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Smart Artificial Intellligence Ambulance with Decision Making System

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Abstract **-Ambulance service which is one of the crucial services, it's get delayed very often. Because of this delay in ambulance service, patient may lose his life and number of these scenarios are increasing day by day. The main reason behind is increasing population which leads to increased number of vehicles, due to which emergency service like Ambulance get affected. Controlling the traffic becomes major issue when it comes to large intima delays between traffic lights/signals. Due to this, ambulance service which is one of the crucial services, it's get delayed very often. Because of this delay in ambulance service, patient may lose his life and number of these scenarios are increasing day by day. This paper proposes a solution to make such services easily available to those in need. The system provides a solution to the number of problems occurring in this world. The system provides a suggestion of the nearby hospital and also shares the patient information currently present in the ambulance. We developed this system which monitors the respiration level, Temperature and Pulse sensor. These values will be updated to hospital through SMS via GSM.**

INTRODUCTION

In today's fast-paced world, the efficiency of emergency services, particularly ambulance systems, is critical in saving lives. However, the increasing population and congestion on roads pose significant challenges, often resulting in delays in ambulance response times. These
delays can have dire consequences, potentially leading to loss of lives due to delayed medical attention. Recognizing the urgency of addressing these challenges, this paper proposes a Smart Artificial Intelligence Ambulance with a Decision-Making System, aimed at revolutionizing ambulance services. By integrating advanced technologies and innovative solutions, this system aims to mitigate the delays in ambulance services and provide timely medical assistance to those in need. The proposed system utilizes a combination of real-time patient health monitoring and traffic analysis approaches to optimize ambulance response times. By incorporating sensors to monitor vital signs such as respiration level, temperature, and pulse, the system ensures continuous monitoring of the patient's medical condition during transit. Moreover, the system employs artificial intelligence algorithms to analyze traffic patterns and optimize route selection, ensuring that ambulances reach their destination swiftly and efficiently. Through the integration of GPS technology and traffic data, the system identifies the shortest and fastest routes, minimizing delays caused by congestion and traffic signals. Additionally, the system features a decision-making module that provides recommendations for the nearest hospitals based on the patient's location and medical condition. By leveraging real-time data and intelligent algorithms, the system facilitates seamless coordination between ambulances and healthcare facilities, ensuring that patients receive timely and appropriate medical care.

OBJECTIVES:

To design/build an ambulance system with patient health monitoring system and traffic analysis approach and to develop a system which will monitor continuous medical condition of an individual on a device and provide nearest hospital data of patient.

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LITERATURE SURVEY

[1] Improving the Performance of Ambulance Emergency Service Using Smart Health Systems

In this paper, we use the smart health to improve the performance of ambulance service. In particular, we use the real-time traffic information and hospital waiting time to minimize the ambulance response time, ambulance travel time to hospitals, and waiting time at hospitals.

[2] Novel approach of Internet of Things (IoT) Based Smart Ambulance System for Patient's Health Monitoring

These features depend on the time, the position of the accident, ambulance and hospital, number of streets and injured person, type of accident, and age of the patient. With these features, the Ambulance can be decided to select the minimum route to find the nearest hospital. In this paper, we evaluate crucial metrics in responding to the accident, such as establishing temporary emergency units, the number of available ambulance units, and the city's response and resources.By incorporating these additional points, the advantages of using IoT technology in greenhouse management become even more comprehensive and compelling.

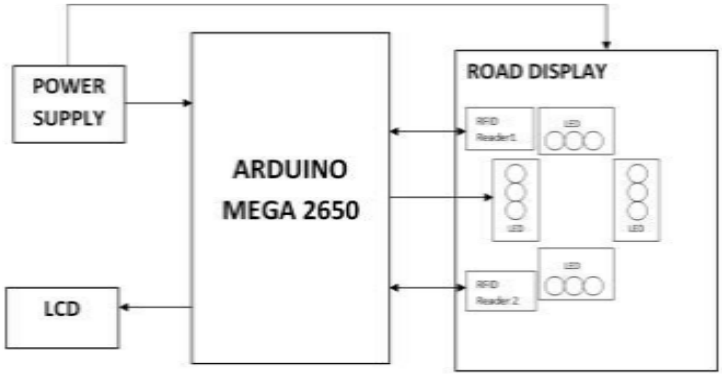
[3]These features depend on the time, the position of the accident, ambulance and hospital, number of streets and injured person, type of accident, and age of the patient. With these features, the Ambulance can be decided to select the minimum route to find the nearest hospital. In this paper, we evaluate crucial metrics in responding to the accident, such as establishing temporary emergency units, the number of available ambulance units, and the city's response and resources.

