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An Approach for Rescue System in Ambulance

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Abstract:-High population density metropolitan areas experience significant problems with traffic congestion. One of the main services that are impacted by traffic bottlenecks is the ambulance service. This article proposes "Smart Traffic Signals for Ambulance" as a method to streamline ambulance transportation. The suggested solution develops an Android application that utilises a Bluetooth network to link the traffic signal station and the ambulance. The primary premise of the proposed system is that if an ambulance is forced to stop due to a traffic signal, the driver will select the road and communicate the information to the signals. Ambulance LED (Blue) will turn ON after receiving signal, alerting people that an ambulance is on its way. It regains once the ambulance leaves.

I. Introduction:-

In a typical scenario, the traffic lights are functioning regularly. If an emergency occurs in a certain direction, the ambulance driver must click a button on a mobile application, which quickly sends the signal to the traffic management system.

By converting all of the red lights in the ambulance's path to green, the suggested system relieves traffic congestion and clears the way for the ambulance to get to its destination. An android application that is part of the system registers the ambulance on its network. If the ambulance stops while travelling in an emergency, the driver will hit the button on the Android application for the traffic signal and the direction whereIt yearns to go places. And that specific indicator is turned green until the ambulance passes by before returning to its previous state. By regulating the traffic lights, it functions as a life-saving project by reducing the amount of time needed to respond to emergencies. In addition, we turn on the ambulance's blue LED to let people know it is on the way.

Ambulance service is one of the areas where traffic congestion has a significant impact. Ambulances frequently contain urgent or critically ill patients who must be sent to the hospital as soon as possible so that they can receive the right care and improve their chances of survival. A patient could pass away.

if the ambulance takes longer than expected to arrive at the hospital. The cars on the road must move aside for the ambulance in order for this to happen. However, occasionally the ambulance becomes stopped in the traffic, wasting time while waiting for the traffic to clear. These restrictions can be removed thanks to new technology.

This essay suggests that the ambulance driver monitor traffic signals and manipulate them. The driver transmits the direction in which it wishes to go depending on the emergency. Depending on the order, that specific signal is turned green to make room for the ambulance, while the others are turned red. By using this technique, the ambulance is given access.

II. Literature Survey:-

To calculate the health parameters, hardware is needed. They are transported to the hospital via an ambulance, and serial communication is used to store the data in the PC in the ambulance. The flow is managed by RF communication. Health monitoring and traffic control systems are the two systems that are merged in this essay. The Health Monitoring System will collect data, and a PC will transmit parameters to the hospital server. Using the keypad inside the ambulance, the driver manages traffic flow. Both systems will operate at the same time. The hospital doctor keeps track of the patients' health metrics. The ambulance's driver might simultaneously alter the signals. By incorporating a GPS navigational The major goal of the study is to create a Microcontroller based intelligent ambulance system that can alter the traffic lights upon its arrival at traffic light junction using IR (Infrared) sensors. With a congestion detecting module, this system may be improved for the real-time situation. Additionally, the ambulance system features a Global System for Mobile Communication (GSM)-based information gadget that notifies the doctors of the patient's condition and instructs them to head to the closest hospital for the patient's speedy recovery. Two ambulances could be precisely the same distance apart from a traffic signal in which case the traffic light receiver would randomly choose which ambulance's transmitter to receive without taking any factors into account.

The main objective of the project is to develop a microcontroller-based intelligent ambulance system that, when it arrives at a traffic light intersection, can use IR (Infrared) sensors to change the traffic lights. This system could be enhanced for the current scenario with a congestion sensing module. The ambulance system also includes a Global System for Mobile Communication (GSM)-based information device that alerts the treating physicians to the patient's condition and directs them to take him or her to the closest hospital for a quick recovery. If two ambulances are exactly the same distance from a traffic signal, the traffic light receiver will choose at random, without taking any criteria into account, which ambulance's transmitter to receiveCloud computing can handle the vast amount of data created by these devices, and it can also be used to instruct those devices to carry out a task. The IoT and cloud are the foundation of this project. In order for the traffic signal to react to the ambulance's arrival, communication between the traffic signals and the ambulance must be established. For the ambulance and traffic light to instantly communicate, the application needs a certain amount of bandwidth. The system will have adaptive signal regulating based on image processing.

