Automatic bus arrival announcement System using rf transmitter and receiver

Thilagavathi. P., Kishore. D.,LingeshS.,Naveena.M.,Vignesh.V.
Associate. Prof., DepartmentofECE, KSRCETIRUNCHENGODE, TamilNadu, India
StudentinDept.ofECE,KSRCETIRUCHENGODE,TamilNadu, India

Abstract-This method serves as an example of the computerized information speech announcement that informs passengers of the estimated wait time for the next bus at bus stops. Public transportation providers struggle to provide services on time in towns due to traffic gridlock. In this endeavor, an at-the-bus prototype of a gadget will be able to recognize itself when contacted using RF signals created. Since there are so many buses and bus stations, wireless contact between the gadgets in the current system is more difficult. Each halt in this procedure requires at least four to five minutes, which is a waste of time. Additionally, travelers frequently struggle to obtain correct information about bus arrivals and departures. A speech announcement enabled intelligent building with an RF transceiver and Arduino board linked to a computer was developed to solve this problem. It offers audio announcements for buses as well as automatic reporting.The developed method entirely removes manual driver reporting, saving commuters between 15 and 20 minutes. Furthermore, if there are more bus stations along the route, more time will be conserved. Bus arrival or exit time complications were also kept to a minimum. Additionally, since there is no human involvement in this system, any potential errors that might have happened during filing and announcement are eliminated. Additionally, costs for specialized personnel used only for reporting and announcements can be decreased. Many stakeholders, including travelers, drivers, and the bus transportation agency, stand to gain from this method.

Keywords—RadioFrequency(RF);Bus Name Announcement;Arduino IDE;Displaying bus names; C, C++ Programming Languages;Hex files; Power Supply;Arduino Microcontroller;LCD;Voice Board; Protocol Coordinator;CORBA object;Proteus Software.

I.INTRODUCTION

This project's primary purpose is to have the name of the station announced and displayed on the vehicles. The project includes a number of RF Transmitter parts that could be used to communicate data to the vehicle.Due to the quantity of buses and bus stations, wireless contact between the devices in the current system is more complicated. Each pause in this procedure requires at least 4-5 minutes, which wastes time. Here, we propose a speech announcement-enabled intelligent structure made up of an RF trans-receiver, an Arduino board, and a server in order to solve this problem. It offers audio notifications for buses as well as automatic reporting.

LITERATURESURVEY

a. ARDUINO AND LORA BASED BUS STOP REMINDER

AuthorName: Mr.Aruloli K., Gomathi M., Rathika.V, Swetha J.(2021)

Implementation is based on integrated with an IOT platform.The Arduino and Lora based circuits along with RF receiver based circuits to be placed in buses andLCD to display the names of bus stops as they arrive. We use RF transmitter-based circuits which will be placed on bus stops. This system does not need any bus stop names or route names to be stored in the bus system. Each bus stop system has a code and our receiver circuitry can be fed with as well as edited of existing bus stop names using a USB keyboard interface. Each bus stop system constantly transmits a unique bus stop code. When the bus comes in a range of a bus stop the code is picked up by the bus system

b.BUS STAND AUTOMATION

Author Name: Mr. Tavate Ganesh Balasaheb., Mr. Rajage Sagar Akaram., Mr. Vhanmane Suresh Ashok.

In input section commanding sensors are placed for give command to microcontroller. As input sensor we placed push to on switch for giving signal to the microcontroller. In output section we used three application first is GSM based communication system. Second is LCD display. Third is Audio announcement. All system will be powered by solar panel. Right now, we are using dummy solar panel but when this system will be implemented real time then we will powerup all system through solar panel. Also, we try to whole building will powerup by using solar panel. In solar system we used hybrid solar power system in that on grid and off grid system.

SIMULATION OF THE SUBWAY BUS AUTOMATIC CONTROL SYSTEM

AuthorName: V. V. Korolev, R. A. Chenin, A. Y. Zakharova and Y. A. Gapchenko.