[4] This paper presents an integrated platform for smart ambulance routing and patient status monitoring during the ride. The main target of the platform is to increase the likelihood of the patient's survival by having the ambulance arriving to the hospital as soon as possible while allowing the responsible doctor to monitor the patient's biomedical data.

EXISTING SYSTEM:

• The issues faced by the ambulance drivers who take the patients to the hospital had waited outside the hospital for a prolonged time due to the unavailability of Beds.
• The patients to die inside the ambulance itself which parked in front of the hospital make the death ratio to all-time high.
• Deny of hospital for the treatment saying no beds even though having beds in hospital because of expecting high treatment cost from the rich patients.
• Sometimes, Ambulance driver may not know to which hospital the patient should be taken to or they might have some dealing with the hospital chiefs for a marketing purpose

EXISTING BLOCK



.PROPOSED TECHNIQUE:

- The proposed system is implemented to overcome the drawbacks and limitation of the existing system using an advanced methodology and technology, AI.
- The proposed system consists of multiple sensors which helps in monitoring the essential parameters of a patient.
- The parameters include monitoring heart rate, respiration and temperature of patient. If any deviation occurs, then an alert system is produced using buzzer.
- It'll process with the algorithm, and decide the patient falls under which categories he/she needs oxygen bed support, ventilator support, and MICU support by checking with the networked medical system availability hospital using SMS.

Expected Advantages:

- ❖ The system make sure that at the time of emergency they can get ambulance very fast and this method can save more and more lives.
- ❖ This method is implemented using an advanced technology Artificial Intelligence which makes better and accurate decisions.

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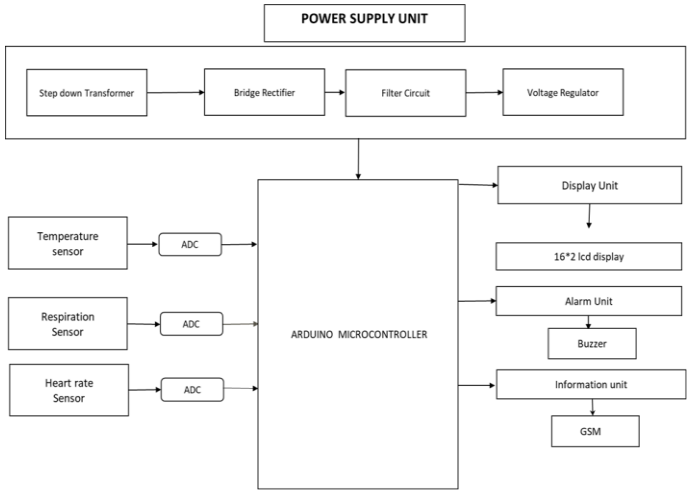