The proposed system will combine an automated signal with a traditional system as a foundation. The motor is used to rotate a digital camera. This has a lane-facing perspective and observes the traffic. The digital camera is used to record the artificial vision. The camera turns 90 degrees in steps before facing each lane and taking the picture. The PC use a microprocessor to move the camera in a different direction. Image processing techniques are used to predict the load on each lane of traffic. When compared to GPS, image processing has poor precision. Whenever a vehicle larger than an ambulance isif there is something in front of the ambulance, the camera won't be able to capture it.

III.Requirement Specification

1.Functional Specification

These are the specifications that the system must meet in order to satisfy the end user's basic needs. As a requirement of the contract, all of these functionalities must be built into the system. These are shown or described as the input to be provided to the system, the operation carried out, and the intended outcome. In contrast to non-functional needs, they are essentially the user-stated criteria that are visible in the finished product.

2.Non-functional Requirement

In essence, they are the requirements for quality that the system must meet in accordance with the project contract. Depending on the project, these criteria may be prioritised differently or applied to a different degree. Additionally known as non-behavioral requirements.

They mostly address matters like:

- Portability
- Security
- Maintainability
- Reliability
- Scalability
- Performance
- Reusability
- Flexibility

3.Constraints Considerations

Design considerations are the expansions of design constraints (of limits). There will always be restrictions, limitations, or other types of obstacles in every design effort. Budget or physical space restrictions may apply to some projects. some are constrained by their choice of colours or materials..

4.Technology Considerations

Arduino IDE software

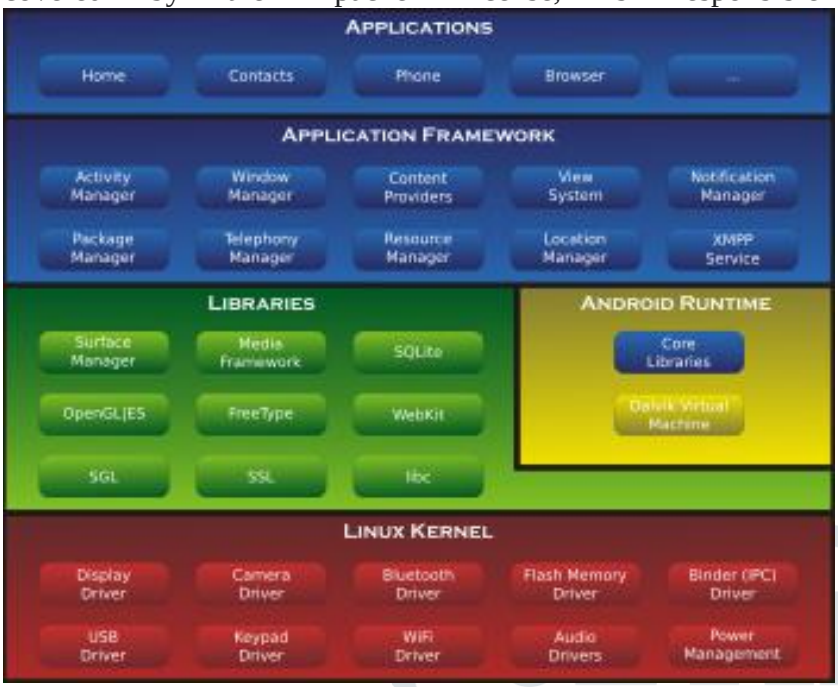
It is simple to write code and upload it to the board using the free and open-source Arduino Software (IDE). The software can be used with any Arduino board.