Starting with the functional requirements, the basic building components of the system were modelled using the UML language, and state charts were utilised to illustrate their behaviour. A testing activity was completed at the conclusion to verify and validate the entire model and to show its consistency, completeness, and correctness. The development of new policies and standards that will harmonies this industry, as well as the emergence of new technologies like CBTC that expand these issues in an urban rail context, have all been prompted by the requirement to develop railway signaling systems that exhibit efficiency, security, and interoperability characteristics. The ATO subsystem, which automates BUS operation alongside ATC in a CBTC system, is an example of innovation.

c.PROBLEMSTATEMENT

The folks who lack literacy and are new to cities will find our effort to be of great assistance. Together with the passenger's destination, it also broadcasts vital locations like hospitals and police stations. With the aid of an autonomous station display arrangement, it is one of the components of the Intelligent Transport System that will lessen the burden of bus drivers and conductors. The safety of bus drivers is also ensured by this scheme. In this project, we suggest designing an embedded device that uses a GPS module to track the location of passengers as they travel by bus and alert them through a loudspeaker and LCD display when they arrive at their destination. It is one of the most economical strategies that is simple to adopt using public transportation. This initiative offers benefits to all types of people. As a result, the GPS provides the information that it receives from the satellites. Here, a GPS module continuously monitors the bus, alerting the driver when the passenger reaches their destination over a loudspeaker and displaying their destination on an LCD. not announcing but simply showing. The main disadvantages are:

- ✓ Constant human mediation.
- ✓ High cost.
- ✓ More Manpower is required.
- ✓ Installation and incorporation is tedious.

II.PROPOSEDSYSTEM

In the proposed system, a speech synthesizer in conjunction with a speaker system will assist a blind person at a bus stop in locating a bus that travels a specified or desired route. The suggested technology achieves its goal of giving the visually handicapped a helping hand for easy navigating. The Global Positioning System's technology is enabling profound social transformation while also increasing the system's accuracy. Everyone will be impacted by things like safer aero plane landings and higher Internet speeds. The associated RF frequency range ranges from 30 kHz to 300 GHz.Amplitude Shift Keying (ASK) modulation is used to encode digital data as fluctuations in the amplitude of the carrier wave. An RF Transmitter and an RF Receiver make up this RF module. The transmitter and receiver (Tx/Rx) pair utilizes a 434 MHz frequency. The antenna of an RF transmitter, which is attached to pin 4, receives serial data and broadcasts it wirelessly over RF. The transmission happens between 1Kbps and 10Kbps. An RF receiver using the same frequency as the transmitter picks up the sent data. In this system, an RF pair is employed for wireless communication. A text editor for writing code, a message area, a text terminal, a toolbar with buttons for frequently used operations, and a number of menus are all included in the ARDUINO (IDE) software. To upload applications and communicate with the Actual hardware, it establishes a connection with it. We need to create more software functionality for the Virtual Wire library in order to complete this task. Here, the Transmitter and Receiver sections are loaded first. Once the software has been loaded, we can test its functionality by simply sending data through the Arduino's transmitter end, which then causes the voice board to deliver a speaker announcement. And after that, merely 24 by verifying through module whether the identical transmitted data is received at the receiving end.

a. PROPOSED BLOCK DIAGRAM:

Transmitter side:

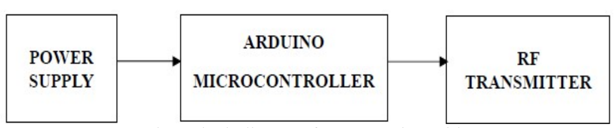
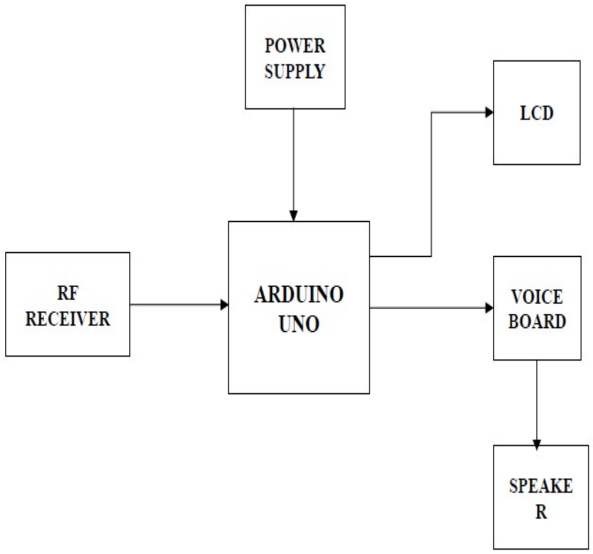


