AUTOMATED EXTERNAL DEFIBRILLATOR USING FLYING ROBOTIC AMBULANCE

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***Abstract*-**The Purpose of this paper is to introduce a flying robot that saves lives of victims in case of sudden cardiac arrests .we have designed this robot to bring along an Automatic External Defibrillator (AED) to help the lay rescuers in providing first aid to the victim before the arrival of ambulance .Once when the cardiac arrest occurs, signal would be transmitted to the AmbuFBot station by sensing through heart beat sensors fixed in the devices frequently used by the victim or by using some specified mobile phone applications. AmbuFBot station is normally integrated with three different independent servers ,namely database server,GIS Server, and message controller. With the use of these servers and controllers, the ambulance robot would be operated by the human operators in the AmbuFBot station until it reaches the location of the victim .The AmbuFBot would dispatch the defibrillator along with the instructions on how to operate, to the lay rescuers nearby. In addition to this AmbuFBot also performs the task of calling the ambulance to the location of victim automatically.

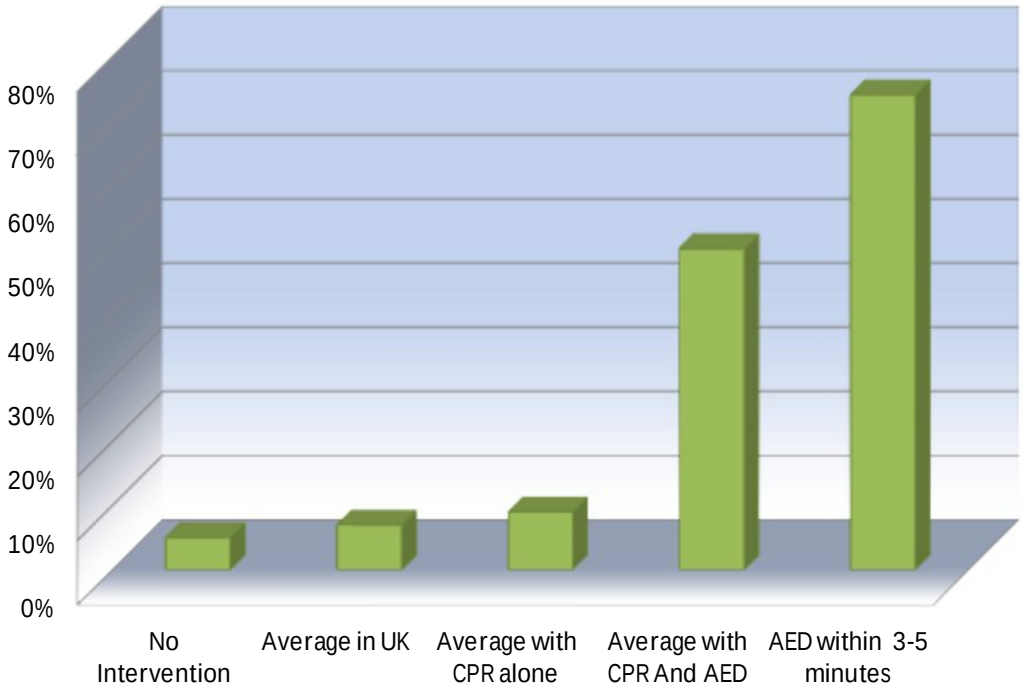
1. INTRODUCTION

Sudden Cardiac Arrest (SCA) is a sudden and unexpected pulseless condition attributed to cessation of cardiac mechanical activity. It is usually caused by ventricular fibrillation which is an abnormality in the heart's electrical system.

When SCA occurs ,blood ceases flowing to the brain, heart, and rest of the body and the person collapses. In fact, the victim will be clinically dead and will remain so unless someone helps them immediately.SCA remains the leading cause for death. The number of people who die each year due to SCA is roughly equivalent to the number who die from diseases such as Alzheimers , assault with firearms, breast cancer, cervical cancer, colorectal cancer, diabetes, HIV, house fires, motor vehicle accidents, prostate cancer ,suicides and so on. Although SCA is a life-threatening condition, it can be treated successfully through early intervention with cardiopulmonary resuscitation (CPR), defibrillation, advanced cardiac life support, and mild therapeutic hypothermia. Four out of Ten SCA victims can survive ,if they receive immediate CPR and are treated quickly with defibrillators. This would be effective, if the treatment is delivered quickly—ideally, within three to five minutes after collapse .Even the best emergency medical services available may

not be able to reach a victim within three to five minutes. That is why prompt action by bystanders is so critical. Automatic External Defibrillator is a portable, user-friendly electronic device that automatically diagnoses potentially life-threatening heart rhythms. If the AED detects a problem that may respond positively to an electric shock, it delivers a shock to restore a normal heart rhythm. AEDs provide simple audio and visual instructions that are designed for use by lay rescuers. Some AEDs advise the operator to press a button inorder to deliver the shock. Whereas, other AEDs automatically provide a shock if the heart is in a fatal rhythm.