For Windows, macOS, and Linux, the Arduino Integrated Development Environment (IDE) is a cross-platform programme that uses C and C++ functions. It is used to create and upload applications to boards that are compatible with Arduino as well as other vendor development boards with the aid of third-party cores.The GNU General Public License, version 2 governs the publication of the IDE's source code. The Arduino IDE has specific code organisation guidelines to support the languages C and C++. A software library from the Wiring project, which offers numerous standard input and output operations, is provided by the Arduino IDE. For the sketch to start and the main programme loop, user-written code only needs two fundamental functions, which are combined with a programme stub main() to create an executable cyclic executive programme using the GNU toolchain, which is also distributed with the IDE. The Processing IDE, from which the Arduino IDE is derived, will be replaced by the Visual Studio Code-based Eclipse Theia IDE framework starting with version 2.0.

Android

Android is an open source mobile operating system that was created specifically for touchscreen mobile devices like smartphones and tablets. It is depended upon a simplified version of the Linux kernel. A group of developers called the Open Handset Alliance creates Android to whom economically supported by Google.

It is free and open-source software, and the Android Open Source Project (AOSP), which is principally covered by the Apache License, is responsible for maintaining its source code.



With the help of the source code, Android variations have been created for a variety of other electronic devices, including gaming consoles, digital cameras, portable media players, PCs, and others. Each of these devices features a unique user interface. Two well-known variants created by Google are Wear OS for wearables and Android TV for televisions. APK-formatted software packages for Android are often made available through paid app stores.

IV.Problem Statement

Ambulance service is one of the areas where traffic congestion has a significant impact. Ambulances frequently contain urgent or critically ill patients who must be sent to the hospital as soon as possible so that they can receive the right care and improve their chances of survival. If the ambulance takes longer than expected to get at the hospital, a patient risk losing his life. The cars on the road must move aside for the ambulance in order for this to happen. However, occasionally the ambulance gets stopped in the traffic, which results in a long wait for the traffic to clear.

V.Objective

The primary goal of this endeavour is to promptly administer basic first aid to every patient. Our duty is to care for the sick and get him or her to the hospital as fast as we can if there is heavy traffic and the patient is in a serious state.

