memo

Awesome Customer, Inc.

To: Performance

From: Customer Interface

Subject: Automatic Door Opener Software Request

Here at Awesome Customer Inc., we have been doing a lot of market research and have found that there is large market demand for garage door, swing gate, and office door control systems. As such, our internal teams are off developing specifications, interfaces, and device drivers.

Performance has been a valued software supplier and we would like for you to look into providing a general software control/monitoring "Automatic Door Opener" solution. We would like for Performance to analyze the following set of information provided in this memo and design a solution for the functionality, delivering the following to us:

1. Software Requirements
2. Software Design
3. High level Pseudo-code Implementation of the software
4. Software Test Plan (if you have time)

Notes:

- There is no need to duplicate information contained in this document. You can simply reference this document if required.
- The hardware register information is provided for reference. If you are unfamiliar with registers, don't include that level of detail in your deliverables.

Unfortunately, our engineering staff will not be available to answer your questions or to clarify any information provided in this memo. Our past experience with Performance has proven that the engineering staff is great at developing a solid solution with little direction. ***As such, we just ask that you document your assumptions and any proposed refinements for discussion at a later date.***

The following is an initial set of information that our internal teams have provided.

Hardware Component Description

1. Two (2) Drive Motors
2. One (1) Push Button
3. One (1) Single Board Computer (SBC) integrating the Drive Motors and Button

System Requirements

1. When the button is pressed, the Automatic Door Opener system shall cause the door to CLOSE if it is currently in the OPEN position.
2. When the button is pressed, the Automatic Door Opener system shall cause the door to OPEN if it is currently in the CLOSE position.
3. When the button is pressed, the Automatic Door Opener system shall ignore the button press if the door is currently MOVING.
4. The Automatic Door Opener system shall be able to monitor door position.
5. The Automatic Door Opener system shall be able to command the motor(s) to move the door to the OPEN position.
6. The Automatic Door Opener system shall be able to command the motor(s) to move the door to the CLOSE position.
7. At initialization, the Automatic Door Opener system shall cause the door to OPEN if the door is not in either CLOSE or OPEN position.

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Device Driver Interface Details

A Device Driver for each Motor should be expected to be accessed via Memory Mapped I/O.

Motor 1 is mapped to address 0x80000000
Motor 2 is mapped to address 0x70000000

The following are the definitions of current 32-bit registers:

Register Name	Byte Offset	Notes
motor_interrupt	0x00	The purpose of this register is to service interrupts. When the device driver recognizes a change in state, an interrupt is triggered and the appropriate state bit is set high. The device driver will not trigger a subsequent interrupt for that state until the bit is cleared.
motor_status	0x01	The purpose of this register is to enable on demand access to status elements of the motor.
motor_command	0x02	The purpose of this register is to enable command of the motor.

Register Name	Name	Bit(s)	Access Type	Description
motor_interrupt_register				
	CLOSED	0	R/W	High when Motor transitions to CLOSED position.
	OPEN	1	R/W	High when Motor transitions to OPEN position.
	RESERVED	2..31	N/A	Reserved for future use.
motor_status				
	SPEED	0..2	R	Instantaneous speed in Counts/Second
	STATE	3	R	Current state of motor (0 = IDLE, 1 = MOVING)
	POSITION	4..13	R	Current position of the Motor/ Door (0=CLOSED, 1023=OPEN)
	RESERVED	14..31	N/A	Reserved for future use.
motor_command				
	command	0..2	W	Use to set intended command of the motor when command_enable is set (0 = CLOSE, 1 = OPEN, 2 = STOP)
	speed	3..5	W	Use to set intended speed of the motor when command_enable is set. Not used when command is STOP.
	command_enable	6	W	Use to command the drive.

A Device Driver for the Button should be expected to be accessed via Memory Mapped I/O.

Button is mapped to address 0x60000000

The following are the definitions of current 32-bit registers:

Register Name	Byte Offset	Notes
button_interrupt	0x00	The purpose of this register is to service interrupts. When the device driver recognizes a change in state, an interrupt is triggered and the appropriate state bit is set high. The device driver will not trigger a subsequent interrupt for that state until the bit is cleared.
button_status	0x01	The purpose of this register is to enable on demand access to status elements of the button.

Register Name	Name	Bit(s)	Access Type	Description
button_interrupt				
	PRESSED	0	R/W	High when button is pressed down.
	RELEASED	1	R/W	High when button is NOT pressed down.
	RESERVED	2..31	N/A	Reserved for future use.
button_status				
	STATE	0	R	Current state of button (0 = RELEASED, 1 = PRESSED)
	RESERVED	1..31	N/A	Reserved for future use.