IPRO 319

Development of Solutions to Improve Survival Rate of Cardiac Arrest Patients

The Problem

- Sudden Cardiac Arrest is a leading cause of death in the United States, accounting for an estimated 325,000 deaths each year
- Cardiac arrest occurs when a patient's heart completely stops beating
- When this happens, oxygen ceases to flow into the brain
- Brain injury is likely if cardiac arrest is untreated for more than 5 minutes
- When circulation is restored, oxygen rich blood rushes back into the brain, which further damages the brain.
- Current procedures dictate that 100% oxygen be given to cardiac arrest victim

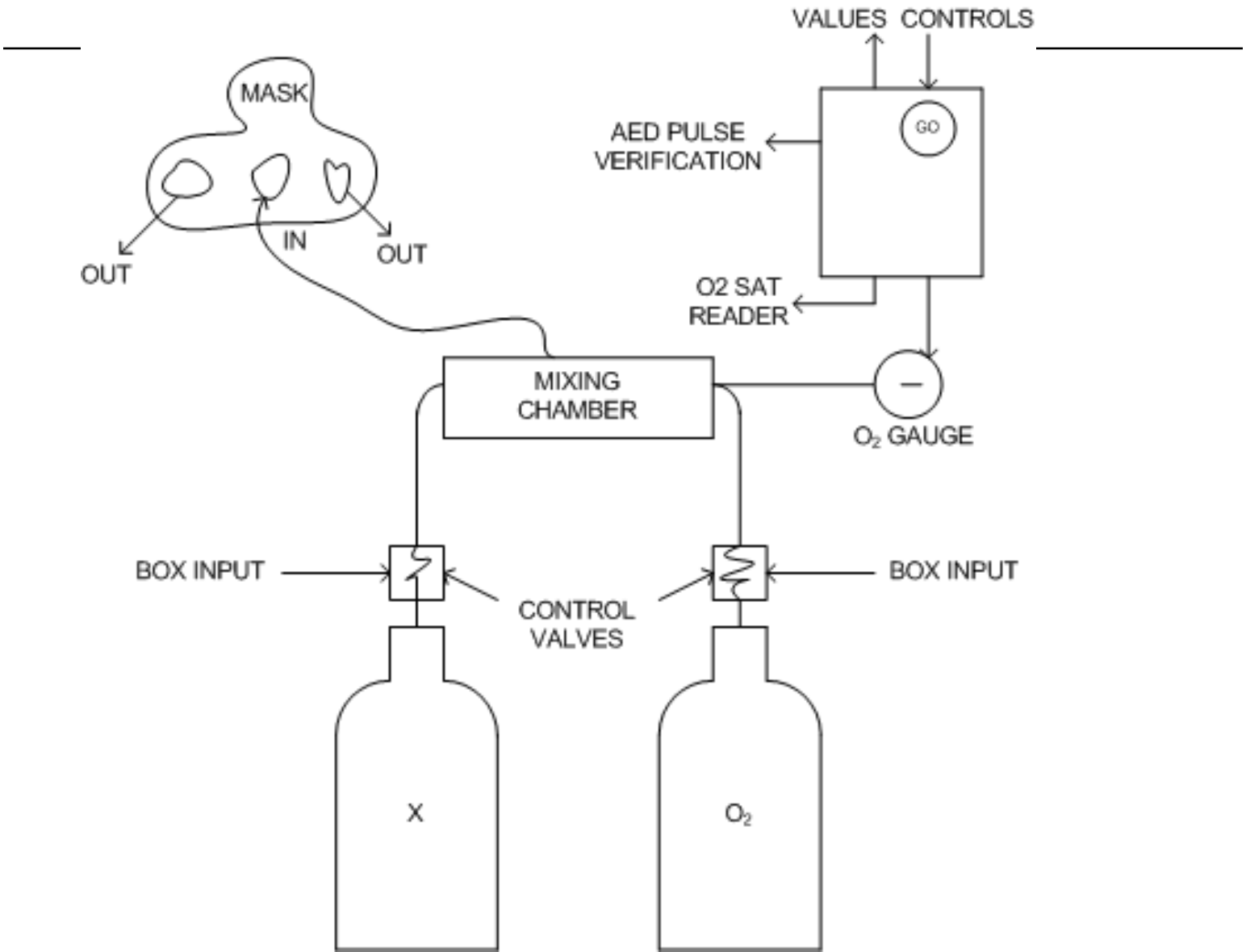
Goals

- To prevent the brain damage from occurring when the heart is restarted
- Design device to be used within first 10 minutes of the arrest
- Simple, cost-effective design that eliminates potential for human error
- Design device that can be integrated into existing AED devices

Research

- Cooling
  - Used to lower the temperature of the brain to reduce swelling after resuscitation, which leads to brain damage
- Shaking
  - Pigs and mice were shaken and found to benefit from this treatment after cardiac arrest
- Breathing
  - H_2S gas used in mice to induce hibernation
    - Found to be toxic to larger animals
  - Can still reduce oxygen amounts during the initial breathing time after resuscitation
    - Shown in studies to improve chances of survival

Solution Design



Obstacles and Resolutions

- Research on Hydrogen Sulfide has not been tested on humans to see if it will induce hibernation
- Many oxygen sensors cannot read oxygen levels lower than 70%
- EMP are reluctant to change the way heart attack victims are treated
- Human testing is not possible by the team

Project Plan Timeline