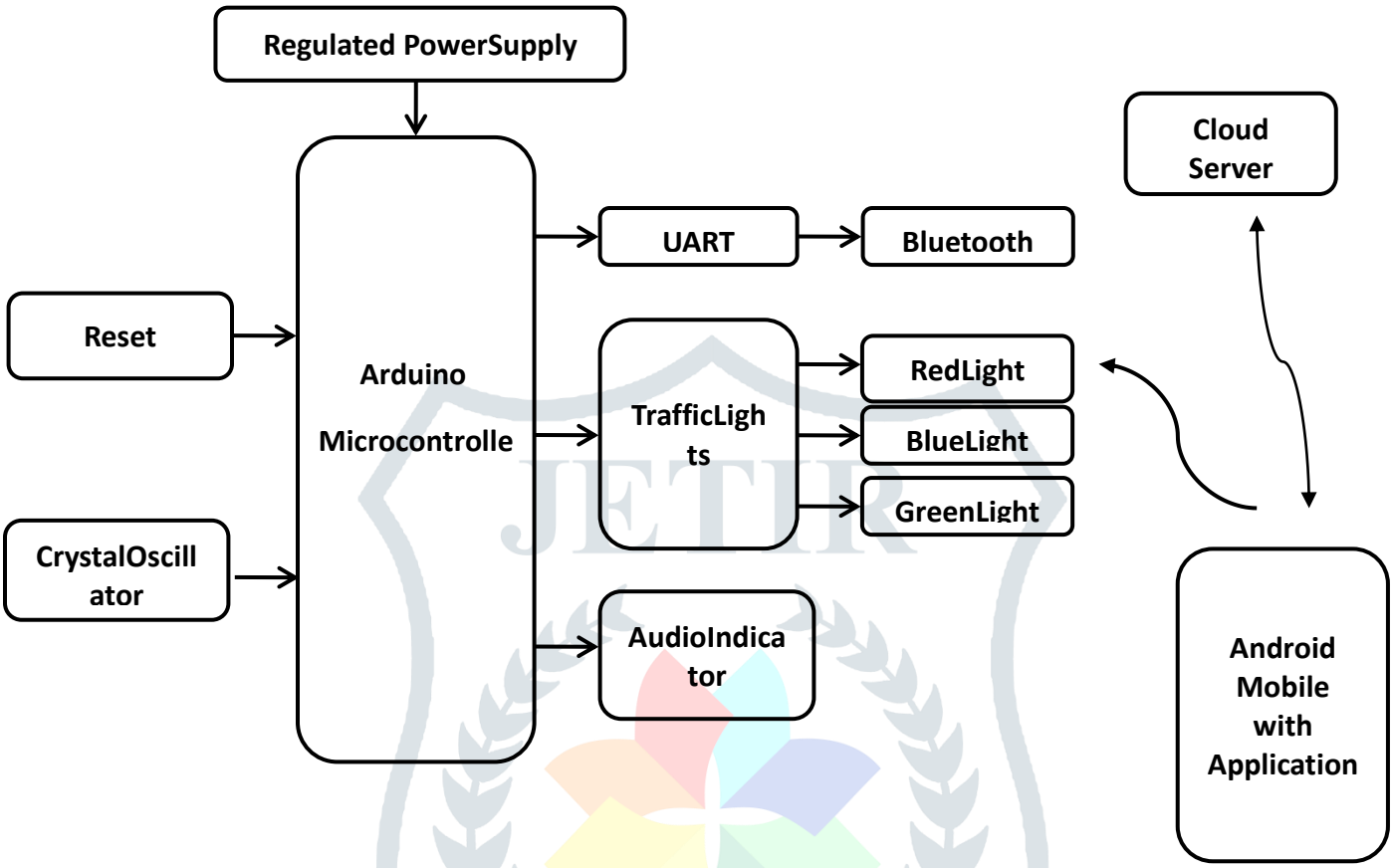
The major goal of this technology is to enable the ambulance to travel to a certain place without having to stop anywhere till it gets there.

VI.Scope

The device does not automatically change the signal or provide the shortest route to the hospital. More manually than automatically, the mechanism works. This system could eventually be fully automated because it can determine the quickest route to the closest hospital, and if an ambulance stops at a light, the signal will automatically change based on the shortest route to the hospital. More time is saved, and the patient is sent to the hospital as quickly as possible.

VII. System Architecture

Ambulance rescue system



There are two modules in the system. Android applications make up the first module, which is a software module. The hardware module for traffic signal implementation is the second module.