Fig1.Block diagram for Transmitter side



Receiver side:

Fig2.Block diagram for Receiver side

b. POWER SUPPLY

Due to cost considerations, ac power is virtually entirely produced, transported, and distributed; yet, dc power is needed to operate the majority of electronic devices and circuits. Batteries and dry cells are suitable for this usage. They undoubtedly offer the benefits of portability and ripple-free power, but their voltages are low, they require regular replacement, and they are more expensive than traditional dc power supply. Nowadays, a circuit that changes an ac supply into a dc supply is found in practically all electronic devices. The equipment component that converts ac to dc is known as the DC power supply. Typically, there is a power transformer at the power supply's input.It is followed by a voltage regulator circuit and a rectifier (a diode circuit) smoothing filter. According to the block diagram, the fundamental power supply is made up of four components: a transformer, a rectifier, a filter, and a regulator. A continuous DC voltage is applied across the load using the DC power supply's output. Let's quickly go through each component of the dc power supply's purpose. Transformers are used to adjust the supply voltage in accordance with the demands of the solid-state electronic devices and circuits that will be powered by dc power supplies (often to step-down the supply voltage). It can offer isolation from the supply line, which is a crucial safety factor. Internal shielding may also be present to stop errant electrical noise signals from the power line from entering the power supply and potentially disrupting the load.

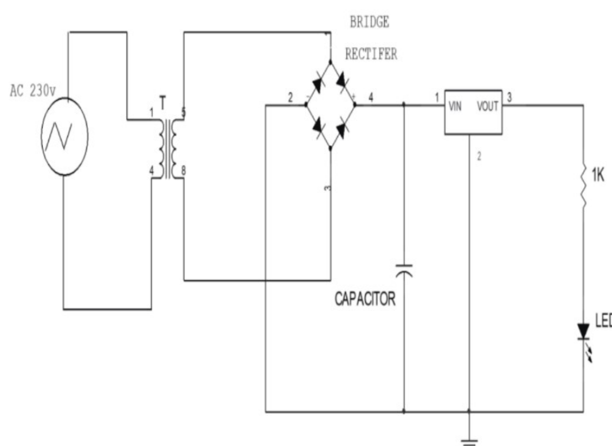


Fig3.Block diagram for power supply

c. ARDUINO CONTROLLER

Open-source electronics platform Arduino makes use of straightforward hardware and software to make it simple to use. Inputs like light from a sensor or motor activation may be read by Arduino boards. The Arduino project began in 2005 as a teaching tool for students at the Interaction Design Institute in Ivrea, Italy, with the aim of giving both beginners and specialists a simple and affordable approach to create gadgets that use sensors and actuators to interact with their environment. The signal from an analogue sensor may be read using these pins. Power Pins: The Arduino UNO contains three GND pins, a Vin pin, a 5V pin, a 3.3V pin, and four more power pins for various sensors. The crystal oscillator assists Arduino in fixing timing issues.The Arduino UNO operates at a 16MHz frequency.

With the aid of several Arduino shields—discussed in this paper—it is also capable of receiving and transmitting data via the internet. Arduino makes use of hardware called the Arduino development board and software called the Arduino IDE for writing code (Integrated Development Environment). These microcontrollers may be readily programmed using the C or C++ language in the Arduino IDE and are built with Atmel's 8-bit Atmel AVR or 32-bit Atmel ARM microcontrollers. The Arduino boards entered the electron CRT market in India just a few years ago, unlike other microcontroller boards there, and were solely intended for small-scale projects. Electronics-related people are currently slowly emerging and adopting the role of Arduino for their own projects. By only utilising a USB cable to upload, this development board may also be used to burn (upload) fresh code to the board. The Arduino IDE offers a condensed integrated platform that can operate on standard desktop PCs and enables users to create C or C++ applications for Arduino.