COMPONENTS OF HARDWARE

1 ARDUINO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions.

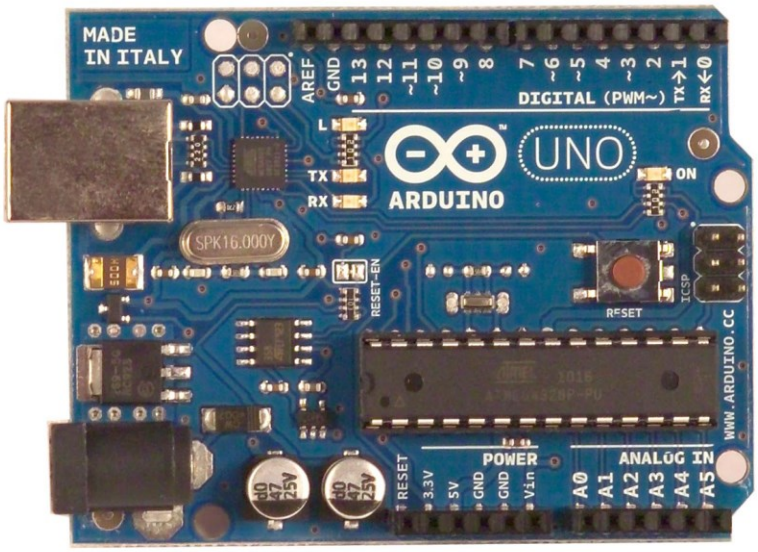

Fig.2: ARDUINO

2 LCD Display**:**

When sufficient voltage is applied to the electrodes the liquid crystal molecules would be aligned in a specific direction. The light rays passing through the LCD would be rotated by the polarizer, which would result in activating/highlighting the desired characters. The power supply should be of +5v, with maximum allowable transients of 10mv. To achieve a better/suitable contrast for the display the voltage (VL) at pin 3 should be adjusted properly. A module should not be removed from a live circuit.

The ground terminal of the power supply must be isolated properly so that voltage is induced in it. The module should be isolated properly so that stray voltages are not induced, which could cause a flicking display. LCD is lightweight with only a few, millimeters thickness since the LCD consumes less power, they are compatible with low power electronic circuits, and can be powered for long durations. LCD does not generate light and so light is needed to read the display. By using backlighting, reading is possible in the dark. LCDs have long life and a wide operating temperature range. Before LCD is used for displaying proper initialization should be done.

LCDs with a small number of segments, such as those used in digital watches and pocket calculators, have individual electrical contacts for each segment. An external dedicated circuit supplies an electric charge to control each segment. This display structure is unwieldy for more than a few display elements. Small monochrome displays such as those found in personal organizers, or older laptop screens have a passive-matrix structure employing super-twisted nematic (STN) or double-layer STN (DSTN) technology—the latter of which addresses a color-shifting problem with the former—and color-STN (CSTN)— wherein color is added by using an

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internal filter. Each row or column of the display has a single electrical circuit.
The pixels are addressed one at a time by row and column addresses. This type of display is called passive-matrix addressed because the pixel must retain its state between refreshes without the benefit of a steady electrical charge. As the number of pixels (and, correspondingly, columns and rows) increases, this type of display becomes less feasible.

Fig.3:LCD Display

3 HEART BEAT SENSOR

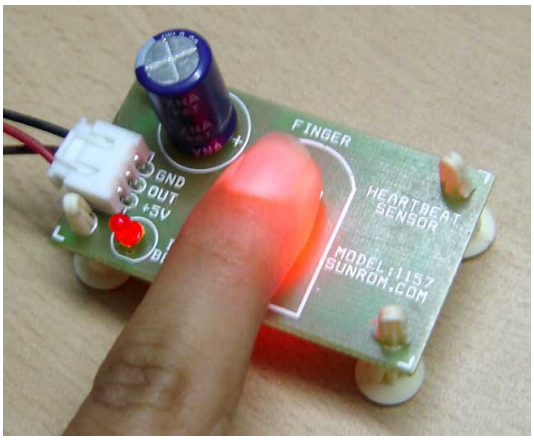
Heart beat sensor is designed to give digital output of heat beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heart beat. This digital output can be connected to microcontroller directly to measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

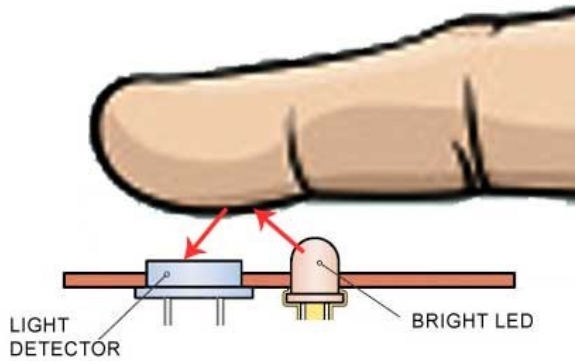
FEATURES:

- Microcontroller based SMD design
- Heat beat indication by LED
- Instant output digital signal for directly connecting to microcontroller
- Compact Size
- Working Voltage +5V DC

APPLICATIONS:

- Digital Heart Rate monitor
- Patient Monitoring System
- Bio-Feedback control of robotics and applications





4 TEMPERATURE SENSOR

The first slave connected to a temperature sensor LM35. This senses the temperature of an engine and provides the level of temperature.

