PLUS (Patient's Life Upgraded Service) Wagon

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Abstract - *In emergency condition, each and every second counts to save a human life. Now a days many lives are being lost even before the patient reaches the hospital or life is lost due to lack of basic information about the condition of the patient and the delay caused due to this. Emergency patient transportation via ambulance becomes a very critical case in metropolitan cities due to rising traffic. Though the ambulance tries to find their way through the city, the movement of traffic is very slow because of its volume and density. Thus, in order to overcome these problems, mainly two facilities are taken into consideration. For sending the patient health status to the doctor in advance, sensors have been used by the help of IoT. Linear actuator mechanism(pneumatics) helps our PLUS Wagon to reach the hospital as soon as possible, by enabling it to raise the chassis while trying to negotiate its way out of the traffic jam.*

*Key Words***:   IoT-Internet of Things, PLUS Wagon Patient's life Upgraded Service Wagon, Pneumatics**

1. INTRODUCTION

For a metropolitan city, a quick and accurate emergency medical response is mandatory service for citizens. The rapid development of IoT technology makes it possible to connect various objects such as sensors, connecting through internet and providing important data for application purpose.

The IoT is the interconnection of uniquely identifiable embedded computing devices within the existing internet infrastructure. IoT means that the components can even be controlled remotely via internet. Emergency service must be provided on time. In India, a large number of patients lose their lives because of heart attacks and reason being the inability to receive proper help on time. He/she must be taken to the hospital as early as possible so as to receive proper treatment, which may save a life.

This project is mainly based on communication between ambulance and various devices such as mobile phones, traffic signals so that the possibility of saving a life increase. Also, as we know that most of the metropolitan cities are facing problems due to traffic rush and hence, even though vehicles do try to clear path for the ambulance but are not very successful in doing so.

Hence, we have come up with the idea of lifting our PLUS Wagon's chassis using linear actuator mechanism, so that it can easily cross over other vehicles (while stuck in the traffic) and reach the hospital on time.
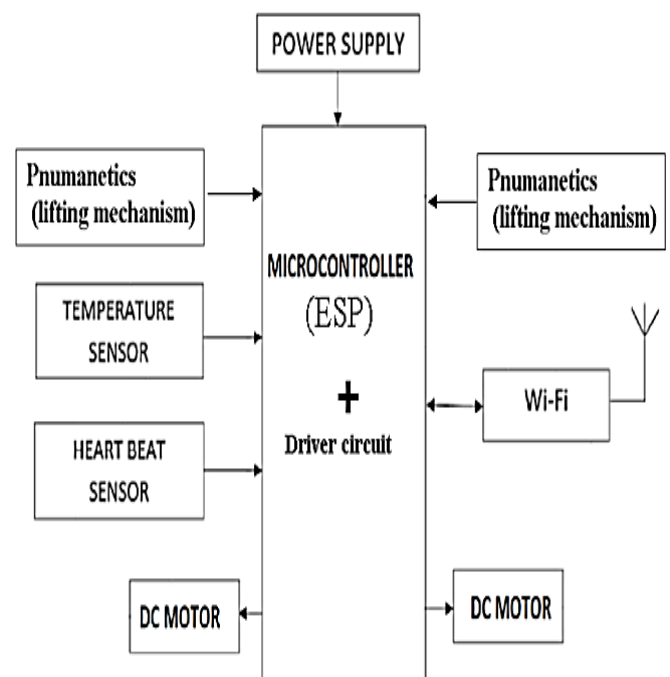
2. BLOCK DIAGRAM

Fig -1: Architecture overview

The figure a represents the block diagram of proposed work. The power supply to the motor shield (driver circuit + microcontroller) is provided using a Lithium ion battery. The microcontroller plays the role of controlling unit, due to which the movement from fixed position of the PLUS wagon takes place.

