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INSPIRATIONAL CASES | FINALIST 2024 | MEXICO

#HEALTH

Student-created app that helps rehabilitate people with prosthetics

Students added technology to solve a problem they had already experienced and to support other young people and adults experiencing similar cases.

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COMMUNITY/CITY
Leon, Guanajuato

SCHOOL
León High School

PROJECT NAME
JENNI "My Physio Friend"

STEM AREAS
Science, Engineering and Technology

OTHER AREAS OF KNOWLEDGE
Sociology

Have you ever been through a difficult time with a family member and thought: I wish I could do something so that others don't have to go through the same thing? Well, that was the inspiring nickname of two students who created "JENNI", an artificial intelligence rehabilitation application focused on people with prosthetics. Their project works like a game in which patients can level up as they progress in their rehabilitation, which motivates them not to give up the battle.

The innovation came in second place in the Solve for Tomorrow program in Mexico, in 2024. It all started with 17-year-old high school student (the school stage before university), Camila. "JENNI" tells the life story of her cousin, Jennifer, 15, who is still in her third year of high school (the phase of studies before high school) and was also part of the project.

When Jennifer was 11, she got cancer. She underwent chemotherapy and during the course of treatment her lower limb had to be amputated. "She was obviously depressed and in shock at the time. It was a story of resilience. She went through rehabilitation and didn't have money for a prosthesis," recalls the mediator teacher Reyna Hernández.

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Faced with this situation, Jennifer's family asked for a prosthesis donation from an institution but she had difficulties adapting. The girl then needed to use crutches.

When Camila learned about the Solve for Tomorrow program, she thought about this experience and wanted to use technology to include people who have prostheses, by designing an application to do rehabilitation. She sought out Teacher Hernández, who teaches several subjects at school, such as academic tutoring, which is the link between those in charge, the students and the directors to guide in multiple situations.

Although she has a background in Chemistry, the teacher is a naturally curious person. She likes to read a lot and do training sessions. She saw in Camila the same desire of always learning and felt identified with Jennifer's story, because she had recently overcome a tumor.

The three of them started the project. The first step was to deepen their knowledge of prosthetics and share experiences with each other. "We thought we could expand access to rehabilitation with artificial intelligence. The students started doing a lot of research to help as many people as possible," says Hernández.

Eureka moment!

According to the teacher, there was a moment when the students thought about developing a sustainable and more affordable prosthesis, but she showed them that it would be a much bigger project and they focused on creating an app, because that way they could reach more people and quicker. While working on the idea, Jennifer remembered how lonely and unmotivated she felt during her rehabilitation period, so she suggested the app not be "boxy," but rather have a more user-friendly interface. These reflections completely changed the course of "JENNI," which would now be like a videogame and would even have a pet!

The pet named Jenni guides the user through the app and as the rehabilitation task levels are completed, rewards such as clothes and accessories for the character are earned.

For adults, even seniors, who may have difficulty using technology, they suggested using voice recognition tools to make commands easier.

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Health professionals helped formulate the prototype

Through former students of the school and friends of Hernandez, the team visited clinics to collect data about how many amputations there were and what types, among other information, to get an idea of the potential impact of the app. “We were amazed by the number of prostheses that exist, and I think it was also a moment to expand our concept of what a prosthesis is and how it works,” she notes. In the end, they considered more than 10 types of prostheses for the prototype.

When a person logs into the app, they have to answer a quick questionnaire with their name, age, tastes, and what their psychological and prosthetic needs are. Then they have to select the rehabilitation levels they identify with. The app also has buttons that leadt the person to an institution for emotional support.

The team interviewed therapists to design the structure. Following their advice, they learned that they should start with easier exercises, which coincided with the idea of doing it in levels. “The app monitors the user’s time in each exercise, as if it were a day-to-day cataloging of their rehabilitation routine,” she adds.

But how to train the device to know which exercise to recommend to each person? They consulted a programmer teacher to understand more about programming and to find out how artificial intelligence (AI) could be useful. In the end, they used internet databases; especially from the Mexican Social Security Institute as reliable sources to train the AI.

When the first version of the prototype was ready, they tested it with their relatives and friends who used prosthetics or were temporarily injured. The feedback was positive, even though adults commented that it was too childish.

In the future, the group wants to make more variations to serve more diverse audiences and to test with traumatology patients. In addition, the school is part of the University of Guanajuato, one of the most recognized public universities in Mexico, and they plan to make more alliances with the institution to improve the technology behind the innovation.

From little knowledge in STEM to example of support for rehabilitation with artificial intelligence

The students did not have classes in robotics, programming or similar and seeing that some of the other Solve for Tomorrow participants were practicing those topics in their schools, they were worried about not having any chance of winning. “That did not discourage them. They investigated further and saw that there are many training courses to learn more. It was a growth; they came out of the experience knowing that yes, they can,” observes the educator.

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Now, after the program, the two students are still taking courses to further develop their programming skills and are already thinking about starting their own business. The school community has also changed: “I think there is a before and after JENNI at the school. The other students were motivated to participate more in projects like this, based on the girl´s example.”

With this 100% female team, the teacher stresses the importance of having equal opportunities for all genders. “If I see a chance to support women, I do it, because by supporting one, we support each other,” she says.

Explaining!

According to data from the National Government, in Mexico there are 780 thousand people with amputations and only 7,500 have a prosthesis of 75 thousand amputees (10%) and 5,250 of them, (7% of the total of amputees) do not know how to use it. The main cause of amputation is suffering from Type 2 Diabetes Mellitus.

Focus on practice!

Take a look at the teacher’s guide on how to develop an app to support people with prosthetics in rehabilitation.

1 Empathy

The “JENNI” project arose from the personal experience of Camila, a high school student, whose cousin Jennifer faced difficulties during her rehabilitation after the amputation of a lower limb. Jennifer, who was initially unable to access a suitable prosthesis, experienced demotivation and isolation. Upon learning about the Solve for Tomorrow program, Camila saw an opportunity to create a technological solution that would facilitate rehabilitation and motivate people in similar situations, involving her cousin and teacher Reyna Hernández in the development of the project.

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2 Definition

The team identified the lack of accessible tools for rehabilitation of people with prosthetics as a key problem. Initially, they considered designing an affordable and sustainable prosthesis, but Teacher Hernández guided them towards a more viable and scalable solution: an application with artificial intelligence that would accompany users in their rehabilitation through a gamified system. The goal was to offer motivation and emotional support during the process of adapting to the prosthetics.

3 Ideation

To design "JENNI," the students conducted research on types of prostheses and rehabilitation needs, visiting clinics and interviewing specialists. Inspired by video games, they decided that the app should include rehabilitation levels, a virtual pet as a guide, and rewards for users as they progress through their exercises. They also incorporated a voice recognition system to facilitate access for people with less familiarity with technology.

4 Prototype

The team developed a prototype that allowed users to register, answer an initial questionnaire, and receive personalized rehabilitation exercises. The application recorded the time of use and progression, adapting the exercises according to the user's progress. To train the artificial intelligence, they used databases from the Mexican Social Security Institute. Health professionals were also consulted.

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5 Testing

The app was tested with family members and friends who used prosthetics or had temporary injuries. They received positive feedback on its usefulness and playability, although adults suggested less child-like designs. In future versions, they plan to diversify the interface and test it with trauma patients. In addition, they are looking to establish partnerships with the University of Guanajuato to improve the technology and expand its impact. The experience motivated the school community to participate in STEM projects, highlighting the potential of technology for inclusion and rehabilitation.