OMNIDIRECTIONAL MACHINES THAT PERFORM PATIENT CARE

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Summary. *The worldwide pandemic situation with COVID-19 is still not over, consequently, it is crucial to come up with a project that ensures health providers such as caregivers, nurses, doctors, and other workers are not being affected by any viral infection. Our system consists of an omnidirec-tional wheel car that would provide bi-directional safe communication between medical staff and af-fected patients, ensuring an easier experience and work with fighting the virus for both he doctors and the Covid sufferer.*

Key words: *IoT, omnidirectional machines, COVID-19*

Introduction

In the last year, the world has suffered major changes after the Coronavirus has appeared. At this moment, there are 120 million cases worldwide of Covid, with 2.66 million deaths. Amnesty International analysis claims that since September there were more than 7000 deaths registered in the medical system globally, which means that by now the number of deaths has reached at least 10000. The problem is that the doctors that are working with the covid patients are daily exposed to the risk of contracting with the dangerous virus. Even if they are exposed to costumes and masks, this fact doesn′t ensure a 100% sterilization from the virus. That is why we came up with an idea on how to minimize the contact of doctors with infected patients: a robotic car that would ensure transport and distant ″communication" between medical staff and a patient.

Omnidirectional cars that can perform patient care

It's critical because the COVID-19 pandemic is far from over. The method we're trying to introduce has a number of advantages, including keeping medical staff healthy and preventing them from contracting viral infections. They are not only required to care for ill patients, but they also place themselves at risk of contracting the disease. Thousands of physicians and nurses have become sick as a result of the COVID-19 epidemic, and hundreds have died.

The use of robotics to fight the COVID-19 outbreak has sparked a lot of interest, and for good reason: More robots means less one-on-one interaction, which means less sick healthcare employees. This also cuts down on community transmission by using up less PPE supplies. Simultaneously, the use of telemedicine to enable doctors and nurses to interact with patients without risking infection is increasingly growing. While robots have not yet physically communicated with patients, it is not impossible to foresee a future in which this is possible.

We believe that the future of healthcare will include tele-nursing, which combines robotics and telemedicine. Tele-nursing is the concept of a human nurse controlling a robot from a distance to perform most (or all) of the tasks associated with patient care. Tele-nursing needs a growing range of components, including robotic manipulation, teleconferencing, virtual reality, health sensors, and low-latency communication networks. Nurses will be able to conduct a significant portion of patient care using robots as tele-nursing technologies expand, decreasing PPE use and improving social distancing.

The technology has the potential to help with social distancing, lowering the incidence of healthcare-acquired infections among patients and workers.

Overall, a nursing machine robot can perform a few basic tasks:
- Bidirectional staff and patient contact
- Mobility within a room or between rooms
- Providing patients with their prescribed medications
- Collection of clinical data, analyses, and evaluations

Methodology

Our goal is to implement a self-driving car that would follow a colored line (probably a red one) and gather the needed clinical data from each room. For that we would need several hardware devices:

1. Camera that will process the image and make sure that the car follows the correct path.
2. A sensor that will make sure the car stops in front of an unexpected obstacle.
3. A computing power device that will handle the operations of driving, stopping, following the line, communicating with the cloud.
4. The car with omnidirectional wheels with small discs (called rollers) around the circumference which are perpendicular to the turning direction.

By implementing the omnidirectional wheels in our embedded system we want to make the car more flexible in terms of handling the effect that the wheel can be driven with full force, but will also slide laterally with great ease. In terms of sensors, we plan on using two types of sensors: IR sensor and ultrasonic sensor. The first element is responsible for the movement of the car. For our project, the omni-directional cars would move on the trajectory of a red line on the floor. For this action, we need IR sensors as the line detecting sensor for the project. It consists of an IR LED and a Photodiode and some other components like comparator, LED etc. The ultrasonic sensor is a device that uses ultrasonic sound waves to determine the distance to an object. A transducer is used in an ultrasonic sensor to transmit and receive ultrasonic pulses that relay information about the proximity of an object. Our project requires this type of sensor in case of an obstacle emergency in the path of the car.

Conclusion

In this article, we come up with a system that would make a crucial change in the medical system in this tough period of time, when Covid has already taken millions of lives and is representing a danger for all the doctors that fight with it. That is why, as the system provides safe work with the patient for the medical staff, it would minimize the number of covid cases and would ease the healing process for both patients and doctors. Our system would be actual even in the future, when the global pandemic ends, because the omni-directional wheel car would make a great change in the medical system. It can be used even if there is no need of isolation, for easing the work of a doctor and a nurse.

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