#### **SMART BUS STOP**

### K. Amogha<sup>1</sup> C. Sai Sahithi<sup>2</sup> I. Harish<sup>3</sup> Student

Dr. Y. Sreenivasulu Professor

Department of Electronics and Communication Engineering, Sreenidhi Institute of Science and Technology, Ghatkesar,Hyderabad, India.

#### Abstract—

The primary goal of this project is to provide a common man bus service in rural areas while also avoiding the expenditure of unnecessary funds. In India, public transportation is frequently problematic, particularly in rural areas. It is difficult to arrange buses from town to village every day especially for the villages that are located far away from towns, cities etc. We will address this issue to some extent by implementing a system that indicates the number of passengers waiting for the bus at a bus stop, and the buses will be operated in accordance with that indication. At the bus depot, a screen will display the number of passengers at the bus stop; if the number of passengers is less than a certain threshold, the buses will not run that day because the cost of travelling to and fro is higher. This system could help to avoid unnecessary financial waste. We frequently see the street lights glowing during the day in many places; these lights are supposed to be turned off early in the morning, but due to the negligence of the linemen, these lights are glowing irregularly, particularly in rural areas. Every day, a lot of energy is wasted in this regard; to save this, automatic street light control instruments are essential. As a result, this project is developed, which automatically turns on the street lights when natural light disappears and turns them off when natural light returns. The control circuit is built with an LDR and a 555 timer.LDR is a type of optical sensor that functions as a variable resistor based on light intensity. The components used are an RF transmitter, an RF receiver, an 89C51 Microcontroller chip, an alarm, a bus release key to keep track of the passengers, and an LCD to display information about the passengers. At the receiver side, a bus stop is provided and a key which is used to count the number of passengers travelling. To track the people, a camera will be placed at the bus stop and live streaming will be performed. The entire receiver unit is controlled by a microcontroller designed as a wireless ID card.

Keywords- Microcontroller, Liquid Crystal Display (LCD), Light Dependent Resistor (LDR).

#### I. Introduction:

In India, public transportation is frequently problematic, particularly in rural areas. It is difficult to arrange buses from town to village every day especially for the villages that are located far away from towns and cities. This system consists of an RF transmitter and receiver, with the passenger's information transmitted via a camera mounted on the receiver side. To control the entire operation, a microcontroller is used on both the transmitter and receiver sides. Bus transportation regulation must ensure that services are provided in accordance with government policy, which can include rural service accessibility, rural poverty reduction, private sector development, and public safety. It must ensure that the public's need for mobility is met, that the services provided are of adequate quality and safe, both for the general public and users, and that fares are reasonable and proportionate to the level of service provided. Regulation is divided into three axes: 1) quality, 2) quantity of service provided, and 3) fares. Fares must, without a doubt, be reasonable given the importance of mobility in rural areas, both economically and socially. However, expecting the private sector to provide service at a loss or forcing operators to waste time and money on administrative procedures that are frequently required to apply for fare increases is counter productive. The project described here is also quite useful for the state electricity departments; generally, the line men, whether the person belongs to the electricity department or the municipality, it is his duty to turn on the street lights in the evening, preferably after the Sun has set, and also is supposed to switch off these lights in the early morning, when the natural light returns Because of the negligence of linemen, these lights frequently remain on

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during the day at many locations. A lot of energy is wasted in this regard, resulting in power outages. There are numerous reasons for power outages; this reason can be added to the list and highlighted. Because of the vast differences in energy production and consumption, energy consumption and distribution have recently become hot topics of debate. According to surveys conducted by many experts, the produced energy is insufficient to meet the demand, particularly in our country, where production is only 70% while demand is 100%. In such a critical situation, energy should not be wasted due to negligence; it is everyone's responsibility to save energy in all possible ways; otherwise, everyone in this country will suffer as a result of the frequent power outages.

#### A. Objective:

To develop a project that provides bus service in rural areas, where transportation is customarily problematic while also evading the unnecessary expenditure of funds. This project has been undertaken which benefits the nation by reducing power waste. The idea is to automatically turn on the street lights in the evening and turn them off early in the morning. Because the main goal of the project work is to save energy, instead of using conventional energy, non-conventional methods can be implemented to power the street lights; one of the best and most dependable methods is to use solar energy.

#### **II. Literature review:**

#### Existing method:

The current system doesn't have an objective for finding the best possible solution to avoid the unnecessary financial wastes, which has led to the crisis in the bus transportation department in the recent times. Earlier, there was no proper solution for the people, who were waiting for really long hours for the arrival of the bus at the bus stations. This would waste a lot of their time and energy in just waiting for the bus. However, the bus operator had no idea regarding the number of passengers who are going to board the bus that particular day. In this case, the operator without any information about the number of passengers willing to board the bus, that specific day, operates the bus which inturn results in the loss of revenue for the transportation department and also the fuel needed to run the vehicle, if the passengers are very less.

#### Proposed method:

The proposed system ensures to save the time of the passengers and also the time slots to be provided for operating the bus. The revenue of the bus transportation is saved by this approach. The existing system just makes sure that the transportation is done, but it is not done in an effective way considering the above parameters. This is addressed in the proposed system. The main idea in the proposed system, is to find a solution to the bus facility in rural areas to reduce the financial waste or losses. Along with this system there is also a concept of street lighting. The passenger details at the each bus stop are sent to the main bus station through the RF technology, here we have the passenger details displayed at the bus station on an LCD display. In the proposed system we see the project split into 2 major functional areas i.e. the Transmitter side and the Receiver side.

