

Innovation Report

ORION Space for the combat of COVID 19

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Abstract: This report discusses on background of the organization and the work it has been doing to fight against the COVID -19. Due to sudden outbreak of COVID-19, individuals and organizations from the diverse fields from around the world are working together to fight against the disease. ORION Space is an organization established to promote space technology in Nepal. Due to the sudden outbreak, ORION Space has also proposed an idea to develop an Automatic Cardiopulmonary Resuscitation (CPR) machine to provide some innovative solution to fight against current outbreak. CPR is a machine which can be used as an emergency procedure when the heart stops beating. CPR is the first step in treating victims of sudden cardiac arrest.

Keywords: COVID-19; CPR; innovation; pandemic

1. Introduction and Objectives

ORION Space is a private company established to provide engineering solutions and promote space science and technology in Nepal. From the past few years, ORION Space is working to develop first pico-satellite to be made in Nepal. Besides the development of a satellite, ORION Space is also involved in developing the product to solve the local issues in Nepal such as Humidifier for mushroom farming, automatic sanitary pad vending machine, etc.

2. Innovative works for combating the COVID-19

2.1 Automatic cardiopulmonary resuscitation

Due to the sudden outbreak of COVID-19, ORION Space is working to develop an automatic CPR machine. CPR is a machine used as an emergency procedure when the heart stops beating by manually pressing the chest. It involves chest compressions from 5cm to 6cm deep at the rate of 100 to 120 per minute. Its main purpose is to restore the partial flow of oxygenated blood to the brain and heart. Current mechanical CPR devices, such as the AutoPulse by Zoll, Inc. (ZOLL, 2020), are very expensive and heavy, thus prohibiting its distribution to the general public. We propose to fabricate a

mechanical CPR device, Automatic CPR, which will be cost-effective and lightweight.

2.2 Model proposed

The model can be developed using the components available easily in the market. It contains the Base, Compressor and the Electronics (**Figure 1 and 2**). The Base can be made from the wood and consists of a rail such that the compressor can be moved along one axis which is parallel to the body of a person. The compressor is connected to rail via a threaded rod so that it can be moved linearly in both the axis. The threaded rod connecting the compressor can be used to adjust the height of the compressor according to the patient's chest size. The compressor is made of aluminum piece but for an easy and cost effective solution, it also can be made with wood. The compressor part consists of spring, 3D printed parts and stepper motor which moves the compressor in the linear direction directly to the person's chest. The speed of the motor can be controlled via the electronics system. Electronics consists of a power supply, a microcontroller, compressor controller board, some sensors to measure the parameter of the person, a display and few switches to change the parameters.

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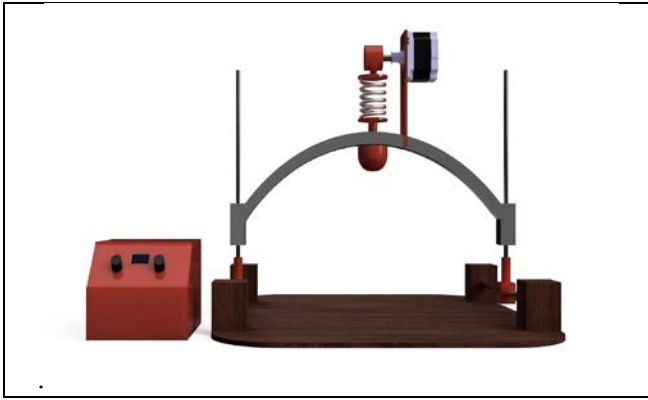


Figure 1. 3D design of an Automatic CPR

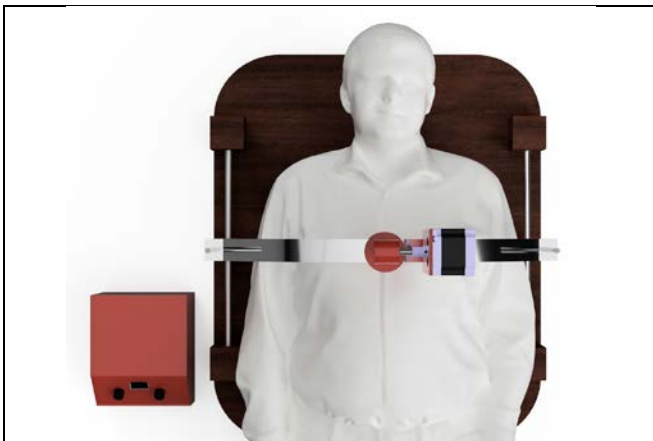


Figure 2. Placement of CPR with respect to patient

3. Challenges and future works

The importance of cardiopulmonary resuscitation as lifesaving technique had been highlighted in past researches (Michigan Instruments 2019; LUCAS 2020; Myaoclinic 2020) and there is growing need of such devices. Our project has completed the concept development phase and is in the process of prototype development phase. Some of the problems that are being faced are because of the movement and the lack of availability of materials due to the lockdown.

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