GENERAL DESCRIPTION

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in

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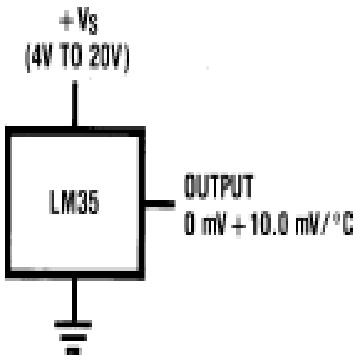

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Fig.5 Basic Centigrade Temperature Sensor (+2°C to +150°C)

The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a −55° to +150°C temperature range, while the LM35C is rated for a −40° to +110°C range (−10° with improved accuracy).

The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-220 package.

GSM Modem Application

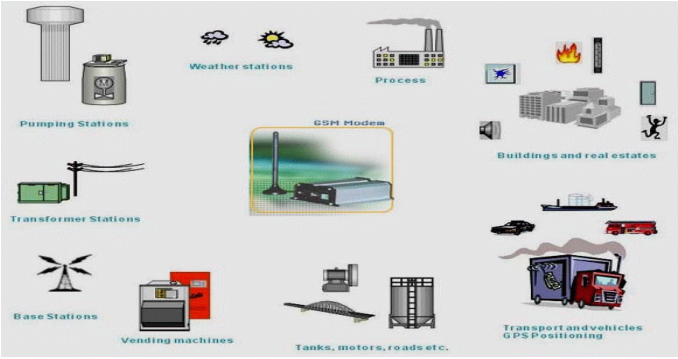

Fig.6: GSM Modem Application

THE GSM NETWORK :

GSM provides recommendations, not requirements. The GSM specifications define the functions and interface requirements in detail but do not address the hardware. The reason for this is to limit the designers as little as possible but still to make it possible for the operators to buy equipment from different suppliers. The GSM network is divided into three major systems: the switching system (SS), the base station system (BSS), and the operation and support system (OSS).

5 BUZZER :

A buzzer or beeper is a signalling device, The word "buzzer" comes from the rasping noise that buzzers made when they were electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles. Other sounds commonly used to indicate that a button has been pressed are a ring or a beep

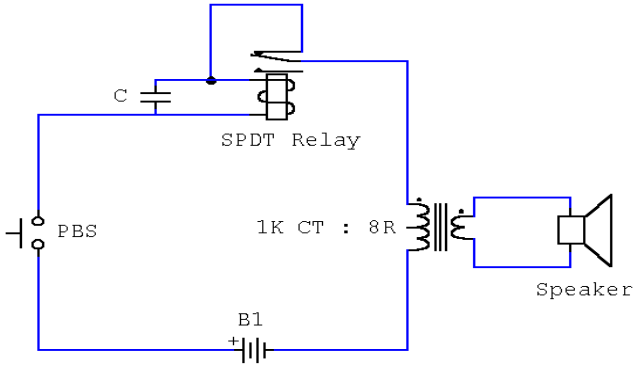

Fig.7: BUZZER

This novel buzzer circuit uses a relay in series with a small audio transformer and speaker. When the switch is pressed, the relay will operate via the transformer primary and closed relay contact. As soon as the relay operates the normally closed contact will open, removing power from the relay, the contacts close and the sequence repeats, all very quickly...so fast that the pulse of current causes fluctuations in the transformer primary, and hence secondary. The speakers tone is thus proportional to relay operating frequency. The capacitor C can be used to "tune" the note. The nominal value is 0.001uF, increasing capacitance lowers the buzzers tone.

ARDUINO SOFTWARE (IDE)