Fig4.Arduino Controller

d. LCD (Liquid Crystal Display)

The term liquid crystal display, or LCD, is self-explanatory. It is a mixture of the solid and liquid phases of matter. A liquid crystal is used by LCDs to create viewable images. Liquid crystal displays are ultra-thin technological display screens that are typically utilised in portable video games, Televisions, TVs, laptop computers, and mobile phones. Comparing LCD technology to cathode ray tube (CRT) technology, screens may be substantially slimmer.

A liquid crystal display is made up of a number of layers, including electrodes and two polarised panel filters. For showing images in laptops and other electronic devices like tiny computers, LCD technology is employed. A layer of liquid crystal receives a light projection from a lens. The grayscale picture of the crystal, which is created when an electric current passes through it, is combined with coloured light to create the colourful image. The screen then shows this picture.

Either an active matrix display grid or a passive display grid makes up an LCD. Although the majority of smartphones with LCD panels employ active matrix displays, some older devices continue to use passive display grid designs. For their displays, the majority of electronic gadgets rely primarily on liquid crystal display technology. The liquid has the distinct benefit of using less power than an LED or cathode ray tube. Instead of emitting light, liquid crystal display screens operate on the principle of blocking light. As LCDs don't emit light, they need a backlight. We constantly utilise electronics with LCD screens, which have taken the place of cathode ray tubes.Cathode ray tube draws more power compared to LCD's and are also heavier and bigger.

LCD Working

The liquid crystal molecule tends to untwist when an electrical current is given to it; this is the basic idea behind LCDs. As a result, the angle of light travelling through the polarised glass molecules and the angle of the top polarising filter alter. As a consequence, a little amount of light is permitted to flow through a specific portion of the LCD's polarised glass. As a result, that particular spot will grow darker than others. The LCD operates on the idea of light blocking. In the back of the LCDs that are built, a mirrored mirror is placed.The top of the device has an indium-tin oxide electrode plane, while the bottom of the device has polarised glass with a polarising film. A common electrode must encompass the whole area of the LCD, and liquid crystal material must be placed above it.

The second piece of glass that follows has another polarising film on top and an electrode in the shape of a rectangle at the bottom. The fact that both parts are maintained at right angles must be taken into account. The light will be reflected by the mirror and bounced back as it passes through the front of the LCD without any current. The liquid crystals between the common-plane electrode and the electrode shaped like a rectangle will untwist when the electrode is linked to a battery by the current from it. As a result, the light is prevented from passing. That specific rectangle looks to be empty.

