

An Overview of PERS Based Domestic Cardio-Pulmonary Resuscitation Machine

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Abstract - CPR is abbreviated as Cardio-Pulmonary Resuscitation. An emergency procedure in which the heart and lungs are made to work by compressing the chest overlying the heart and forcing air into the lungs. CPR is used to maintain circulation when the heart has stopped pumping on its own. Current ¹²CPR machines are only present in ambulances and need heavy and huge machinery and arrangements. Hence, it increases the cost and complexity. The design that we are going to make would be adjustable in accordance to the patient's requirement and will have the maximum pumping capacity of 105 compressions/min. This CPR is going to be a domestic device and can be used without any specialized knowledge /experience. The compressions can be adjusted by using "Flex sensor". It is cost effective as compared to the similar products available in the market, hence people can afford this product at home.

Key Words: Cardio-Pulmonary Resuscitation, cardiac arrest, PERS, , Cardiac failure.

1. INTRODUCTION

⁸The objective behind making this project is due to the low success rates of the devices which are already available in the market, also they are bulky and increases the cost and complexity. Our Device Cardio Pulmonary Resuscitation (CPR) is going to provide temporary relief to the Patients who suffer from Cardiac Attack. It will give chest compressions in case of sudden cardiac arrest.

It is an automatic, cost effective and portable, emergency alert based CPR device which will automatically compress the chest by 3 inches deep and help spontaneous circulation of blood to brain and restore normal breathing and circulation. This will increase the survival rate of the patient effectively. This CPR will be domestic device and can be used without any specialized knowledge / experience.

In ⁹today's world many human beings are prone to Cardiac diseases like Rheumatism, Cardiac Arrest, Cardiac failure, high cholesterol related cardiac diseases etc. At the time of emergency, if such patients do not get the required remedial actions then it could cost their life.

There are products available in the market for combating such conditions but as they are very expensive, only a very

small portion of patients are able to afford it. Also the success rates of all these products which are available in the market are very low. Current CPR machines are only present in ambulances and need heavy and huge machinery and arrangements. Hence, it increases the cost and complexity.

⁴Looking at these conditions, we took initiative to come forward with an idea of designing a device which can fight towards the cardiac related emergencies and can be affordable to the common man. This project explains the development of prototype model of PERS (Personal Emergency Response System) based on CPR, which will give 100-105 compressions/minute with a depth up-to 5 inches which will allow the normal circulation of blood to brain and normal breathing is restored. It is cost effective, battery operated, anyone can use it. So this will increase the survival rate of patient more effectively as compared to other CPRs which are already available in the market. This project will not only be helpful for the cardiac patient alone but will serve the society at large. An emergency procedure in which the heart and lungs are made to work by compressing the chest overlying the heart and forcing air into the lungs .CPR is used to maintain circulation when the heart has stopped pumping on its own. This CPR will be domestic device and can be used without any specialized knowledge experience.

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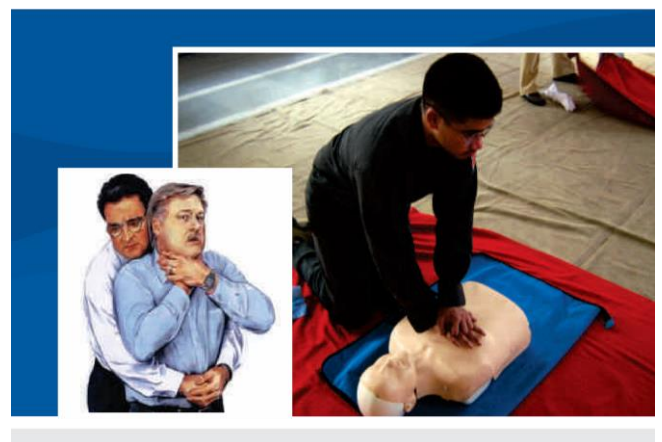


