

PERT Based CPR Machine

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ABSTRACT

PERT is Personal Emergency Response Technique. CPR is 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 give compressions to the patient in an emergency. Current CPR machines are only present in ambulances and need heavy and huge machinery and arrangements. Hence, it increases the cost and complexity. Sudden Cardiac Arrest (SCA) is a leading cause of death in India. It is estimated by the WHO census statistics that approximately 4280 out of every one lakh people die every year from SCA in India. The design 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 will be domestic device and can be used without any specialised knowledge / experience.

Keywords: Cardiac Arrest, Cardio Pulmonary Resuscitation, Automatic CPR devices.

I. INTRODUCTION

Personal Emergency Response Technique is Derived From "An Overview Of PERS Based Domestic Cardio-Pulmonary Resuscitation Machine.

Cardiopulmonary resuscitation combines compressions of the chest with rescue breathing to keep blood flowing through the body and brain while delivering oxygen to the bloodstream. CPR is the first step in treating cardiac arrest in hopes of providing time for first responders to arrive.

CPR supports and maintains breathing and circulation for an infant, child, or adolescent who has stopped breathing (respiratory arrest) and/or whose heart has stopped functioning.[1] Cardiac arrests are very common, and they can happen to anyone at any time. Nearly 383,000 out-of-hospital sudden cardiac arrests occur annually, and 88 % of cardiac arrests occur at home. Many victims appear healthy with no

known heart disease or other risk factors Sadly, 90% of Indians may feel helpless to act during a cardiac emergency because they either do not know how to administer CPR or their training has significantly lapsed. In India , general awareness of CPR (Cardiac Pulmonary Resuscitation) techniques is limited to physicians and paramedics. There exists a shocking lack of awareness about resuscitation techniques in common public circles. When administered precisely, CPR can save thousands of lives each year that are lost due to causes ranging from physiological shocks such as asphyxiation due to drowning; to even Sudden Myocardial /Cardiac Arrest (SCA).

II. SURVEY ANALYSIS



Figure 1

Cardiac arrest impacts too many lives to be ignored. We must employ multiple strategies simultaneously. We not only need more trained lifesaving bystanders, we also need to train the next generation of lifesaving bystanders. Part of the answer to solving this puzzle lies in recognizing that CPR training is a crucial life skill that *everyone* must possess. As such, CPR must become part of American education similar to, for example, the "3R's"- reading, writing and arithmetic. Training high school students is a particularly efficient way to increase the number of bystander rescuers. Several studies have shown that students can quickly become proficient in CPR, even with brief video-based and skills training. This means that, in less time than the average TV program, high school students can learn CPR and save someone's life.

Teaching CPR to high school students results in communities saturated with trained bystanders, not just in any given year, but generation after generation. Over time, this will change mind sets and culture around CPR and profoundly increase the number of trained young adults everywhere. Ultimately, it will increase the probability that if a parent, sibling, grandparent or co-worker experiences cardiac arrest, someone nearby will be able and willing to save a life by calling 9-1-1,

then starting and continuing CPR until emergency personnel arrive. The AHA has embraced this approach with the launch of its CPR in Schools campaign. This nationwide advocacy effort began in 2011 with the aim of legislating mandatory CPR training for high school students in every state. The AHA has worked tirelessly with its local affiliates and other stakeholders (e.g., first responders, doctors' associations, public health departments and parent-teacher associations) in their effort to pass legislation. All told, 37 U.S. states now require the training for high school with more on the way.

When it comes to cardiac arrest, seconds count and bystanders need to act to save a life. Investing in today's students creates tomorrow's lifesaving bystander rescuers and will save countless lives.

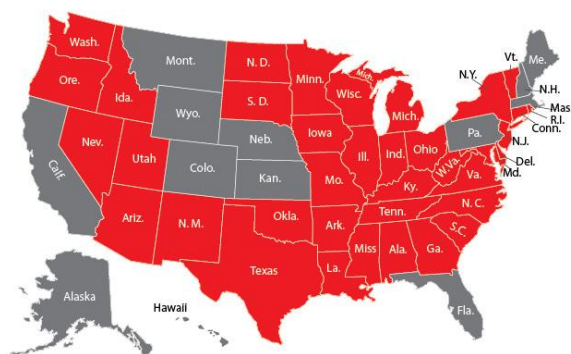


Figure 2. American Heart Association Map Showing States Requiring The Teaching Of Cpr In Schools (In Red)

CPR In Schools Training Kits:

