

## **Noise-Reducing Electromagnetic Latch System for NICU Isolettes**

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Recent research has indicated that decibel levels above 45 dB can impact normal neurological development in premature neonates. It was discovered that this level of noise, and more, is created in the Neonatal Intensive Care Unit (NICU) by the monitoring instrumentation, human activity, and the opening and closing of portholes on isolettes. To mitigate the potential effects of ambient noise, NICU staff now separate infants into individual, quieter rooms. However, the excessive level of noise created by the opening and closing of the current porthole latch mechanism still remains a problem. Our group has designed a new electromagnetic latch system that will allow the NICU staff to gain immediate access to the child in case of an emergency, while generating less noise than current latch mechanisms. The new mechanism is controlled via a foot pedal, proximity sensor, and Arduino Uno microcontroller. The proximity sensor detects when the porthole door is nearly closed and activates the electromagnet, locking the door shut while still allowing manual access in case of emergency. The foot pedal then provides a direct, hands-free mechanism to turn off the electromagnetic, and open the isolette door quickly. The electromagnet and proximity sensor are retrofitted onto the current isolette design via a custom 3D printed housing unit that attaches in place of the original latch. This new mechanism decreased max noise output while opening and closing the doors by over 20 dB, but did not lower it to the goal of below 45 dB. This could be due to ambient noise in the NICU, which ranges from 50-55 dB at baseline. Further work for this design includes making the circuit more robust and providing a finish that would be more suitable for sterilization