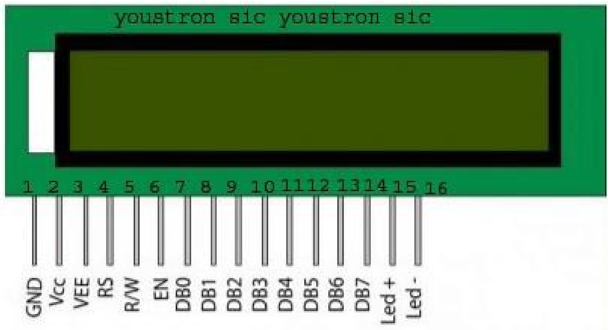


Fig5.LCD Display

e. RF TRANSMITTER AND RECEIVER

This circuit makes a wireless remote using an RF module (Tx/Rx) that may be used to control an output from a distance. The RF module, as its name indicates, sends signals via radio frequency. These transmissions take place at a certain frequency and baud rate. Only a receiver set up for that frequency can pick up these transmissions. In this system, a four channel encoder/decoder pair has also been employed. At the transmitter side, four switches are used to take the input signals, and a set of four LEDs are used to monitor the outputs in accordance with each input switch. The circuit may be utilised to construct a system for remote appliance control.Every domestic appliance can be driven by the relevant relays linked to the receiver's outputs. This transmitter/receiver (Tx/Rx) pair of this radio frequency (RF) communication system uses Amplitude Shift Keying (ASK) at a frequency of 434 MHz. The transmitter module receives serial input and uses RF to send these messages. The receiver module, which is installed far from the source of transmission, receives the broadcast signals. The technology enables transmission and reception, or one-way communication, between two nodes. Four channel encoder/decoder ICs have been utilised in combination with the RF module. Here, the encoder and decoder are represented by the HT12E and HT12D, respectively. The encoder changes the remote switches' parallel inputs into a collection of serial signals.Via RF, these signals are sent in serial to the receiver site. The serial format is decoded by the deco'er after the RF receiver and the original signals are obtained as outputs. You may see these outputs on the respective LEDs. The HT12D remains in standby mode and uses relatively little current (less than 1A) for a voltage of 5V when no signal is received at the data pin. The HT12D's DIN pin (pin 14) receives the signal when it is received by the receiver. Oscillator of HT12D activates upon signal receipt. The serial data is subsequently decoded by IC HT12D, which also triple-checks the address bits. The data bits are placed on the HT12D's data pins (pins 10–13) and the VT pin is made high if these bits match the local address pins (pins 1-8) of the HT12D.The decoder's VT pin (pin17) is wired up to an LED. This LED functions as a transmission validity indication. Hence, the data pins of the decoder IC create the matching output. By lowering any or all of HT12E's pins 10 through 13, a signal is delivered, and a matching signal is received at the receiver's end (at HT12D). Ics configure the address bits. Address bits at the encoder and decoder Ics must match in order to deliver a specific signal. By adjusting the address bits, several RF receivers operating at the same frequency. In summary, each transmission involves the transfer of 12 bits of data, including 8 address bits and 4 data bits. At the receiver's end, the signal is received and sent into the decoder IC. When address bits match, the decoder turns the address information into parallel data and lowers the matching data bits, which may subsequently be utilised to control LEDs. The outputs from this system can be integrated at data pins as NOT gates (like the 74LS04) or utilised in negative logic.

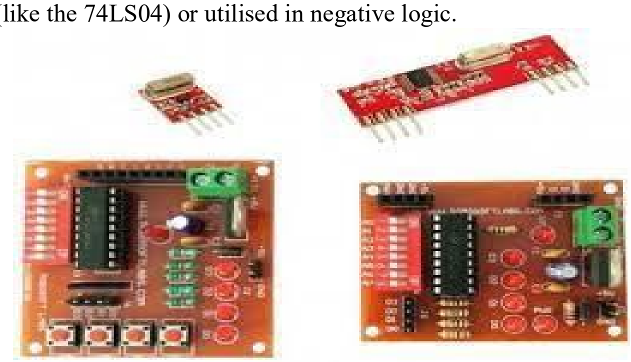


Fig6.RF Transmitter and Receiver

f. VOICE BOARD

Fig7.Voice board

The Voice Record Module is based on the ISD1820, a device for recording and replaying numerous messages. True single-chip voice recording, non-volatile storage, and 8 to 20 second playback are all features available. The sample is 3.2k, and the whole recording time is 20s. The use of this module is quite simple, and you may direct control it with a push button on the board or with a microcontroller such an Arduino, STM32, Chip Kit, or another. You can easily handle record, playback, repeat, and other functions from these. Once the RECLED lights up, press the REC button again to finish the recording. Turn off the REC button. choose "Playback mode" PLAYE will play the entire record or turn off with a single click of the button; The PLAYL button must always be pressed in order to halt or finish recording or playback; The record will continue to replay each time the P-E pinafore is cut short or the power is turned off. When the FT pinafore is shortened in FT mode, all of your MIC input will be sent to the speaker for playback. Recording (REC) (REC) High level is effective; the chip will begin recording as soon as REC rises (regardless of whether the chip is playing sound or in the power-saving state). The recording level (REC) must be kept high. The recording cycle finishes when REC falls low or the memory is full. The chip then automatically inserts an end of information mark (EOM) so that any ensuing replay operations may be halted in time. The chip then switches automatically into a power-saving mode.

