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OPEN LOOP STATE MACHINE SYNCHRONIZATION

HP INC

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Abstract

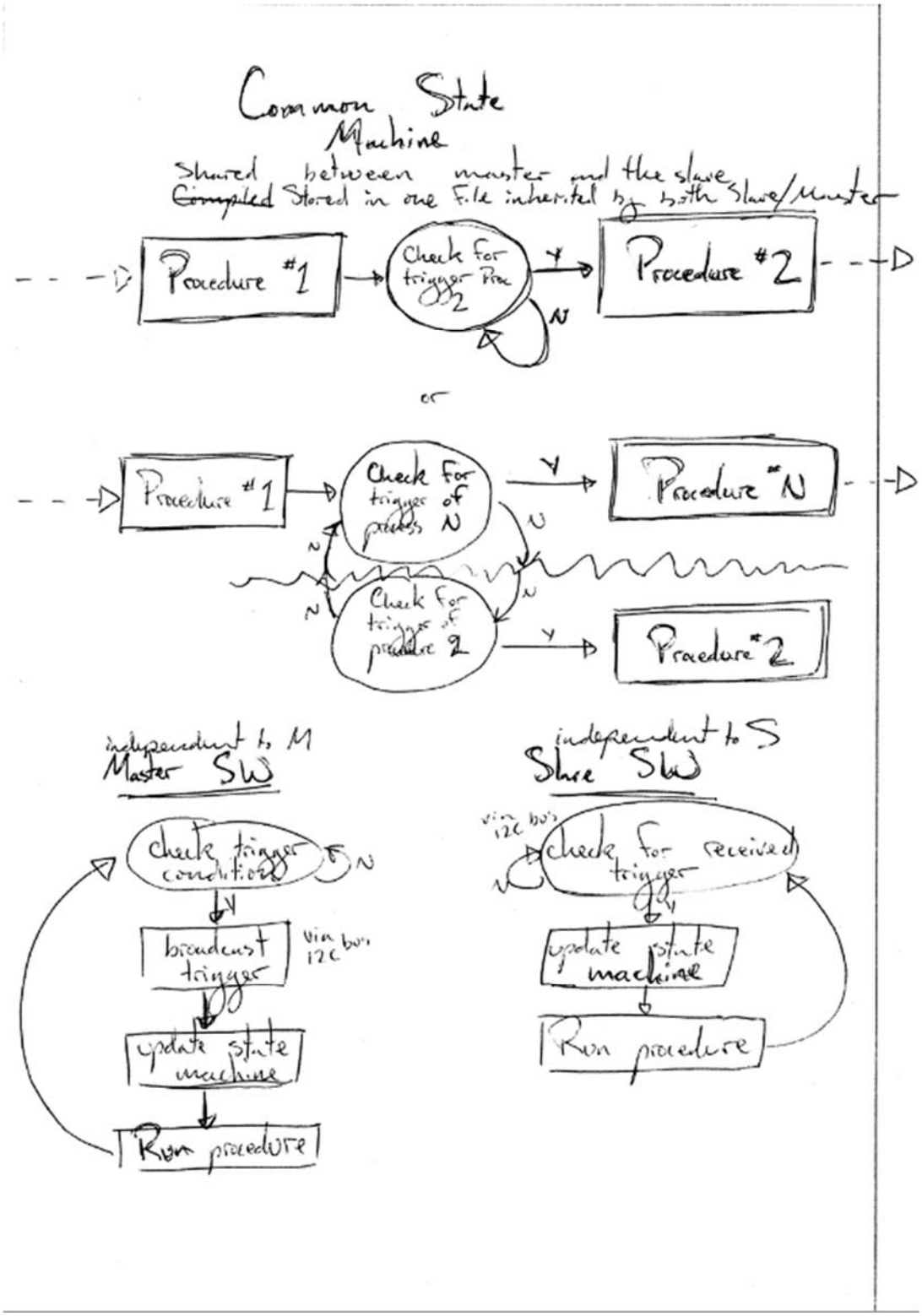
This is a method for using an open loop state machine synchronization on a shared bus to emulate electromechanical hardware devices for software development.

Article

This idea applies to electrical emulation of electro-mechanical systems. It can be used to speed the development of low-level software when hardware is not designed or available. This problem is often faced early in the development cycle of a system.

This is a method for controlling many microcontrollers to emulate motor feedback, mechanical switches, optical sensors, or other electro-mechanical devices. This method differs from other emulation strategies by distributing the electro-mechanical emulation across multiple microcontrollers instead of emulating on single chip or in software. By utilizing multiple microcontrollers this method can emulate many electro-mechanical devices using simple, cheap microcontrollers. The method can be more easily extended to emulate large or simplified to emulate smaller system. Multiple microcontrollers also allow the emulation of incomplete systems. This is useful when some hardware is available from previous designs and only some new hardware is needed to be emulated or if the hardware requirements change as new hardware becomes available or is required by the design.

When put into practice each microcontroller is attached to a shared communication bus with a master/slave architecture. They are programmed with a shared state machine, and an emulation device or devices is assigned to them. When in use each slave waits for the trigger to advance its state machine to be raised on the bus. The master monitors the slaves for trigger conditions to be raised through its own inputs and outputs and by slaves on the bus. It then broadcasts the triggers to the bus. When a trigger is sensed, each master and slave update their own internal state machine and then run their emulation procedure for their assigned device.



During the programming stage, the code for all sensors and state machines is uploaded to each slave, but only the code for the device/devices it is assigned is used. This allows every microcontroller to

be assigned a new device to emulate, or to be removed from the system.

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