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Autonomous Delivery Robot for Pandemic Case

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Abstract:*With the presence of diseases and their increase during the Corona period, the Ministry of Health recommended social distancing among everyone, limiting the spread of infection among them, and delivering medicine without the risk of contamination through human touch, so we propose an independent system. Delivery robots that can deliver medicines without human assistance, as this robot includes a Raspberry Pi board that is used to ensure that the entire robot is functioning and is controlled by a four-wheel drive and remotely controlled via an RF remote control. To carry things, although they are durable and safe, they can be stolen, as no one can open them except the intended recipients, and if the robot senses danger, it sounds an alarm. In addition, there is an ultrasonic sensor that can reduce collision with people or things, and the robot can move easily and monitor it via a remote camera, and the robot has a speaker to interact with customers and make a sound when it approaches the door.Also, the robot is equipped with an ultra-sonic sensor to avoid dashing into people or objects. The control team monitors the robot's direction via a remote camera to easily navigate the robot. And check for any theft attempts. The robot consists of a speaker to interact with customers and make a sound to alert them to open the door when the bot arrives. Also, the speaker is used to make noise if a theft attempt is made along with a siren system. The bot can deliver food and packages up to 10 kg using its powerful 4-wheel DC motor drive system. The RF control with long range camera allows it to deliver as well as thwart any theft attempts using the on-board siren system.*
Keywords:*Autonomous,Artificial Intelligent, Delivery Robot.*

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I. INTRODUCTION

Intelligent robots have a well-developed "artificial brain," which can arrange actions according to the purpose and has sensors and effectors. An interdisciplinary area of computer science and engineering is robotics. Robotics entails the creation, maintenance, use, and operation of robots. Robotics aims to create devices that can aid and support people. A robot is a machine designed through an engineering system that makes it work as an alternative to human labor, despite its appearance not similar to the appearance of humans, but it is able to perform the required function in the way that humans do. also, A robot is a machine particularly one programmable by a PC equipped for completing an intricate series of activities naturally, robot can be directed by an outer control gadget, or the control might be implanted within. Most robots are task-performing machines, planned with an accentuation on obvious usefulness. In hospital settings, delivery robots can carry out a variety of activities to cut down on operational costs. Deliveries of meals, medical samples, and medications make up the first set of tasks. The delivery robots can move throughout the interior layout of the hospitals thanks to their numerous sensors. To be able to work in multi-story structures, they also feature an electronic signal that may call for an elevator ride. Some delivery robots have codes and biometric fingerprint scanners to guard against illegal access to the goods within due to security concerns.

II. Methodology

Currently, there is intense competition to keep up with the rapid advancement of current technologies, which have taken over a significant amount of space and are used in a wide range of disciplines. Additionally, there is a growing need for it to make life easier and more modern, Therefore with the development in the field of medical, especially medical robots. And from here we were able to produce a autonomous delivery robotthat can overcome the problemsandincludes social distancing between patients and doctors that may provision of time and effort, so In this research, we will talk about the most important methodology used in Autonomous delivery Robot. We focus on talking about the specifications of the devices and software used. These are some examples of hardware specifications (Raspberry Pi,DC motors, Long Range Remote Controller Receiver .Remote Camera, Transmitter, and Receiver and Antenna .in addition , we will concentrate on the python compiler in software specifications.

Planning the review

Three steps make up this phase determining the necessity for a review, defining the research questions, and creating assessing a review methodology:

Identifying the need for a review

The outbreak of the disease around the world threatens the risk of a major global catastrophe. Corona virus, for example, is easily transmitted and spreads quickly. Recently, the Corona virus epidemic has spread, as the virus that causes Covid 19 disease spreads easily between people. The data showed that the Covid-19 virus is mainly transmitted from one person to another through close contact. The virus spreads through respiratory droplets that an infected person exhales when they cough, sneeze, breathe or speak. A person nearby may inhale these droplets or enter their mouth, nose, or eyes.In our project, we will create an independent delivery robot for the case of an epidemic, which will contribute greatly to limiting the spread of epidemics among people in the future. If an epidemic or a new variant occurs by limiting the opportunity for human contact, the robot will deliver medicine and food to the infected people.

Developing and Evaluating a Review Protocol

The process would then proceed to developing and validating an appropriate review protocol after identifying the justification for the review and deciding which research topics would be addressed. The protocol establishes the processes explicitly and, if validated, greatly reduces the influence of individual expectations and guards against biased results. It is a necessity for all other stages of the systematic review.