Note: The rising edge of REC features an 84 millisecond anti-shake to stop keys from being accidentally activated. Edge-triggered playback (PLAYE): The chip begins to play when there is a rising edge at this end. As soon as the chip reaches the EOM mark or the end of the memory, the sound stops and the chip enters power conservation mode. Release PLAYE after you've finished playing. Level trigger playback (PLAYL): The chip starts playing when this end switches from low to high. Continue until this end hits an EOM mark, memory bundle, or returns to low level. It will automatically enter the power-saving state when the sound has finished playing. Recording indicator (RECLED): This end is low and can drive an LED when it is in the recording mode. Also, enter a Low-level pulse when the playback reaches the EOM point. You may use this pulse to activate PLAYE in order to implement loop playback. MIC: Microphone input: The preamplifier included inside the chip is linked to this end. The preamplifier's gain is managed by the on-chip automatic gain control circuit (AGC). outside microphone through a series capacitor, connected to the secondary end. The chip frequency band point's low frequency cut-off is determined by the coupling capacitance value and the 10K input impedance at this end. A microphone example (MIC REF).

The preamplifier's reverse input is located at this terminal. Noise may be minimised and the common mode rejection ratio can be raised when the microphone is linked differentially.

III.SOFTWARE DESCRIPTION

a. *PROTEUS SOFTWARE DESCRIPTION*

The Proteus model was used to create the proposed system that will be discussed in this phase. The simulation circuit was created with the Proteus programme utilising the appropriate Proteus components in order to produce the desired output. We'll go into more depth about this simulation circuit below. The Proteus dependability manager and object factory are described in this chapter along with their design and present state of implementation. Furthermore detailed are the application requirements and the categories of Aqua applications that Proteus presently supports. The doorway, another Proteus component**.**

b. *WORKING OF THE PROTEUS*

Application Model

This section describes the type of applications that are supported by the current implementation of Proteus.

Distributed Application Features

Aqua applications using the current implementation of Proteus may exhibit the following properties:

- ✓ The app can communicate synchronously or postponed synchronously. When two objects communicate synchronously, the request from one object is blocked until the response is received from the other object. Deferred communication occurs when one object retains a request-reply structure after sending a request to another object without blocking. The application's CORBA objects can perform both client and server functions.
- ✓ Any CORBA object in the application may communicate with multiple applications.
- ✓ Any CORBA object in the application may have stated.

In this thesis, synchronous communication. Hierarchical method invocations are possible in the programme. Consider the scenario when object A requests something from object B. Object B could ask object C a question before answering to object A. It is possible to create applications without using the Aqua architecture. Aqua only has a minimum level of integration since the application was created in a way that prevents replication. Only two more CORBA methods for each object must be defined in order to integrate an application to use Proteus. The state of an object can be transferred using these techniques. There are no modifications required for an item if they don't need to be duplicated.

- ✓ Application Conditions The specifications placed on an Aqua application are listed in this section. Each need is classified as either an implementation limitation or a design restriction. The easing of the constraints imposed by the existing implementation is covered in Section 6.2.
- ✓ The CORBA Life Cycle and Naming services cannot be utilised by the application. The fact that Proteus must handle object creation prevents the usage of the Life Cycle service. It is possible to directly utilise Internet Object References for object binding instead of the Naming service (IORs). This is often accomplished by having the programme read a file with the necessary IOR. The design imposes these requirements.
- ✓ The programme is unable to make advantage of standard asynchronous communication. Communications can either be synchronous or postponed synchronous. The present version of Proteus imposes this condition.
- ✓ An object must be deterministic if it has to be reproduced. When two replicas receive an ordered series of messages, determinism states that both replicas will be in the same state once all the messages have been processed. In most cases, this necessitates preventing an object from utilising non-deterministic features like threads, random number generators, and timestamps. Moreover, the object must use the Aqua architecture for all communication. Because Proteus's present implementation only supports the active replication technique for Aqua applications, this need is necessary.

Replication is not possible for an object created using a threaded ORB with non-deterministic scheduling, delayed synchronous communication, and communication with multiple objects. When the desired QOS cannot be maintained or when it has been attained. For Aqua applications, the dependability manager also offers fault handling. The dependability manager assesses the system setup based on faults found by other components and either fixes the issue or contacts Quo. A CORBA object process plus a gateway process make up the dependability manager. This section explains the implementation of the CORBA object that is used to connect with the other system components as well as the functional interface to the dependability manager. The adviser makes choices on how to set up the system.

c. Protocol Coordinator

The CORBA object used to connect with Quo, object factories, and application gateways is the protocol coordinator. The dependability manager's data structures that track the system configuration are likewise managed by the protocol coordinator. The protocol coordinator invokes the relevant procedure in the advisor whenever an unexpected event happens while configuring the system. The following methods make up the protocol coordinator's CORBA interface:

View change - The Aqua application gateways call this method to report Maestro/Ensemble view changes. The protocol coordinator uses information about view changes to decide if the change was brought on by a crash failure, a configuration change that Proteus requested, or a combination of both. The advisor is contacted to take action for each replica that has crashed if the view change is the consequence of a crash.