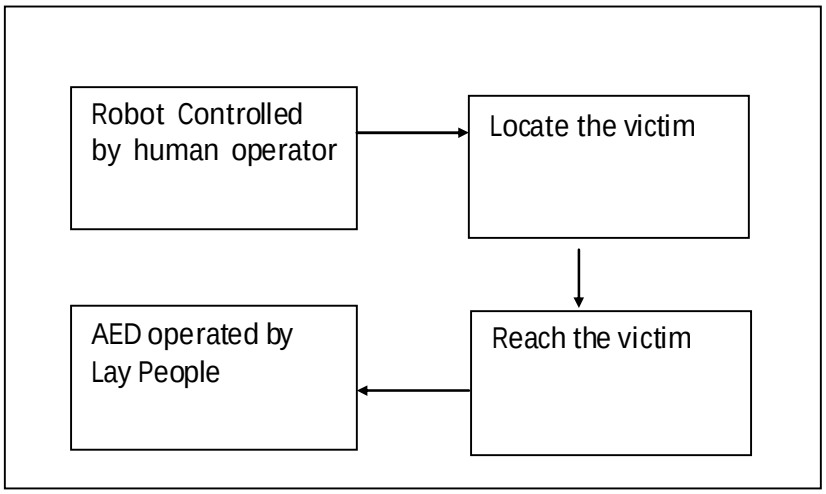
Fig:1.1 Impact of Public Access Defibrillator on Survival



2. SYSTEM DESCRIPTION

In this system flying AmbuFBot is operated by using a tele-control mechanism. In this type of mechanism, both the robot and the defibrillator are controlled by human operators. In partially autonomous , there is no human intervention in operating the robot , but the defibrillation is done by the lay rescuers. Whereas, in fully autonomous systems, both the robot navigation and defibrillation are done without any human intervention. In Tele-control, the human operators navigate the AmbuFBot from the AmbuFBot station to the location of victim via surveillance cameras and control panels. Then , when AmbuFBot reaches the location , the human operators provides instructions to the lay rescuers on how to operate the AED device.

Fig:2.1 Tele-Control



By using body attached sensor, a warning message and Global Positioning System (GPS) information can be send immediately to the AmbuFBot centre. With the help of GSM module an absolute patient's database is provided which has basic information like personal contacts and characteristics, blood group , height, weight and photograph that are needed to generate the complete information for helping victims. After processing this data packet, human operators in AmbuFBot centre starts operating AmbuFBot. It can move with high speed and accuracy to the location of victim. It can eradicate the delay that always facing by the ambulance. Microcontroller is the important hardware module which can be programmed accordingly. The heart beat sensor will be integrated in the objects that a person uses frequently like spectacle, watch,etc.,

fig 2.3 block diagram of body-attached sensor

GPS module	Gyro sensor	Microprocessor	GSM module
	Communication I/O	Power supply	

fig 2.2 heart beat sensor in watch

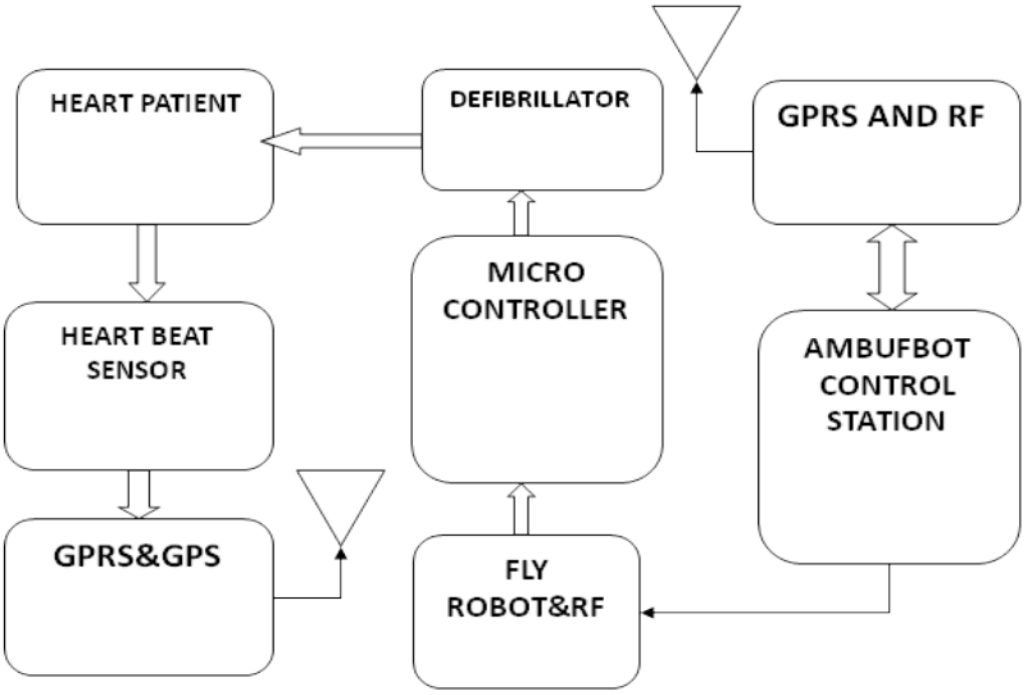


Fig 2.1 Overview of the system workflow

The GPS module is used to deliver satellite locations so that shortest path of victims can be found. The gyro sensor will be concatenated with tag that contains patients identification code through which the patient can be identified once registered. Body-attached sensor requires certain amount of power to function properly hence power supply is essential .With the help of GSM module emergency messages will be transmitted to the AmbuFBot station.

3. CONCLUSION & FUTUREWORKS

In this paper we have designed an flying robot which provides AED to the victims suffering from sudden cardiac arrest. We believe that immediate access to AED will increase the survival time of patients. There are three dispatching methods of AmbuFBot to reach the victims location: tele-control, partially autonomous, fully autonomous. But we have fully concentrated on tele-control due to some practical difficulties in implementing other methods .Our future research will focus on improving the autonomous operation of AmbuFBot

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