

Voice Activated "Nurse" Call Bell

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PURPOSE:

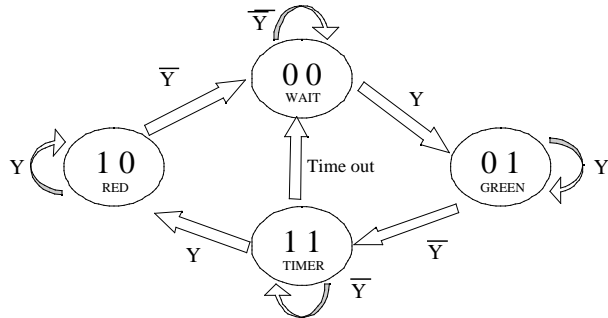
At Zambarano Hospital in Pascoag and at the Eleanor Slater Hospital in Cranston there are over a hundred patients suffering from para- and quadriplegia as well as cerebral palsy. These disabilities make it extremely difficult for the patients to do everyday activities without assistance. One of the hospitals' largest concerns is that the state of Rhode Island requires that each patient must have a way to call the nurse in case of distress. Currently patients are equipped with either a sip-and-puff switch or a single-switch button with which to activate the call bell. Because the patients have limited movement, it often becomes difficult for them to reach the call bell switch, thus leaving them helpless if some distressing situation were to arise. For this reason, we have been designing and building a voice-activated call bell in order to eliminate the necessity of movement to call for a nurse.

INITIAL ASSUMPTIONS:

In order to keep costs low, we ruled out the use of a microprocessor and decided to implement a simple state machine. We also realized that in normal hospital conversation the word "nurse" is frequently used. In order to avoid false activation, the patient must say "nurse" two times.

DESIGN:

With careful organization and several revisions, we finally ended up with the following state diagram. The system consists of 4 states and one input. We used 00 = initial wait state. In this position the circuit is waiting for the first "Nurse" to be said. Once this occurs, the state changes to 01 and lights the green LED. After detecting a low Y-input, we enter the 11 state, which is another wait state that implements a timer in order to avoid accidental activation. If "Nurse" is detected for the second time before the timer reaches 4 seconds, then the



state moves into 01 which activates the red LED as well as the call bell. As soon as the Y-input goes low, the state returns to the initial wait state (00).

CURRENT STATUS:

We had several set backs caused mainly by gate delay, but after numerous revisions to our input (Y) circuit and state machine we have a fully working design. This circuit consists of 8 CMOS chips, a 32Hz Clock, and the IMAGES voice recognition kit. The complete design is built on the protoboard and fully functional. Currently it is being reproduced as a circuit board prototype which should be completed very shortly.

FUTURE PLANS:

Once the prototype is complete and tested, we will organize and make a printed circuit board that incorporates the IMAGES kit in order to eliminate the second circuit board. This printed circuit board will be placed into a project box. The final Call Bell will appear to the patient as a small box with a microphone, two-tone LED (red/green), orange LED, and a touch pad with "TRAIN", "0", and "1" to allow for a nurse to program the voice recognition system to recognize only the patient's voice. If possible we are also looking into acquiring a patent for the "Voice Activated Call Bell."

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