*Registe***r** – An object factory uses this method to register itself. The dependability manager replies to the factory to let it know that it has successfully registered itself after building up the internal data structures to support a new host in the system.

Starts reply – This method is called by an object factory to report the status of a request made to start an application.

Kill reply – This method is called by an object factory to report the status of a request made to kill an application.

Load reply – An object factory will use this method to report the host's load. This might be as a consequence of the dependability manager making a request for the load or as a result of the object factory periodically updating the load.

New expectedregion – The dependability manager communicates with QUO using this technique. When the remote application's QOS is first provided or changes as a result of adaptation, this function is called.

The advisor's instructions are also carried out by the protocol coordinator. The two methods inside the protocol coordinator utilised by the adviser in the dependability manager's present implementation are start and kill. According on the advisor's recommendation, the protocol coordinator calls start or kill on the appropriate object factory. The mechanism for dynamically reconfiguring Aqua application gateways will remain within the protocol coordinator in future implementations, which is why there is an additional level of abstraction for launching and destroying replicas. Timers are used by the protocol coordinator to monitor system settings. If the predicted view change from starting a replica does not occur within a certain window of time, or if the factory response to a start request does not come within a certain window of time, the adviser is alerted of a start failure. Keep in mind that the dependability manager becomes non-deterministic when timers are used.

d. *The Proteus Environment*

The Proteus PIC Bundle offers a comprehensive method for creating, testing, and digitally prototyping embedded system designs based on Microchip Technologies TM series microcontrollers. With the aid of this programme, you may simulate the circuits you design and execute schematic capture. During this lab session, PROTEUS will be used to demonstrate its use, and you are then invited to learn how to use the programme interactively.

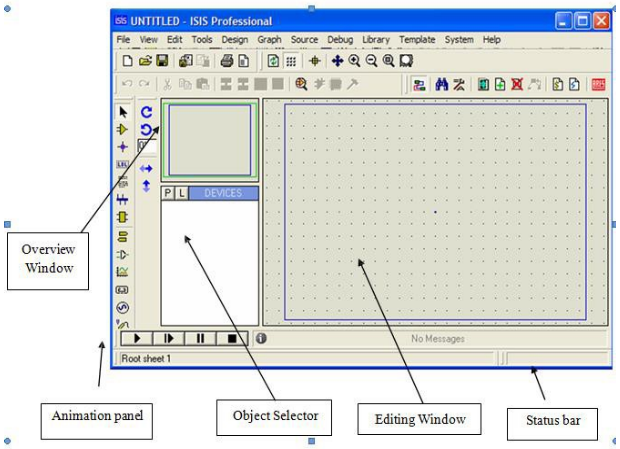


Fig8.IDE for Proteus environment

To add the ARDUINO UNO to the Object Selector, enter "ARDUINO UNO" in the Key words box and double-click the resulting link. The LEDs, buttons, crystal oscillator, capacitors, 7 SEG-COM- Cathode, and resistors should be treated similarly. Close the Library Browser once you've picked every component for the design and left-click once on any component in the Object Selector. Place the component on the schematic by left-clicking on the Editing Window. Repeat this method for each component on the schematic.

e. *Attaching the HEX File*

- In order to correctly mimic the design, the following step is to attach the HEX file to our design. The following steps are how we do this.
- It is necessary to specify which file the processor is to run. In our example this will be filename. Hex (the hex file produced from MPASM subsequent to assembling filename.asm).
- Right-click on the PIC schematic component, then left-click on the part to connect the file to the processor. The Modify Component dialogue form, which has a field for Program File, will then appear as a result. if the filename hasn't previously been supplied. Hex either manually input the file's path or use the button to the right of the field to browse to the file's location. Press yes to close the dialogue form after choosing the hex file to execute. The source file has now been added to the design.

f. *Debugging the Program (Simulating the Circuit)*

Place the cursor on the Play button on the animation panel at the bottom right of the screen, then click left to mimic the circuit. The duration of the animation should be displayed in the status bar.