Simultaneously, the updates are provided about the patient's health condition to the healthcare unit that includes temperature and heart rate using respective sensors via cloud. After the obstacle is crossed over, the wagon halts and chamber is brought back to the position via command of microcontroller.
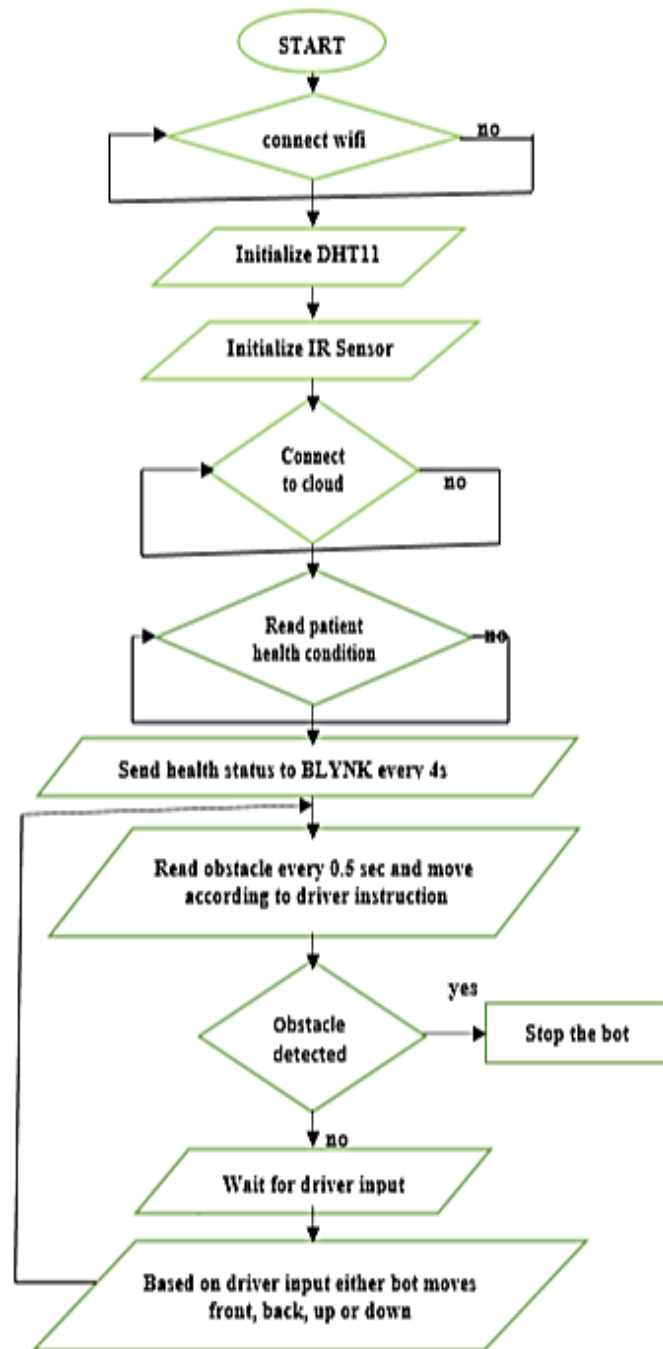
3. METHODOLOGY

Fig -2: Flow of operation

3.1. Connecting Modules to Cloud

PLUS Wagon has to provide continuous update to hospital regarding patients health status, CLOUD technology is used which helps to transfer the data from ambulance to the destination within less time and accurately.

For this Wi-Fi is provided in ambulance in addition with various advanced equipment's which can record the data and send by using Blynk app like patient's heart rate temperature other health related information etc.

3.2. Provide a traffic free path in emergency or critical conditions

Nowadays, to clear the path for ambulance, surrounding bodies/vehicles should clear the lane and this consumes time. When an ambulance is stuck in heavy traffic and is unable to reach its destiny in such cases the ambulance driver can lift the chassis of ambulance (PLUS Wagon) With the help of pneumatics and cross the vehicles stuck ahead and continue its journey, this will reduce the travelling time and many lives can be saved which are lost due to delay in reaching the hospital.

3.3. Manually (Driver) controlled chassis movement

Considering a situation in which a patient is critical and stuck in heavy traffic, here our PLUS Wagon has advantage over other ambulance.

