

Request #: **HUTRR92**
Title: Hinge Angle Sensor
Spec Release: 1.12
Received Date:
Requester: Matthew Williams
Company: Microsoft

Pages Affected: Sensors (0x20)
Values checked: By chair (Matthew Williams)

Current Status: Approved
Priority: Normal

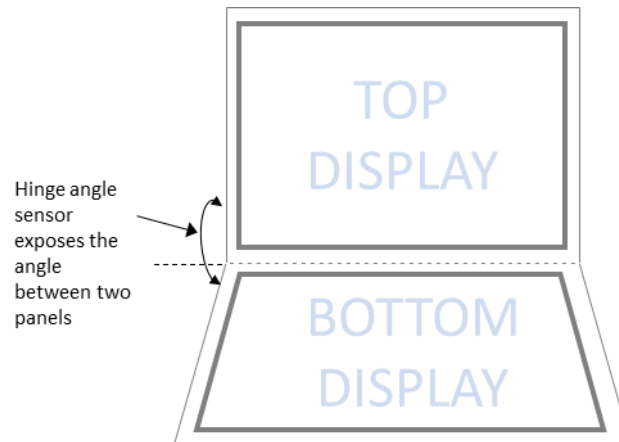
Required Voter: Wacom
Required Voter: Intel
Required Voter: Apple

Voting Begins: 14th April 2020
Voting Ends: 21st April 2020
Voting Result: 4-0-1 (Yes/No/Abstain)

Hinge-Angle Sensor

1. Background

New foldable form factors have two integrated displays connected by a hinge that allows to user to put the device in various configurations that allows the system to be used like a book, laptop or tablet (to name a few). A hinge sensor is integrated in such systems to enable the operating system to detect such postures of the device. This document proposes HID usages to allow a HID device to expose such a sensor to the host.



2. Usages

Sensor Device Usages

We propose adding the following usages to mark an application or physical collection as exposing hinge angle or a gesture sensor:

Usage ID	Description
0xE4	<i>Other: Hinge Angle</i> This usage must be used by a HID device to mark an application or physical collection as a hinge angle sensor

Sensor field usages: Hinge Angle Sensor field usages

The following fields are used to expose data from a hinge angle sensor:

Usage ID	Description
0x05E1	Usage to expose the measured interior hinge angle (in degrees) between two panels in a system.

This field is also used to expose absolute change sensitivity for a hinge angle sensor when used with a modifier (Section 1.2 has more details about “Change Sensitivity Absolute” modifier).

Add the following to section 1.1. in page 24

Other: Hinge Angle Sensor	CA, CP – An application-level or physical collection that identifies a sensor that measures the hinge angle.
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Add the following usages to expose hinge angle value in input reports

Create new section “1.1.19” “Other: Hinge Angle Sensor Field Usages” which has the following table

Hinge Angle	SV – Hinge Angle value (in degrees)
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Update the table in Page 10 with the following values:

	<i>(for Data Fields commonly used with Orientation/Orientation Extended sensors, please look at Usage range 0470 – 048f)</i>		1.13
E0	Other	CA, CP	1.1
E1	Other: Custom	CA, CP	1.1,1.16
E2	Other: Generic	CA, CP	1.1,1.17
E3	Other: Generic Enumerator	CA, CP	1.1,1.17
E4	Other: Hinge Angle	CA, CP	1.1, 1.19
E5-EF	Other: Reserved		
	<i>(for Data Fields commonly used with Custom sensors, please look at Usage range 0540 – 055f)</i>		1.16

Update table in Page 20 with following values:

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	(These data fields are used by hinge angle sensors)		
05E0	Data Field: Hinge	SV/DV	1.19
05E1	Data Field: Hinge Angle	SV/DV	1.19
05E2-05EF	Data Field: Hinge Angle Reserved		
0600-07FF	Reserved for future use as Sensor Types, Data Fields and Properties		
09C0-09FF	Reserved for use as Selection Values		
1000-	Reserved for use as Data Fields with Modifiers		1.2
FFFF			