IV. RESULT

a. *Receiver output before signal is received.*

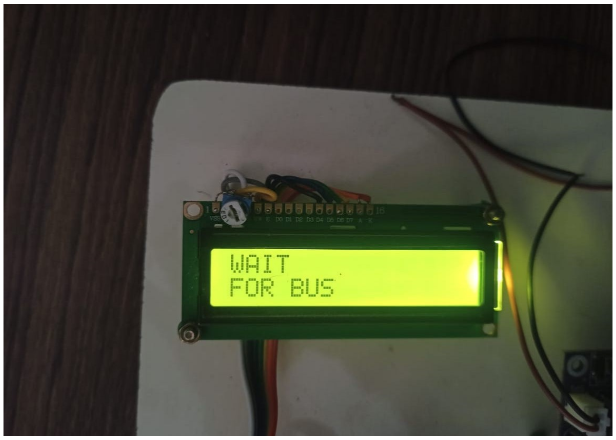


Fig9.Receiver output for before signal is received

b. Receiver output after signal is received.

Fig10.*Receiver output for after signal is received*

c. RF Transmitter Section

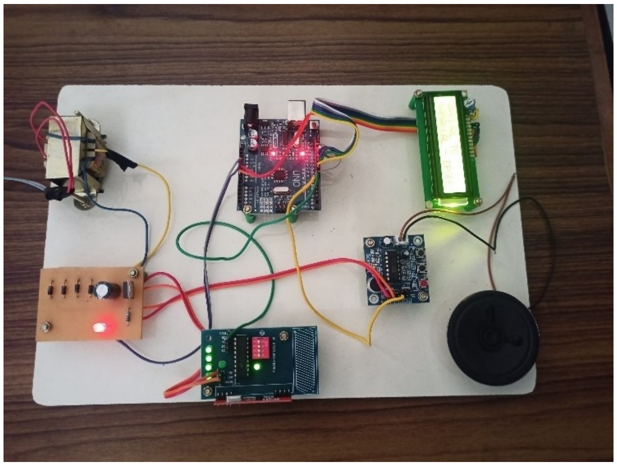


Fig11.RF Transmitter section

d. RF Receiver Section

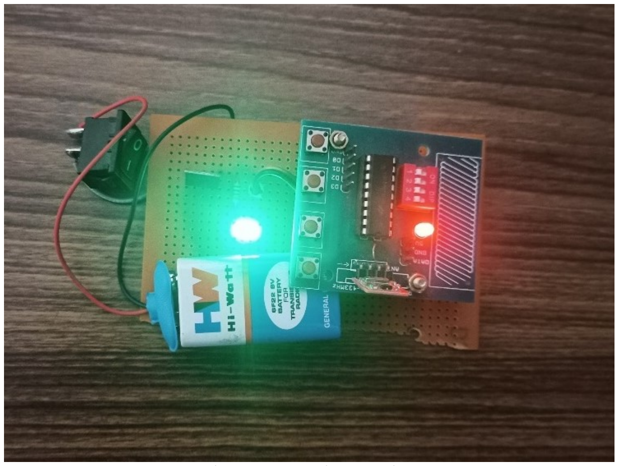


Fig12.RF Receiver section

V.CONCLUSION

The signal from the equipment placed on buses that comprise each bus site will be polled using the RF Trans-receiver. The location of the adjacent bus terminal is used to further analyze this data. It is processed by Arduino coupled to an RF Trans-receiver and shown on the screen if it is within the range. Also, if information transmitted through an RF signal matches the position of the bus depot, it is saved immediately at the depot bus stop. RF Technology has been chosen as the platform for this sort of system. The reason is because practically everyone has access to this technology for wireless communication, since it has developed on an enormous scale. As there is no need for physical intervention, it makes access simple for all users.

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