Fig -1: Basic CPR

1.2 OBJECTIVE OF THIS PROJECT

In India, approximately 4280 out of every one lakh people die every year from sudden cardiac arrest. The Prime cause of Such a Low Success Rate is delay in getting Medical Assistance. Our Device Cardio Pulmonary Resuscitation (CPR) is going to provide temporary relief to the Patients who suffer from Cardiac Attack due to the delay timing of ambulance. Our project will give chest compressions in case of sudden cardiac arrest. It is an automatic, cost effective and portable, emergency alert based CPR device which will automatically compress the chest 3 inches deep and help spontaneous circulation of blood to brain and restore normal breathing and circulation. This will increase the survival rate of the patient effectively.



2. ANOLOGY

¹¹Following Figure Shows Comparison of compressions and ventilations with and without an advanced airway.

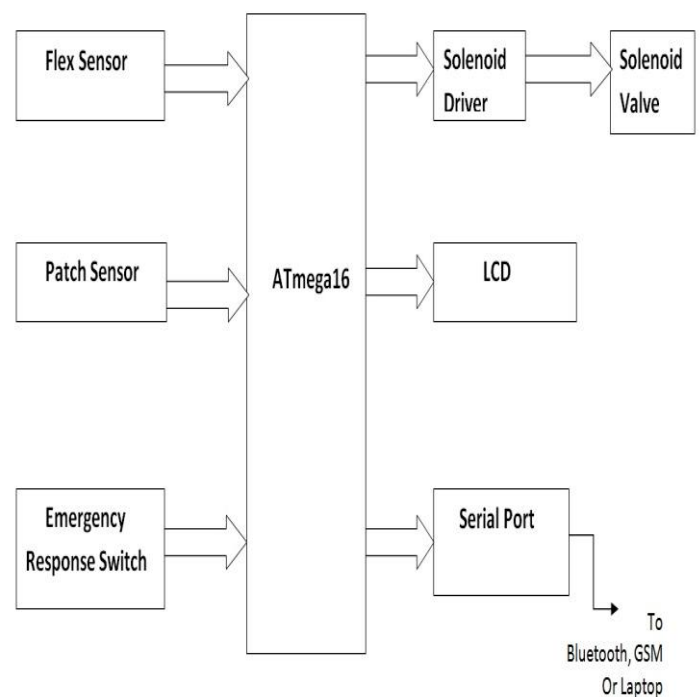
Ventilation Technique	Compressions to Breaths (Adult)	Compressions to Breaths (Child and Infants)
No advanced Airway (mouth-to-mouth, mouth-to-mouth mask, bag-mask)	. 30 compressions to 2 breaths . Compression rate of 100-120/min	. 15 compressions to 2 breaths . Compression rate of 100-120/min
Advanced airway (endotracheal intubation, laryngeal mask airway, supraglottic)	. Compression rate of 100-120/min, without any pauses for breaths . 1 breath every 6 seconds(10 breaths per minute)	. Compression rate of 100-120/min, without any pause for breaths . 1 breath every 6 seconds(10 breaths per minute)

3. SCOPE OF PROJECT

It can be made battery operated, so there won't be any need to find electric connection in case of emergency. Whole device can be made operator voiced so that the operator's commands can provide assistance to people operating the instrument.