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

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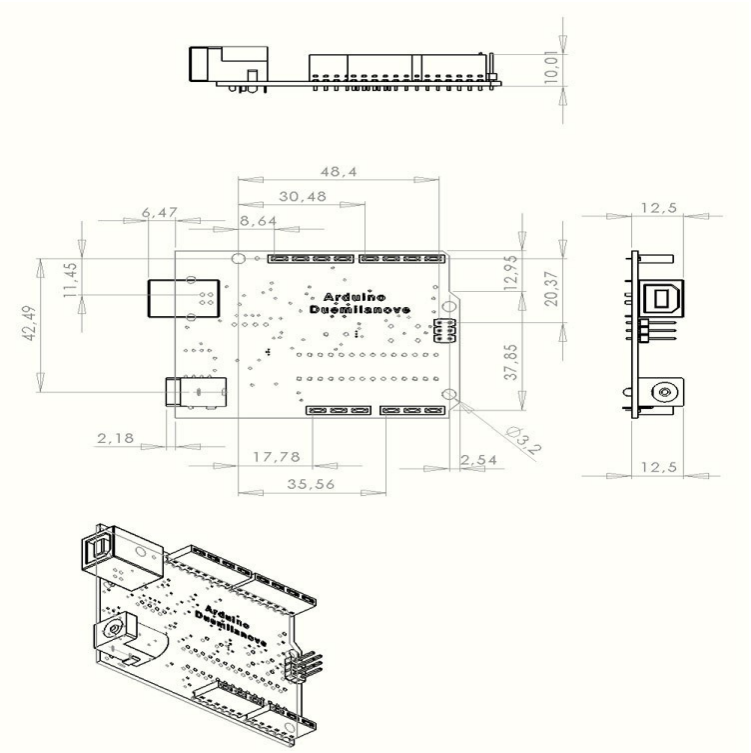
6 DIMENSION DRAWING:



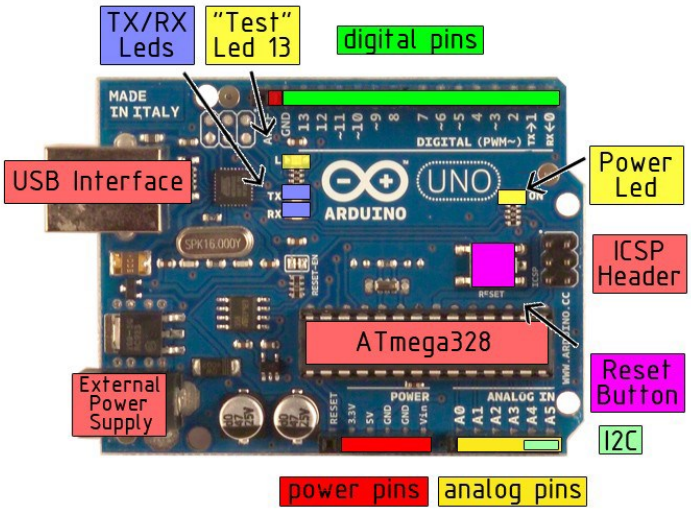


Fig.8 DIMENSION DRAWING

7. THE CONSTRUCTION OF A DYNAMIC SCATTERING LIQUID CRYSTAL CELL:

The liquid crystal material may be one of the several components, which exhibit optical properties of a crystal though they remain in liquid form. Liquid crystal is layered between glass sheets with transparent electrodes deposited on the inside faces.

When a potential is applied across the cell, charge carriers flowing through the liquid disrupt the molecular alignment and produce turbulence. When the liquid is not activated, it is transparent. When the liquid is activated the molecular turbulence causes light to be scattered in all directions and the cell appear to be bright.

This phenomenon is called dynamic scattering.

The construction of a field effect liquid crystal display is similar to that of the dynamic scattering type, with the exception that two thin polarizing optical filters are placed at the inside of each glass sheet. The liquid crystal material in the field effect cell is also of different type from employed in the dynamic scattering cell. The material used is twisted numeric type and actually twists the light passing through the cell when the latter is not energised.

A liquid crystal display (LCD) is an electronically-modulated optical device shaped into a thin, flat panel made up of any number of color or monochrome pixels filled with liquid crystals and arrayed in front of a light source (backlight) or reflector. It is often utilized in battery-powered electronic devices because it uses very small amounts of electric power. LCD has material, which continues the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered from similar to a crystal.

LCD consists of two glass panels, with the liquid crystal materials sandwiched in between them. The inner surface of the glass plates is coated with transparent electrodes which define in between the electrodes and the crystal, which makes the liquid crystal molecules to maintain a defined orientation angle. When a potential is applied across the cell, charge carriers flowing through the liquid will disrupt the molecular alignment and produce turbulence.When the liquid is not activated, it is transparent. When the liquid is activated the molecular turbulence causes light to be scattered in all directions and the cell appears to be bright. Thus the required message is displayed. When the LCD is in the off state, the two polarizer's and the liquid crystal rotate the light rays, such that they come out of the LCD without any orientation, and hence the LCD appears transparent.

