.

3.7 Parameters

The Adc Data Collector component has no parameters.

3.8 Events

The Adc Data Collector component has no events.

3.9 Data Products

Data products for the ADC data collector component.

Table 4: Adc Data Collector Data Products

Local ID	Data Product Name	Type
0x0000 (0)	Channel_0	Packed_Integer.T
0x0001 (1)	Vsys	Packed_Integer.T
0x0002 (2)	Temperature	Packed_Integer.T

Data Product Descriptions:
- **Channel_0** - The ADC reading at Channel 0 in microvolts.

- **Vsys** - The ADC reading of the system voltage in microvolts.

- **Temperature** - The ADC temperature reading in Celsius.

3.10 Data Dependencies

The Adc Data Collector component has no data dependencies.

3.11 Packets

The Adc Data Collector component has no packets.

3.12 Faults

The Adc Data Collector component has no faults.

4 Unit Tests

None

5 Appendix

5.1 Preamble

This component contains no preamble code.

5.2 Packed Types

The following section outlines any complex data types used in the component in alphabetical order. This includes packed records and packed arrays that might be used as connector types, command arguments, event parameters, etc..

Data_Product.T:

Generic data product packet for holding arbitrary data types

Table 5: Data_Product Packed Record : 344 bits *(maximum)*

Name	Type	Range	Size (Bits)	Start Bit	End Bit	Variable Length
Header	Data_Product_ Header.T	-	88	0	87	–
Buffer	Data_Product_ Types.Data_ Product_ Buffer_Type	-	256	88	343	Header.Buffer_ Length

Field Descriptions:
- **Header** - The data product header
- **Buffer** - A buffer that contains the data product type

Data_Product_Header.T:

Generic data_product packet for holding arbitrary data_product types

Table 6: Data_Product_Header Packed Record : 88 bits

Name	Type	Range	Size (Bits)	Start Bit	End Bit
Time	Sys_Time.T	-	64	0	63
Id	Data_Product_Types. Data_Product_Id	0 to 65535	16	64	79
Buffer_Length	Data_Product_ Types.Data_Product_ Buffer_Length_Type	0 to 32	8	80	87

Field Descriptions:
- **Time** - The timestamp for the data product item.
- **Id** - The data product identifier
- **Buffer_Length** - The number of bytes used in the data product buffer

Packed_Integer.T:

Single component record for holding packed Integer value.

Table 7: Packed_Integer Packed Record : 32 bits

Name	Type	Range	Size (Bits)	Start Bit	End Bit
Value	Integer	-2147483648 to 2147483647	32	0	31

Field Descriptions:
- **Value** - The 32-bit Signed Integer.

Sys_Time.T:

A record which holds a time stamp using GPS format including seconds and subseconds since epoch (1-5-1980 to 1-6-1980 midnight).

Table 8: Sys_Time Packed Record : 64 bits

Name	Type	Range	Size (Bits)	Start Bit	End Bit
Seconds	Interfaces. Unsigned_32	0 to 4294967295	32	0	31
Subseconds	Interfaces. Unsigned_32	0 to 4294967295	32	32	63

Field Descriptions:
- **Seconds** - The number of seconds elapsed since epoch.
- **Subseconds** - The number of $1/(2^{32})$ sub-seconds.

Tick.T:

The tick datatype used for periodic scheduling. Included in this type is the Time associated with a tick and a count.

Table 9: Tick Packed Record : 96 bits

Name	Type	Range	Size (Bits)	Start Bit	End Bit
Time	Sys_Time.T	-	64	0	63
Count	Interfaces. Unsigned_32	0 to 4294967295	32	64	95

Field Descriptions:
- **Time** - The timestamp associated with the tick.
- **Count** - The cycle number of the tick.

5.3   Enumerations

No enumerations found in component.