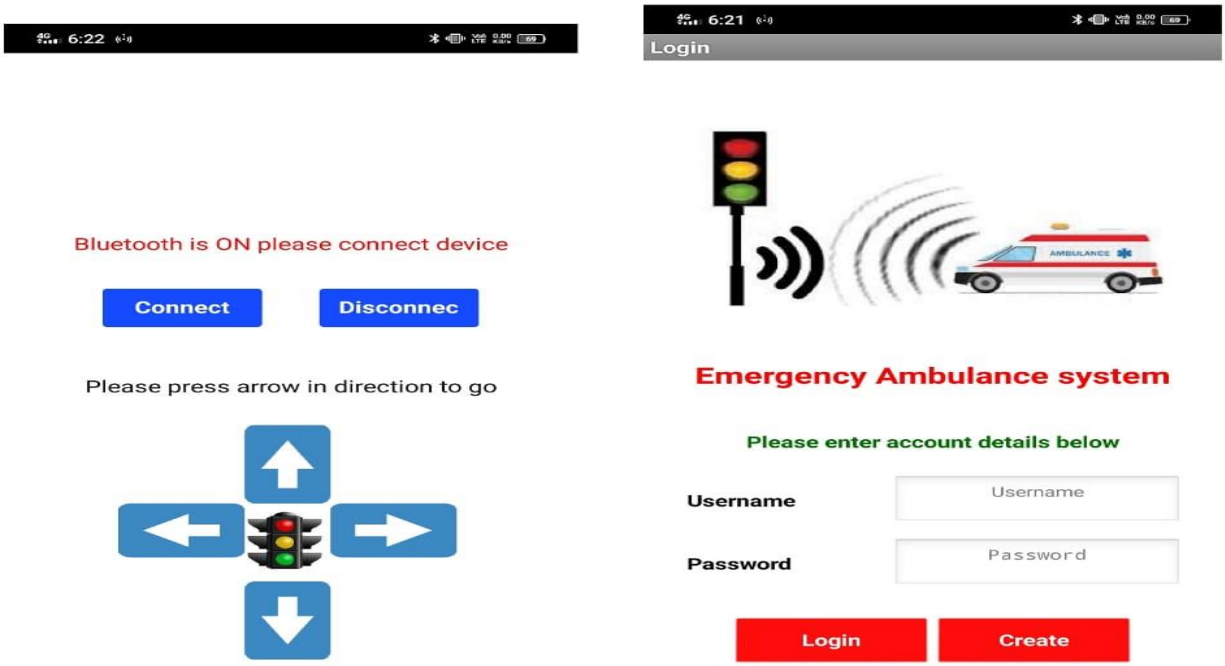
Module 1: The initial module is an android programme. Driver must first log into the Android application. Driver will hit button once they have logged in successfully. Four buttons for four directions are present in an Android application. The ambulance driver will decide on the best direction for the journey and send the activation command for that specific signal. The traffic signal system receives the chosen motion direction.

Once the commands from the ambulance driver have reached that particular light, it is changed to green or red depending on the direction it is facing. This signal change functions similarly to an interruption at a traffic signal. When the status of the ambulance is active, the signal is altered. The signal is sent a disable order as soon as an ambulance crosses it, and the signal returns to its usual flow.

The driver will login using his or her Android application, and the server will keep the driver's ID and password. There will therefore be IOT-based login.

Module 2: The hardware module for traffic signals is the second module. For traffic signals, we will utilise hardware called Arduino. It is made up of LEDs that show traffic signs. The stop signal will be made of red LEDs, the go signal will be made of green LEDs, and the ambulance signal will be made of blue LEDs. Hardware and software (Android application) will be connected over Bluetooth in order to interact.