The following topics ought to be covered by the protocol:

- Technique for finding primary studies
- Guidelines and methods for choosing primary studies
- Procedure and checklist for evaluating the caliber of studies
- Data extraction method and strategy

Method for combining the extracted data: We will go into more detail about each of the steps we utilized to conduct this review in the sections that follow.

The search strategy

Here is the search approach, the queries are used to determine the primary phrases, which are then followed by the identification of synonyms, related terms, and alternative spellings. Boolean operators "or" and "and" are then used to connect alternative and linked terms. Then, a pre-review search is conducted to see if the keywords point to any particular known articles that scholars are already familiar with. The primary search is carried out after selecting scientific databases. Either the paper's title, abstract, or both must contain the search phrase.

Selection criteria and procedure

Study selection criteria are established in accordance with the research topics. In order to decide which papers directly address the study issues and should be chosen, these criteria comprise both inclusion and exclusion criteria.The selection method entails: Extracting all publications that constitute the search's primary findings. Candidate papers will be chosen based on the selection criteria.Redundant papers are eliminated from selected papers once they have been examined for duplication.Other researchers double-check deleted publications by one researcher to make sure no pertinent papers were removed.In a meeting, the chosen papers are reviewed one last time, and the conclusions are made.Selected articles are tallied annually for each source.If a study or review appeared in more than one place, the most thorough one is chosen.

Strategy and procedure for extracting data

The process of collecting primary data from multiple sources, coordinating and translating them into an understandable format in order to enrich the theoretical framework of scientific research, or collecting information for analysis and then reaching results that answer the questions of the study. The key aspect of the strategy is to report accurate data because reporting inaccurate data leads to ill-considered decisions.

For each study issue, a set of categorization systems was first created. these diagrams. It was first discovered by reviewers who conducted a search for a few key terms in the abstracts (and, if required, the introduction and conclusion sections of the articles). The next step is to integrate the keywords to create a comprehensive knowledge of Leaves. Reviewers will benefit from having categories on hand, each of which represents crucial studies.However, when examining papers in-depth, charts can be created through a process of data mining if necessary.

III. Results

Case(1): Smallpox

Smallpox is caused by the smallpox virus that appeared thousands of years ago. Smallpox symptoms begin with a high fever 101-104 degrees Fahrenheit, headache and body aches, and sometimes vomiting.These symptoms usually appear 7-19 days (on average 10-14 days) after exposure to the virus. And after two or three days, a rash appears on the face, arms, and legs, then spreads to all parts of the body within 24 hours. And when you appear Skin rash, fever usually begins to subside, and the infected person may begin to feel better. The rash begins to form Flat red tumors grow simultaneously. At the beginning of the second week, the growing tumors turn into pus-filled blisters that cover themDandruff.

How does smallpox infection occur?

In general, transmission of smallpox from one person to another requires direct contact and prolonged periods of time. And sometimes people become contagious with the onset of fever, but they become more contagious with the onset of the rash. Once you appearSkin rash, the disease intensifies, and the infected person is unable to move in the surrounding community. The infected person remains contagiousto others until the last spot of smallpox scab is gone.

Smallpox diagnosis

AS showed in figure 4.4 the doctor or head of the public health department will order to limit contact with others and conduct a blood test to verify the diagnosis of the condition. The doctor will take precautionary measures such as wearing a PPE glove and a mask. The doctor will also sterilize himself before entering the patient and leaving the patient. If the patient had smallpox, symptoms would appear within 7 to 19 days after exposure. Infected people should stay at home and monitor themselves daily for a high temperature until it exceeds 38°C. In this case, the patient should immediately contact the local health department to receive instructions on how to self-isolate either at home or in a designated care setting to reduce the risk of exposing others to the disease.

Smallpox treatment

Smallpox treatment includes drinking enough fluids and taking medications to balance body temperature and relieve pain, The patient takes the medicine three times a day.

