

The NAO robot – named Alfio 3 - with the children of the Complex Operating Unit of Pediatric Neurology and Muscular Diseases of the IRCCS "G. Gaslini "of Genoa.

The protagonists speak, adults and children (and even the robot)

A project supported by the association "Il Cuore di Santa, NEVER forgets" of Santa Margherita Ligure and received with active interest and collaboration by Prof. Pasquale Striano, by Dr. Maria Francesca Aiello, by Dr. Michela Sole, psychologist, and by the student in Medicine Leonardo Magliulo, is in progress at the Complex Operative Unit of Paediatric Neurology and Muscular Diseases of the IRCCS Paediatric Institute "G. Gaslini "of Genoa with the collaboration of the Italian School of Robotics.

The project involves the use of a small humanoid robot NAO (named Alfio 3), for some sessions of playful interaction with the Gaslini little patients. Indeed, today there is an interesting literature on the benefits of using robots to support the teaching of Special Needs as well as on their use in Paediatric Institutes or Departments to alleviate patients' state of suffering and distress. But the project started a few weeks ago at the Gaslini is undoubtedly unique, for the medical and specialist team that has formed steadily around the trials and for the duration of the same.

We asked the project partners to describe the birth and the first steps of the experimentation.

Stefania Mai, founder of the association "Il Cuore di Santa, NEVER forgets" tells us about the birth of the project. "It was born when we made the decision with our association to get out of our borders. The association was born in 2013 following the death of my brother in a motorcycle accident and with some friends we decided to create an association, (<https://www.ilcuoredisantanondimenticamai.org/>) that could somehow remember him with works of charity. The first actions of the newly formed association were carried out in Santa Margherita (near Genoa, Italy), with two

cars donated to Public Assistance, support for the Green and Red Cross, the construction of a playground, 4 DAE columns located in strategic points of the city, and support to a child and his family to face a serious illness, we all succeeded together.

The experience of helping Michele has taught us how important it can be to have support to deal with all kinds of pain. I already knew Prof. Pasquale Striano and I talked to him about our idea. This time, we wanted to give hope to children treated in the Pediatric Neurology and Muscular Diseases Unit, and to their families: a hope, a smile, a bit of fun. We thought, with his help and that of the engineer Micheli, to introduce the NAO robot to Gaslini.

We did not hide that it would be a challenge, as this project came out of the known schemes related to donations, and difficult to understand. We have always succeeded in communicating to the public and to the donors who are following us, our dreams and actions: now we had to explain that we wanted to give, not an object, but a hope. But as soon as we were able to communicate our emotions and how this little humanoid would have given joy to children, participation was very high and full of enthusiasm.

The making of the project started in May 2018, and on October 18th there was the evening, with NAO super guest. The Cabarettisti of Genoa participated to it, along with representatives of the national football teams Sampdoria and Genoa, and buffets was offered by all the restaurants of Santa Margherita and prizes by the Santa Margherita traders. We have thus collected the amount that allowed us to carry out our project. Which is very special, because it gives emotions of joy and joy not only to the little patients, even to us who collaborate.

At the first laboratory, next to the children, their parents and us, there were the Councilor for Health and vice-president of the Liguria Region, Sonia Viale, the Councilor of the Liguria Region Stefano Mai, the primary Prof. Carlo Minetti, the doctors involved in the project, the nursing staff of the department.

This is why we are happy to follow the experiment: a different joy every time.

Prof. Pasquale Striano

Thanks to the association "I Cuore di Santa NEVER forgets" it was possible to think of a project that would introduce digital technology in a pediatric hospital. In the ward, an unresolved problem is how to improve interaction, especially the communication between us and children, our patients with developmental disorders, autism spectrum disorders, with cognitive difficulties that limit their communication skills. That's why, talking about it with Stefania Mai, we decided to use some information technology tool. In Genoa there is a renowned association, the School of Robotics which has significant expertise in this field, and we bet on the introduction of the robot.

I must particularly thank the General Management, in the person of Dr. Paolo Petralia, and the Scientific Director, Prof. Carlo Minetti, for giving us this opportunity, as it is not easy to bring an external technology to a pediatric ward. We are very happy observing how the children in the clinic expressed their joy, interest and joy in interacting with the robot. Humanoid robotics can have great potential in improving the quality of hospitalization for pediatric patients and impacting the development and rehabilitation of the neuro-cognitive abilities of hospitalized children, for example, for children who have to deal with particularly difficult therapies, or as communication mediators between children and staff.

