

Researchers design respirators for children with neuromuscular diseases

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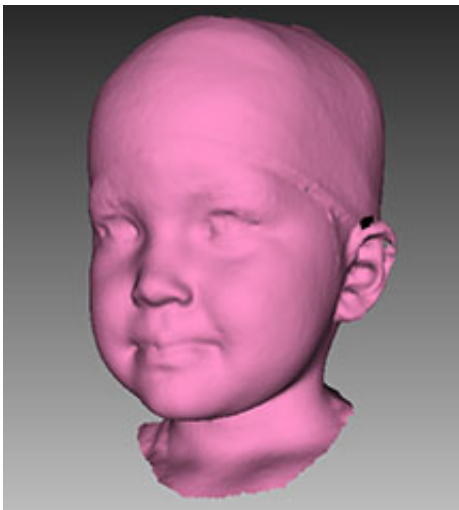
3D imaging system for the development of the breathing mask.

TU Delft is developing a special respirator for children with a neuromuscular disease. The Sporters in Actie foundation collected €100,000 for research on this breathing mask during the 'Greatest Golf Tournament in the World' in Zoetermeer on Saturday 6 April.

Many neuromuscular diseases damage respiratory muscles, so that artificial respiration becomes necessary in time. As yet, there are no special respirators for small [children](#) (up to the age of six) who require artificial respiration for extended periods. These children often have to use [masks](#) designed for adults. As the masks often do not fit properly this can lead to serious problems, such as [eye infections](#) caused by escaping air, facial and dental deformation, insufficient ventilation caused by leaking masks, pressure spots on the nose and forehead because the mask has to be tightened extra fast, and [skin damage](#) caused by the mask shifting due to the poor fit.

3D

TU Delft is developing a special children's [respirator](#). The project will cost €250,000 and the contribution by the 'Greatest Golf Tournament in the World' will help to complete the research so the mask can actually be produced. PhD student Lyè Goto of TU Delft's Faculty of Industrial Design Engineering has been developing the new mask for over a year now. 'The first and most important step is the collection of what we call the anthropometric data. These data help describe the shape of an average child's face per age category and gender. We build an inventory of 3D images of a large population of children's faces, paying particular attention to the level of diversity between the individual children. To do this, we have a [3D imaging](#) system made up of six digital cameras which record the faces from various angles.'



Prototypes

Goto is presently photographing the faces of a few hundred healthy children aged between six months and six years. These data will be supplemented with the data of patients with neuromuscular diseases, which is necessary because these children's faces may be malformed by the disease.

'Next we have to analyse the anthropometric data, which can be a very complex operation,' explains Goto. 'Once we have completed the analysis we can deliberate on the design of the mask. We will have to decide whether to produce masks in different sizes or size categories, or to choose a modular design with a separate facepiece, or maybe another solution. I will have working prototypes ready by the third year of my PhD research, after which we want to involve the industry in the project.'

TU Delft is collaborating on the research with Sophia Children's hospital in Rotterdam, Youth Healthcare and other scientists. Dr Johan Molenbroek, TU Delft's project leader: 'The treatment of these children has been suboptimal for decades. Thanks to this research, soon the youngest children will be able to have their own personal and comfortably fitting respirators as well. The children and their parents and carers will sleep better at night and we will see fewer complications among these young patients.'

Provided by Delft University of Technology

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