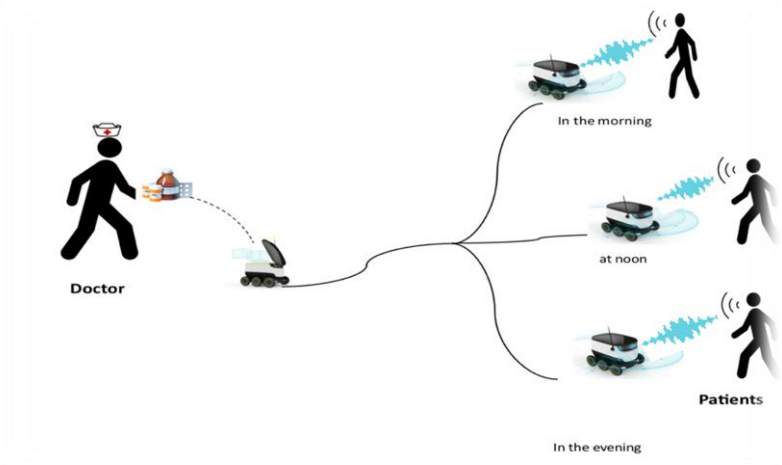

Figure 1: Smallpox with presence of robot

The doctor gives the special needs of medicines and medical supplies to the robot, then the robot performs the delivery process to the patient, so that the patient is checked three times a day, as shown in the figure 1

Case (2):Corona Virus

Corona disease is one of the diseases spread in the world, the symptoms of Covid 19 can range from very mild to severe. Some people develop only a few symptoms. Others may not develop any symptoms at all, yet they can spread the disease (transmitting the disease without showing symptoms). Symptoms, such as shortness of breath and pneumonia, may worsen in some people about a week after the onset of symptoms. Children are considered more susceptible to this disease because they can develop two diseases at the same time, which is multi-system inflammation syndrome, a syndrome that can affect several organs and tissues,

Several weeks after infection with the COVID-19 virus. In rare cases, some adults may also develop this syndrome.

How is the Corona virus transmitted from one person to another?

When a person comes into close contact with another person who is coughing or sneezing within a distance of one meter, the infection is spread through droplets, putting that person at risk of exposing his mucous membranes (mouth and nose) or conjunctiva (eyes) to potentially infectious respiratory droplets. The sick person's immediate environment may potentially harbor contaminated instruments that might spread the virus. As a result, the virus that causes COVID-19 disease can spread either directly through contact with an infected person or indirectly through contact with objects or surfaces in the immediate surroundings. Applied to an infected person, such as a thermometer or stethoscope.

Corona diagnosis:

Contact your doctor if you experience coronavirus disease symptoms in 2019 or if you have been exposed to it. Additionally, let the doctor know if you had contact with anyone who has COVID-19 positive results.Depending on where a person lives, several factors may be taken into account when determining if a COVID-19 virus test is necessary.Depending on where you live, it may be possible to visit the clinic to see if testing is necessary and accessible. If you have a very high risk of developing serious consequences so, you from having a sample of your saliva, throat, or nasopharynx taken, your doctor might also advise doing the test. The samples are subsequently delivered to a lab for evaluation. A sample of your sputum may also be sent to a lab for analysis if you cough up phlegm.

Corona treatment:

If symptoms are minor, doctor advise you to heal at home. You might receive specific advice from him or her on how to keep an eye on your symptoms and prevent the spreading of the illness to others. When you are ill,

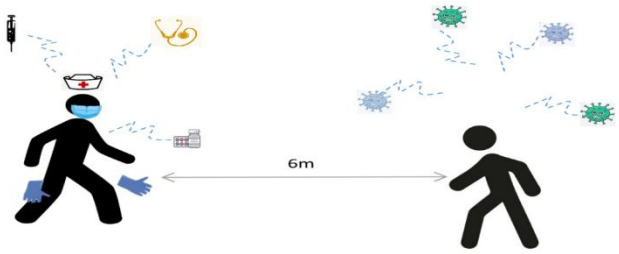

Figure 2: Before presence of robot

instructed to keep as far away from your loved ones and pets as you can, wear a mask around them, and use a different bathroom and bedroom. By opening windows and utilizing air filters when appropriate, you may also maintain the air circulating in your house. Your physician will probably advise you to remain in isolation for a while, with the exception of going outside to receive medical attention. The likelihood is that the doctor will frequently check on your condition. When it comes to ending home isolation, you should adhere to your doctor's and your local health department's recommendations.You might need to stay in the hospital for treatment if your sickness is serious. Use painkillers like acetaminophen or ibuprofen.To ensure the safety of the doctor, medical precautions must be taken, such as wearing a mask and gloves, and maintaining a distance of approximately 6 meters for social distancing, but the presence of a robot replaces all of that, as it delivers medicines and food to the patient without the need for direct communication between the nurse and the patient. After that, the robot goes to the doctor and tell his the The patient's condition as shown in figure 2 and figure 3.