Add the usages highlighted in red to Section 4.1, page 72

```
//sensor category other
#define HID_DRIVER_USAGE_SENSOR_CATEGORY_OTHER 0x09,0xE0
#define HID_DRIVER_USAGE_SENSOR_TYPE_OTHER_CUSTOM 0x00,0xE1
#define HID_DRIVER_USAGE_SENSOR_TYPE_OTHER_GENERIC 0x09,0xE2
#define HID_DRIVER_USAGE_SENSOR_TYPE_OTHER_GENERIC_ENUMERATOR 0x09,0xE3
#define HID_DRIVER_USAGE_SENSOR_TYPE_OTHER_HINGE_ANGLE 0x09,0xE4
```

Add the usages highlighted in red to Section 4.1, page 76

```
// data type for hinge angle sensors
#define HID_USAGE_SENSOR_DATA_HINGE 0x0A,0xE0,0x05 // NArY
#define HID_USAGE_SENSOR_DATA_HINGE_ANGLE 0x0A,0xE1,0x05 // NArY
```

3. Illustrative Examples

3.1. Hinge Angle Sensors

```
// For reference: Complete HID report descriptor
// Hinge Angle Sensor
const unsigned char report_descriptor[] = {
    HID_USAGE_PAGE_SENSOR,
    HID_USAGE_SENSOR_TYPE_COLLECTION,
    HID_COLLECTION(Application),

    HID_REPORT_ID(1),
    HID_USAGE_PAGE_SENSOR,
    HID_USAGE_SENSOR_TYPE_OTHER_HINGE_ANGLE,
    HID_COLLECTION(Physical),

    //feature reports (xmit/receive)
    HID_USAGE_PAGE_SENSOR,
    HID_USAGE_SENSOR_PROPERTY_SENSOR_CONNECTION_TYPE, // NArY
    HID_LOGICAL_MIN_8(0),
    HID_LOGICAL_MAX_8(2),
    HID_REPORT_SIZE(8),
    HID_REPORT_COUNT(1),
    HID_COLLECTION(Logical),
    HID_USAGE_SENSOR_PROPERTY_CONNECTION_TYPE_PC_INTEGRATED,
    HID_USAGE_SENSOR_PROPERTY_CONNECTION_TYPE_PC_ATTACHED,
    HID_USAGE_SENSOR_PROPERTY_CONNECTION_TYPE_PC_EXTERNAL,
    HID_FEATURE(Data_Arr_Abs),
    HID_END_COLLECTION,
    HID_USAGE_SENSOR_PROPERTY_REPORTING_STATE,
    HID_LOGICAL_MIN_8(0),
```

```

HID_LOGICAL_MAX_8(5),
HID_REPORT_SIZE(8),
HID_REPORT_COUNT(1),
HID_COLLECTION(Logical),
    HID_USAGE_SENSOR_PROPERTY_REPORTING_STATE_NO_EVENTS_SEL,
    HID_USAGE_SENSOR_PROPERTY_REPORTING_STATE_ALL_EVENTS_SEL,
    HID_USAGE_SENSOR_PROPERTY_REPORTING_STATE_THRESHOLD_EVENTS_SEL,
    HID_USAGE_SENSOR_PROPERTY_REPORTING_STATE_NO_EVENTS_WAKE_SEL,
    HID_USAGE_SENSOR_PROPERTY_REPORTING_STATE_ALL_EVENTS_WAKE_SEL,
    HID_USAGE_SENSOR_PROPERTY_REPORTING_STATE_THRESHOLD_EVENTS_WAKE_SEL,
HID_FEATURE(Data_Arr_Abs),
HID_END_COLLECTION,
HID_USAGE_SENSOR_PROPERTY_POWER_STATE,
HID_LOGICAL_MIN_8(0),
HID_LOGICAL_MAX_8(5),

HID_REPORT_SIZE(8),
HID_REPORT_COUNT(1),
HID_COLLECTION(Logical),
    HID_USAGE_SENSOR_PROPERTY_POWER_STATE_UNDEFINED,
    HID_USAGE_SENSOR_PROPERTY_POWER_STATE_D0_FULL_POWER,
    HID_USAGE_SENSOR_PROPERTY_POWER_STATE_D1_LOW_POWER,
    HID_USAGE_SENSOR_PROPERTY_POWER_STATE_D4_POWER_OFF,
HID_FEATURE(Data_Arr_Abs),
HID_END_COLLECTION,
HID_USAGE_SENSOR_STATE,
HID_LOGICAL_MIN_8(0),
HID_LOGICAL_MAX_8(6),
HID_REPORT_SIZE(8),
HID_REPORT_COUNT(1),
HID_COLLECTION(Logical),
    HID_USAGE_SENSOR_STATE_UNKNOWN,
    HID_USAGE_SENSOR_STATE_READY,
    HID_USAGE_SENSOR_STATE_NOT_AVAILABLE,
    HID_USAGE_SENSOR_STATE_NO_DATA,
    HID_USAGE_SENSOR_STATE_INITIALIZING,
    HID_USAGE_SENSOR_STATE_ACCESS_DENIED,
    HID_USAGE_SENSOR_STATE_ERROR,
HID_FEATURE(Data_Arr_Abs),
HID_END_COLLECTION,
HID_USAGE_SENSOR_PROPERTY_REPORT_INTERVAL,
HID_LOGICAL_MIN_8(0),
HID_LOGICAL_MAX_32(0xFF, 0xFF, 0xFF, 0xFF),
HID_REPORT_SIZE(32),
HID_REPORT_COUNT(1),
HID_UNIT_EXPONENT(0),
HID_FEATURE(Data_Var_Abs),
    HID_USAGE_SENSOR_DATA(HID_USAGE_SENSOR_DATA_HINGE_ANGLE,
HID_USAGE_SENSOR_DATA_MOD_CHANGE_SENSITIVITY_ABS),
    HID_LOGICAL_MIN_8(0),
    HID_LOGICAL_MAX_32(0xFF, 0xFF, 0xFF, 0xFF),
    HID_REPORT_SIZE(32),
    HID_REPORT_COUNT(1),
    HID_UNIT_EXPONENT(0x0E),
    HID_FEATURE(Data_Var_Abs),

//input reports (transmit)
HID_USAGE_PAGE_SENSOR,
HID_USAGE_SENSOR_STATE,
HID_LOGICAL_MIN_8(0),
HID_LOGICAL_MAX_8(6),