To experiment with these aspects we have established a small informal and transdisciplinary group with different figures: Dr. Maria Francesca Aiello, a child psychiatrist, who has been dealing with these issues for years; Dr. Michela Sole, psychologist and our graduate student Leonardo Magliulo. Thanks also to the Nursing Coordinator Luisa Pozzo and her team for their professionalism and willingness to collaborate.

Dr. Maria Francesca Aiello

Based on what we have seen from our experience and which exists in the literature, we have activated this project in small groups of patients who are hospitalized in the ward on a given day and who are faced with stressful moments with their families, difficulties related to therapies. The opportunities that we have verified since the first meetings with the NAO robot are above all related to relationality and language.

The participation of children in this activity and the interaction with the robot was truly spontaneous and genuine. Through the help of the computer technician who interacts directly with dislocated computers - and who the children do not see - NAO calls them by name, answers the questions that the children ask and that sometimes just amaze in their emotional depth. A child asked NAO: "You were excited to come here, you're embarrassed, are you afraid?".

Another example: the fact that NAO walks slowly and mechanically has stimulated a kind of understanding in a child, since, let's not forget, we are in a department of muscular diseases.

The empathic relationship between children, operators and the robot can stimulate skills and executive functions: working memory, for example, when we ask children to repeat the sequence of different colours that the robot can modify.

This experimentation thus intervenes on different lines of action. It can relieve stress and provide a pleasant and stimulating experience, with opportunities for socialization among patients who are at that moment on the ward and who may have very different problems, from neurological problems to neuropsychiatric problems or even more purely psychological problems. It can be the content of a long-term project on the individual person with an intervention aimed at promoting different skills and abilities.

Dr. Michela Sole

NAO has the ability to become one of *Us*, and with *Us* I mean children, family members and the work team formed around this project. Around the small robot

an atmosphere of curiosity is formed that stimulates everyone to smile and feel part of something special.

NAO, or rather *Alfió3*, has been programmed with movement, comprehension and expression skills, particularly suitable for interaction with all children, despite the different clinical difficulties present. Moreover, the possibility of real-time communication of the robot, thanks to the help of the computer technician, allows children to receive immediate feedback on their expressiveness, thus receiving a very strong positive reinforcement, both on relational and cognitive abilities.

From the meetings held to date, the aspect that most impressed me is like a humanoid without facial expressions (a small thing that perhaps makes it a little more *robotics*) instead it can stimulate the emotional expression of the children present. Emotions are one of the most complex aspects of verbalization and, in children, the difficulty is notoriously amplified. But often, during the meetings, you listen to spontaneous phrases that describe the feelings of the little ones, "I'm too happy!".

I am grateful to all those who have made this project possible, both for having brought an absolutely positive novelty to a paediatric department, because the positive experience of the stay is in itself a very great contribution to the care offered, but also to allow all of us to learn new methods of interaction and communication with a special population such as that formed by the children present in the ward.

The Graduating Student Leonardo Magliulo

Leonardo Magliulo is preparing his thesis in neurology with Dr. Striano on experimentation with NAO.

Over the years I have realized that when dealing with children, often the biggest problem is finding the right way to relate to them, different for everyone, now more and more difficult in an age where technology is a part founding of our everyday life and the relationships are in fact filtered by instruments that have

an appeal with which it is difficult to compete. In my opinion, the beauty of the project lies precisely in this: it is not a tool with which to compete but rather a fundamental tool to find today the “interpretations” of every single child and allow us to help him better, even if only by snatching a smile from him in a moment difficult as that of a hospitalization.

Pictures.

Image 1: The evening of October 18, 2018 at the Covo di Nord Est for fundraising.

Image 2: NAO in an armchair at Covo.

Image 3: NAO enters the Department of Neuroscience and Muscular Diseases. In the picture: NAO, Alessandro Fortino, Stefania Mai, Dr. Striano, Prof. Minetti, Assessori Sonia Viale and Stefano Mai.