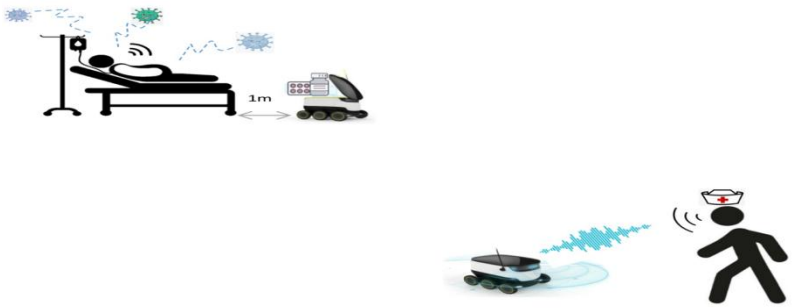

Figure 3: With presence of robot

Case(3): tuberculosis

There are two types of tuberculosis:

1. Pulmonary tuberculosis
2. Non-pulmonary tuberculosis outside the lung

Tuberculosis is transmitted through droplets or sneezing. When the patient comes to the hospital, he performs several tests, including sputum examination and other tests. If a person has tuberculosis, then he is isolated in the hospital for one to two months. Where the examinations are repeated from time to time. If you have latent TB, your doctor may recommend drug treatment if you're at high risk of developing active TB. In cases of active TB, you should take antibiotics for at least six to nine months. The choice of appropriate medication and the length of treatment depends on your age, general health, potential resistance of the bacteria against the drug, and the location of the infection in the body. There are procedures that doctors must take before entering the patient, such as wearing medical gloves and complete sterilization as well Here comes the role of the robot that we made Where the robot carries medicines and food to the patient under the guidance of the nurse The robot also carries out medical laboratory tests and is continuously sterilized as shown in figure 4.

Figure4tuberculosis with presence of robot

Robot reduce the risk of diseases spread:

Here comes the task and role of robots to protect the doctor from the chance of contracting the virus. In the beginning, the doctor puts the medicines and ointments in the robot's box, and the robot delivers the medicines to the patient, and the doctor makes sure that the patient has taken the medicines and ointments through the camera in the robot, which has been linked to the doctor's device, and this process is repeated three times a day, This, in turn, reducing the process of communication and social distancing between the doctor and patients. In addition, it saves effort and time and is faster than the doctor, but it is supervised by the doctor. For all diseases, the robot can carry medical tests and transfer them to the laboratory. This facilitates the delivery process and its arrival as quickly as possible.

IV. Conclusion

This research provides valuable information about an autonomous delivery robot for epidemic cases that facilitates the exchange of items and medicines during epidemics, which reduces the chances of spreading infectious diseases and reduces the death rate. This is done through the use of methodologies and algorithms that help robots to distinguish and identify the intended persons, in addition to detecting defects, if any, as well as talking to the intended human being. during implementation process , we collected all the tools and the battery and installed the electrical circuit with all its components, we noticed that a voice appeared at the beginning, which is a welcome word, and then it moved and we were able to know its movement and paths from the doctor to the patient and the way it deals with the patient and receives medication and treatment from the robot. The contribution of robot in hospital will be as the following:

1. Reducing the death rate from common diseases so that the method of communication is through robots.
2. Reducing the burden on the doctor so that many patients are in the hospital, and the robot will contribute to drug delivery and monitoring of the patient's condition.
3. Reducing the chances of infection for doctors and nurses when examining the patient.
4. The speed of the doctor's response to the patient if the patient has a problem by monitoring the patient through the camera on the robot.
5. Families of patients can be assured of their safety through the robot, as the camera is linked to an application in the smartphone.

In the future, we expect that our project will have good results that serve hospitals in particular and reduce the spread of infection among patients and doctors, and this is the main goal that we want to reach. We expect our project to be very effective, especially for infectious disease physicians, as it will save them time and effort through a push-button robot that delivers medicine to the patient. Our vision is also as an assistant in homes where some family members suffer from infectious diseases. This helps the patient take tools and things without leaving his room and reduces the chance of mixing with his family members.

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