

## The design of an automatic tactile stimulation device to treat Apnea of Prematurity - the BreatheBuddy

TU/e  
PDEng  
THESIS  
AWARD  
2020



Very preterm born infants are not yet fully developed and need intensive medical care for a long period to survive. Due to the immaturity of the respiratory center in their brains, most of these infants forget to breathe frequently; a phenomenon that is called apnea of prematurity. Adequate response to these apnea's it vital as frequent or prolonged episodes can cause permanent damage to the brain, which has a negative effect on the neurodevelopmental outcome. Nurses act on apnea by gently touching or rubbing the skin of the infant to stimulate breathing. However, high workload on the ward can influence the response time of the nurse and prolong the duration of apnea.

We hypothesized that automated mechanical tactile stimulation can improve the treatment of apnea by enabling a direct response. After reviewing the literature and conducting interviews, focus group sessions, experimental studies and clinical studies an automated tactile stimulator is developed. The innovative working principle of our 'BreatheBuddy' has been successfully evaluated in a pre-clinical trial and a patent has been filed. Clinical evaluation of the BreatheBuddy in preterm infants is now planned in the Neonatal Intensive Care Unit of Leiden University Medical Center.

**PDEng Program:**  
QUALIFIED MEDICAL ENGINEER

S.J.E. Cramer MSc PDEng

**Company:**  
Leiden University Medical Center

**Promotor/Supervisor:**  
Dr.Ir. I.M.M. Lammerts, Prof.Dr. A.B. te Pas, Dr. J.J. Baalbergen,  
Ing. A.S.N. Vernooij PDEng, Prof.Dr.Ir. E.J.E. Cottaar

**Current Employment:**  
PhD student and Qualified Medical Engineer at the Neonatal  
Intensive Care Unit at Leiden University Medical Center