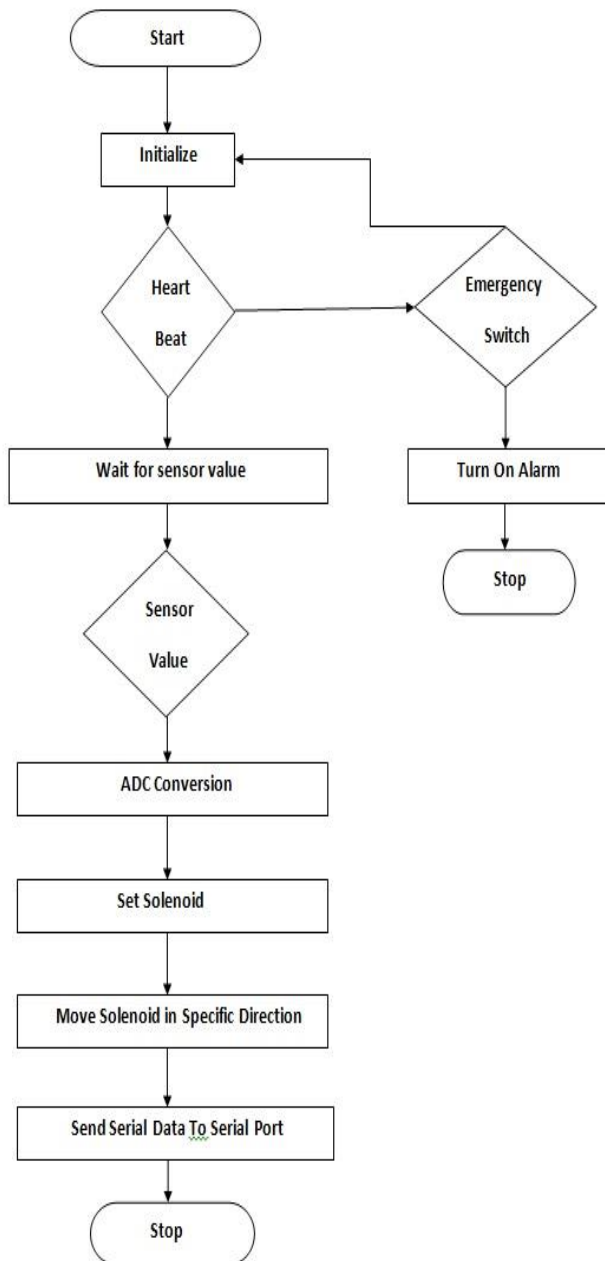
3.1 PROPOSED WORK

The Following Fig Shows Block Construction of Our Project



In this project we have used Atmel's AVR Atmega 16 controller. We have used flex sensor to adjust pumping of CPR machine. Response switch is used to alert the family in case of emergency patch sensor is used to provide current(amperes) in body of patient in given proportion as per the requirements at that time. By adjusting flex sensor value we can control up-down action of solenoid valve and provide CPR to patient. Sensor Value and heart beat will be displayed on LCD. By Serial port we can access output data on android phone, laptop.

3.2 FLOW CHART



4. ALGORITHM

1. Start
2. Initialize
3. Check Patient hear beats
4. If normal, Check emergency switch
5. If switch on then turn on alarm
6. Wait for sensor value
7. ADC conversion
8. Set solenoid
9. Move solenoid UP-DOWN
10. Send data to serial port

11. Check data on Laptop/sms/android app.
12. Stop

5. HARDWARE REQUIRED

1. Atmega 16: Controller of Device
2. Base Plate and Shaft
3. Flex Sensor
4. Solenoid valve
5. Motor Driver (25 to 30 watt)
6. LCD 16x2
7. Patch Sensor (24-25v and 0.8 to 1 A)
8. Power Supply
9. Switch (For alert system)

5. Future Scope

It can be made battery operated, so there won't be any need to find electric connection in case of emergency .

Whole device can be made operator voiced so that the operator's commands can provide assistance to people operating the instrument.

The whole device can be made into Artificial Intelligence where it can give the depths of the compression and how much compression it has to give according to the BMI of the patient .

6. CONCLUSION:

PERS Based Domestic Cardio-Pulmonary Resuscitation Machine is a very useful Bio-medical Product which combats the problems associated with sudden Cardiac arrest and provides temporary relief to the patient. This product can be used as First - Aid for the Cardiac Patient.

Although, there are several products available in the market being used for avoiding Cardiac Arrest but have limitations like cost effectiveness, bulky products which is not portable, need of trained staff for operation. We are focusing on designing a product that eliminates the drawbacks of the CPRM available in market presently. We are trying to design a cost effective, slim and portable CPRM which is extremely user friendly.

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8. BIOGRAPHIES



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