VIII. Screen Shots



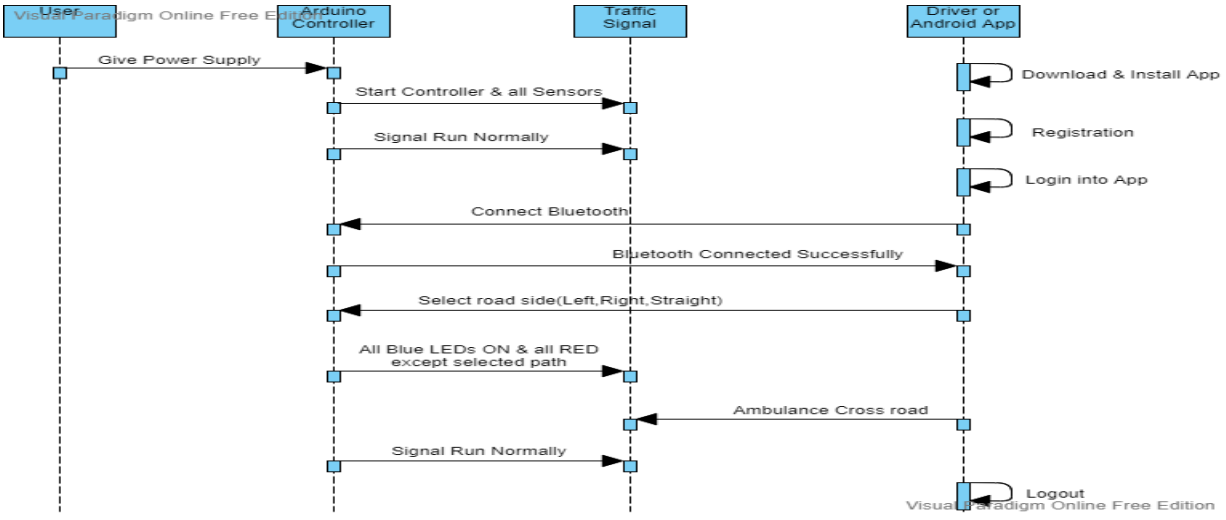
IX. System Design

1.Sequence Diagram

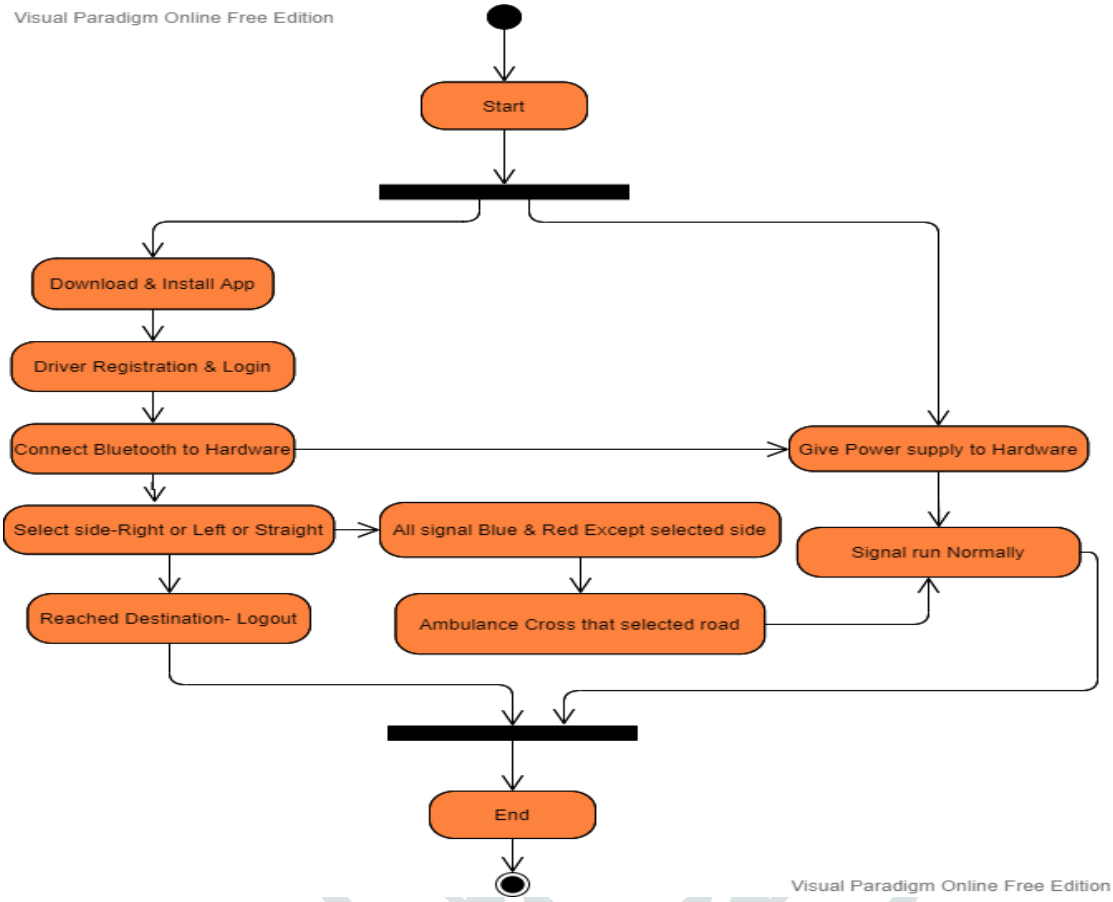
A sequence diagram is an interaction diagram that demonstrates the order in which several items interact with one another. It is an implementation of a message sequence diagram. Object interactions are arranged in temporal sequence in a sequence diagram. A sequence diagram is an interaction diagram, and it can be inferred from the name that it deals with a sequence of messages that pass from one item to another. From an implementation and execution standpoint, a system's component interactions are crucial.