The American Heart Association's newly upgraded CPR in Schools Training Kit™ enables students to learn the lifesaving skills of CPR in just one class period. Plus, the kit teaches AED use and choking relief. The easy-to-use kit is designed specifically for the needs of schools. The kit's brand new wheeled bag allows for convenient movement from classroom to classroom and easy storage. It's also reusable – one kit can train hundreds of people. About 88% of people who suffer out-of-hospital cardiac arrests die. CPR, especially if performed immediately, can

double or triple a person's chance of survival. Sadly, most of the time it doesn't happen that way. The American Heart Association wants all students and educators to learn CPR, putting more qualified lifesavers in our communities. The stress-free CPR in Schools Training Kit is designed precisely for educational environments and can be facilitated by anyone. The kit contains everything needed to train 10 to 20 people at once in CPR. Repeat the process to train a class, a grade - or even your entire campus.

CPR in Schools Training Kit includes:

- ✓ 1 wheeled classroom carry bag
- ✓ 10 Mini Anne Plus® inflatable manikins
- ✓ 10 kneel mats
- ✓ 10 individual carry bags
- ✓ 5 practice-while-watching training DVDs
- ✓ 1 hand pump for manikin inflation
- ✓ 2 mesh collection and storage bags
- ✓ 10 replacement airways
- ✓ 50 manikin wipes
- ✓ 10 replacement face masks
- ✓ 10 AED training simulators
- ✓ 1 Facilitator Binder that contains the lesson plan, pre-and- post-test, and additional supplementary material
- ✓ 1 Facilitator Guide



Figure 3

III. OBJECTIVE BEHIND 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.

IV. SYSTEM ARCHITECTURE

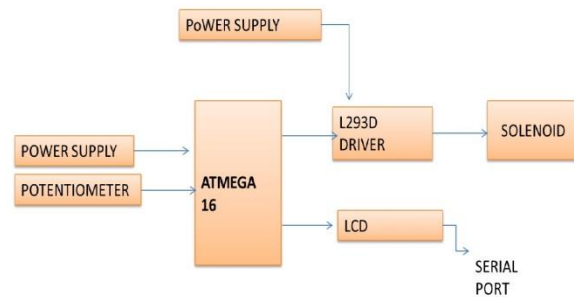


Figure 4

In this project we have used Atmel's AVR Atmega 16 Microcontroller. We have used Potentiometer to Varyr pumping of CPR machine. Response switch is used to alert family in case of emergency patch sensor is used to provide ampere in body of patient in given proportion as per depend on situation. by adjusting value we can control up-down action of solenoid and provide CPR to patient. L293D Driver is used to Drive Solenoid.

Sensor Value and heart beat will be display on LCD. By Serial port we can access output data on android phone, laptop.

V. 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 Potentiometer 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

VI. HARDWARE REQUIRED

1. Atmega 16: Controller of Device
2. Base Plate and Shaft
3. Potentiometer
4. Solenoid
5. Motor Driver L293D
6. LCD 16x2
7. Patch Sensor(24-25v and 0.8 to 1 A)
8. Power Supply
9. Switch (For alert system)

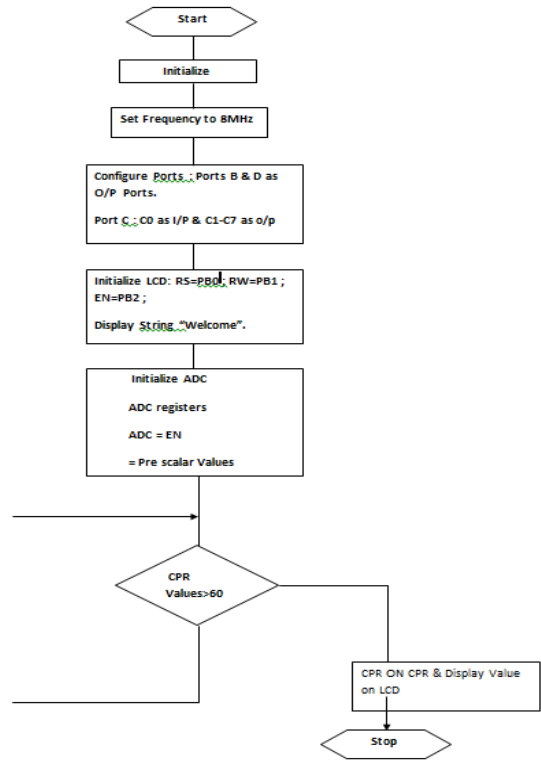
VII. FUTURE SCOPE

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 .

VIII. FLOWCHART



IX. CONCLUSION

PERT 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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