```

```
HID_REPORT_SIZE(8),
HID_REPORT_COUNT(1),
HID_COLLECTION(Logical),
    HID_USAGE_SENSOR_STATE_UNKNOWN,
    HID_USAGE_SENSOR_STATE_READY,
    HID_USAGE_SENSOR_STATE_NOT_AVAILABLE,
    HID_USAGE_SENSOR_STATE_NO_DATA,
    HID_USAGE_SENSOR_STATE_INITIALIZING,
    HID_USAGE_SENSOR_STATE_ACCESS_DENIED,
    HID_USAGE_SENSOR_STATE_ERROR,
HID_INPUT(Data_Arr_Abs),
HID_END_COLLECTION,
HID_USAGE_SENSOR_EVENT,
HID_LOGICAL_MIN_8(0),
HID_LOGICAL_MAX_8(5),
HID_REPORT_SIZE(8),
HID_REPORT_COUNT(1),
HID_COLLECTION(Logical),
    HID_USAGE_SENSOR_EVENT_UNKNOWN,
    HID_USAGE_SENSOR_EVENT_STATE_CHANGED,
    HID_USAGE_SENSOR_EVENT_PROPERTY_CHANGED,
    HID_USAGE_SENSOR_EVENT_DATA_UPDATED,
    HID_USAGE_SENSOR_EVENT_POLL_RESPONSE,
    HID_USAGE_SENSOR_EVENT_CHANGE_SENSITIVITY,
HID_INPUT(Data_Arr_Abs),
HID_END_COLLECTION,
HID_USAGE_SENSOR_DATA_HINGE_ANGLE,
HID_LOGICAL_MIN_8(0),
HID_LOGICAL_MAX_32(0xFF, 0xFF, 0xFF, 0xFF),
HID_REPORT_SIZE(32),
HID_REPORT_COUNT(1),
HID_UNIT_EXPONENT(0x0E),
HID_FEATURE(Data_Var_Abs),
HID_END_COLLECTION,

HID_END_COLLECTION
}
```