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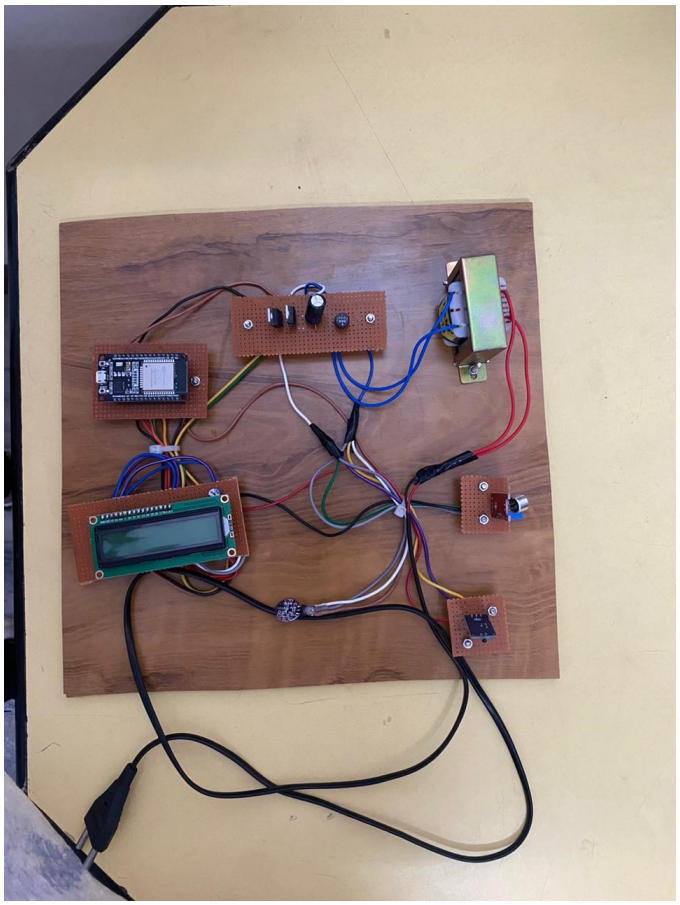

Fig.9.Prototype Model

Third-Party Hardware

Support for third-party hardware can be added to the hardware directory of your sketchbook directory. Platforms installed there may include board definitions (which appear in the board menu), core libraries, bootloaders, and programmer definitions. To install, create the hardware directory, then unzip the third-party platform into its own sub-directory. (Don't use "arduino" as the sub-directory name or you'll override the built-in Arduino platform.) To uninstall, simply delete its directory.

For details on creating packages for third-party hardware, see the Arduino IDE 1.5 3rd party Hardware specification.

Serial Monitor

Displays serial data being sent from the Arduino or Genuino board (USB or serial board). To send data to the board, enter text and click on the "send" button or press enter. Choose the baud rate from the drop-down that matches the rate passed to Serial.begin in your sketch. Note that on Windows, Mac or Linux, the Arduino or Genuino board will reset (rerun your sketch execution to the beginning) when you connect with the serial monitor.

You can also talk to the board from Processing, Flash, MaxMSP, etc (see the interfacing page for details).

Preferences

Some preferences can be set in the preferences dialog (found under the Arduino menu on the Mac, or File on Windows and Linux). The rest can be found in the preferences file, whose location is shown in the preference dialog.

Language Support

FUTURE SCOPE

AI algorithms integrated into the ambulance can analyze patient symptoms, vital signs, and medical history in real-time. This enables the system to quickly diagnose emergencies and prioritize patients based on the severity of their condition AI can use real-time traffic data, road conditions, and predictive analytics to choose the fastest and safest route to the hospital. This ensures that patients receive timely medical attention, especially in critical situations.

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CONCLUSION

The development and implementation of a smart artificial intelligence ambulance with a decision-making system represent a significant advancement in emergency medical services. By harnessing the power of AI, these ambulances can revolutionize the way we respond to medical emergencies and deliver care to patients.Through real-time diagnosis and triage, optimized routing and navigation, remote consultation and telemedicine, automated equipment and medication management, personalized treatment plans, data-driven insights, and integration with the healthcare ecosystem, these smart ambulances offer a comprehensive solution to improving patient outcomes.

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