### Juni Khyat (UGC Care Group I Listed Journal) III. Methodology

# A) Block Diagram



Fig 1. Block Diagram

*B)Hardware Specifications 1. AT89C2051 microcontroller* 



Fig 3.1 AT89C2051 microcontroller

2. AT89C51 microcontroller



Fig 3.2 AT89C51 microcontroller

3. NE555 timer



Fig 3.3 NE555 timer

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Fig 3.4 7805 – Voltage Regulator



Fig 3.5 Relay



Fig 3.6 BC547 Transistor



Fig 3.7 Transformer



Fig 3.8 ESP32 camera

5. Relay

7. Transformer

8. ESP32 camera

6. BC547 Transistor

#### Juni Khyat (UGC Care Group I Listed Journal) 9. RF transmitter and Receiver

Fig 3.9 RF transmitter and Receiver



Fig 3.10 Resistors



Fig 3.11 Capacitors



Fig 3.12 LDR Sensor



Fig 3.13 LCD display

10. Resistors

12. LDR Sensor

11. Capacitors

13. LCD display

### Juni Khyat (UGC Care Group I Listed Journal) 14. LED's



*Fig 3.14 LED's* 

15. Push button



Fig 3.15 Push button

# IV Working and it's Principle

The system uses an RF transmitter and a receiver which will monitor the number of the passengers at the bus stop. At the receiver side, bus stops are present and at the transmitter side a bus depot is provided which consists of buses. The passengers at the receiver side, have to press the button which will depict that the person is waiting for the bus. As soon as the passengers start pressing the button one after the other, the count gets incremented and the driver knows the count of the passengers, so as to operate the bus accordingly. A camera is also provided to monitor the people waiting at the bus stop and also to cross-check the exact count of the passengers waiting to board the bus. Live streaming is done at both transmitter and receiver side, so that the driver can see the passengers waiting at a particular stop. Here we will set a critical value / threshold value i.e. If the count of passengers are less than the critical value, then the bus will not operate in order to save the fuel costs and revenue. The whole scenario is controlled by a micro controller which is present at both the receiver and transmitter sides.

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V Results Case 1 :



Fig 5.1 Case 1



Fig 5.2 Case 2

*Case 2 :* 

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Fig 5.3 Case 3



Fig 5.4 Case 4

*Case 4* :

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*Case 5 :* 



Fig 5.5 Case 5

*Case 6 :* 



Fig 5.6 Case 6

# Description-

*Case I:* When the passengers do not press the button, the count is "zero" and the bus status is "not started."

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*Case 2:* When the button at one of the bus stops is pressed. The counter value increases as the button is pressed.

*Case 3:* When the button is pressed, the counter value is incremented, and the count and status of the bus are displayed as a result.

*Case 4:* When the count value is greater than or equal to the threshold value. The total count is displayed, and the bus status is "Started."

*Case 5:* When the natural light is on, the streetlight near the bus stops is turned off. Because of the presence of natural light, the streetlight in the above image is turned off.

*Case 6:* When the natural light goes out, the streetlights at the bus stops come on. The light glows in the above image when there is no natural light, demonstrating the LDR sensor's operation.

### **VI Connections:**

. 230 V A.C. is given as input to the transformer. The output obtained from the transformer is given to the voltage regulator 7805 to convert it into +12V and -12V respectively

. At the Receiver side, the transmitter and receiver pins of the 89C51 microcontroller are 11 and 10 respectively. However, at the

transmitter side, the transmitter and receiver pins of the 89C2051 microcontroller are 3 and 2. LCD and motor are connected at the receiver side.

. The 8 pins of the LCD can be connected to any of the 40 pins of the corresponding 89C51 microcontroller at the receiverside. Generally, Relay and LDR sensor can be connected to any of the ports of microcontroller.

. Whereas at the Transmitter side, Relay is connected to port 1; i.e. 7<sup>th</sup> pin of the 89C2051 microcontroller and LDR is also connected to port 1; i.e. 6<sup>th</sup> pin of the 89C2051 microcontroller.

. Subsequently, the key is connected to port 1;  $5^{th}$  pin of the 89C2051 microcontroller at the reciever side. Relay is also connected to port 2;  $0^{th}$  pin of the 89C51 microcontroller. Buzzer and key are connected to the ports 2 and 1 respectively to the  $5^{th}$  and  $0^{th}$  pins of the microcontrollers.

. Relay has 5 pins of which, the 1<sup>st</sup> pin is the supply pin. The voltage required from 7805 regulator is mentioned here. However, the 2<sup>nd</sup> and 3<sup>rd</sup> pins contain a rod for flux generation. 4<sup>th</sup> pin normally closed N/C pin. Whereas, the 5<sup>th</sup> pin is normally open pin (N/O), where an LED is connected to demonstrate the street light functioning.

. Here, both LED and LDR sensor requires a voltage of 5V

.The operating voltage of the given Relay is 12V.

# **VII Advantages and Applications**

#### ADVANTAGES

- . Reduces the current financial crisis of the rural bus transportation system
- . It is extremely useful in remote areas.
- . This system is very effective where both the passenger and the bus operator are beneficiary.
- . Saves the time and energy of the people from waiting for longer hours.
- . LDR sensors are simple to install over streetlights.

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. The automatic street light mechanism saves up to a lot of energy.

### **APPLICATIONS**

. Widely used in public transportation sector.

. Finds it's major application in providing effective transportation facility especially in rural and remote areas.

. The automatic street light system can be installed in all the bus stops, both in rural and urban.

### **VIII Conclusion**

The initial goals were successfully designed and achieved. Following the design of the overall system's circuit and programming is done for each sub-system. This project work, "Bus Facility in Rural Areas to Reduce Unnecessary Financial Waste," has been successfully designed, tested, and fabricated. Because it is a prototype module, the system is designed with only two bus stops and a main bus station, with two streetlights provided at the bus. The implementation, execution as well as simulation is successfully achieved.

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