It is simpler to see the sequence of events when using a sequence diagram to depict object interactions in a single use case

2.Activity Diagram



Activity diagrams are visual depictions of sequential actions with support for concurrency, iteration, and choice. The purpose of activity diagrams is to model both organisational and computational activities (i.e. workflows) Activity diagrams display the entire control flow.The transition between activities is depicted in an activity diagram. Alternately, actions that are the outcome of executable calculations that affect the system's state or return its value are produced by various activities. Calling another operation, sending a message, making or destroying an object are all examples of actions.



X. System Testing

Software system testing is testing done on a comprehensive, integrated system to see whether the system complies with the requirements. System testing falls under the purview of blackbox testing, and as a result, white-box testing shouldn't necessitate any familiarity with the inner workings of the logic or code.

Software is tested from two different perspectives:

1"White box" test case design strategies are used to exercise internal software logic.

2. "Black box" test case design methodologies are used to exercise software requirements.

In both situations, the goal is to identify as many mistakes as possible quickly and easily. Software is tested using a white-box approach that focuses on closely scrutinizing procedural details. By creating test cases that exercise particular sets of if the expected or asserted status corresponds to the actual status, logical paths across the software are put to the test.

White Box Testing Techniques

White box testing is a software testing technique in which the tester is aware of the internal structure, design, and implementation of the thing being tested. It is also referred to as clear box testing, open box testing, glass

box testing, transparent box testing, code-based testing, or structural testing. The tester selects inputs to test various code routes and decides on the necessary outputs. Knowledge of implementation and programming is crucial. White box testing examines a system's inner workings, going beyond the user interface.This method is so named because, in the tester's eyes, the software programme resembles a white or transparent box that allows for unobstructed vision within.

What is White Box Testing:- A testing method known as "white box testing" looks at the program's architecture and generates test data from the logic and code of the programme. Clear box testing, open box testing, rationale driven testing, path driven testing, and structural testing are further names for glass box testing. Internal testing is the focus of whitebox testing, which is based on an application's internal operations.

Black Box Testing The software testing technique known as "black box testing" is used to test the software without knowing the internal structure of the programme or code. This testing technique is probably what the bulk of testers really use and perform in real life.

Test No.	Module / Hardware Parts	Action to be performed	Expected Output	Actual Output	Pass / Fail
1	Arduino Controller	Give Power supply	LED of Arduino must be ON then OFF	LED of Arduino ON then OFF	Pass
2	Registration (Android App)	Fill the form & click on Registration button	Registration must be Done & data must be stored into DB	Registration Done & data stored into DB	Pass
3	Login (Android App)	Enter valid ID & Password & click on Login Button	Login must be successful if valid data entered else login failed.	Login successful if valid data entered else login failed.	Pass
4	Connect to Bluetooth Device (Android App)	Click on button.	Must display all available devices & connection must be done	Display all available devices & connection done	Pass
5	Full Project (Arduino Controller)	Give power supply	All LED lights must run according normal signal	All LED lights run according normal signal	Pass
6	Select Direction (Android App)	Select any button (Left/Right/Straight)	All Blue LEDs must be ON & Red signal to all expect selected way	All Blue LEDs ON & Red signal to all expect selected way	Pass

X.

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