Driver sitting inside the ambulance can visualize properly if the remaining time is sufficient for ambulance to lift and cross over the other vehicle in front if so then driver may struck accordingly and chassis can be lifted up and that time in traffic can be saved.

If the time is not sufficient like less than 5 seconds then the driver can wait until the traffic turns green.

This visualization only the driver can do accurately and instruction for accurate movement.

4. WORKING PRINCIPLE

4.1. Software

- C++ and Blynk app: It's a digital platform with Android apps which can be used to build a graphic interface for projects by simply dragging and dropping widgets.

- It allows to control and monitor hardware projects.

4.2. Hardware Requirement

4.2.1   Microcontroller ESP8266:

The ESP8266 is a very user friendly and low cost device to provide internet connectivity to the projects. It has built-in wi-fi module. The module can work both as an Access point and as a station.

4.2.2.   DC Motors

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy.

Two set of motors are used, one for controlling wheels movement and other is used in lifting mechanism.

4.2.3. Heart Beat sensor & Temperature and Humidity Sensor (DHT11)

Heart attack detection using Heart Beat Sensor (Pulse Sensor) works on Photoplethysmography (PPG) technique. Humidity Temperature Sensor - DHT11 is a low-cost digital sensor for sensing temperature and humidity. These sensors can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc, to measure humidity and temperature instantaneously.

4.2.4. Battery (Lead acid Battery, 12v, 1.3 amp)

The battery which uses sponge lead and lead peroxide for the conversion of the chemical energy into electrical power, such type of battery is called a lead acid battery.

4.2.5. IR Sensor

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. This is used for safety of PLUS Wagog as well as surrounding vehicles.

4.2.6. Pneumatics

The compressor is the machine that turns ordinary air into compressed air putting pressurized air to practical use. Here this mechanism is used for lifting the chassis of our vehicle. This is safer as it can use the atmospheric air with higher pressure, hence economical and reliable.

Microcontroller-ESP is main controlling unit. Inputs are given to the microcontroller via a Blynk- App using cloud technology i.e. Patients health status etc.
A patient with critical condition stuck in heavy traffic as seen in Fig.1, has very less chance to reach hospital in time and in many cases, we have seen that patient lose their life just by few second/minute delay in reaching hospital.

By sensing density of traffic jam, the ambulance driver can lift the chassis and move forward to avoid the traffic and save the travelling time.

- Wi-Fi **+** Blynk app **+** cloud is used to record and send the required data to hospital, which will help to gather the treatment requirements intern avoiding the treatment delay.
- To deal with situation like heavy traffic, PLUS WAGON is equipped with the facility to lift the chassis and cross the traffic. Hence it overcome the major drawback of our traffic problems.
- Driver has the main control, depending on his inputs the ambulance can either travel normally or if required it can

be lifted up to cross the traffic jam for any critical condition.

Pneumatics plays the important role and is the basic mechanism for lifting the chassis. It need only 4 components i.e. air compressor, air cylinders, actuator, motor.

5. RESULT and FUTURE SCOPE

Fig -3: PLUS Wagon

As it was very difficult for the ambulances to reach the hospitals on time, we've come with the solution in which we've manipulated the structure of the ambulance by inducing some additional technologies to:

- Ease the work of hospital management.
- Ambulance's travelling time is reduced.
- Providing updates to doctors in advance

In future we will be working with better mechanism for lifting the chassis. With better and new upcoming technologies for more accurate operation.

6. CONCLUSIONS

In the last few decades our medical facilities have seen a lot of advancements and improvements, but even today one of the major challenges before us is to make these facilities available and that too on-time. For this to happen we have to ensure a short and swift path for the ambulances, by avoiding the hour-long traffic jams. To overcome heavy traffic, our PLUS WAGON can lift and cross-over other vehicles, and hence avoid the time lost during such unwanted halts. Usage of other advance equipment's in the ambulance, will help in real time monitoring of patients' health status in case of an emergency, hence playing a vital role during the treatment.

Over all it contributes to the development of smart medical facilities thus improving country's medical condition and protects many civilian's life on a daily basis especially during critical cases stuck in heavy traffic.

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