QUEUE MANAGEMENT SYSTEM

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certified that this project report **"QUEUE MANAGEMENT SYSTEM"** is the bonafide work of "**JANAGAVISHNU.P, PARTHIBAN.P, SURIYA PRAKASH.S UDAYA KUMAR.R"** who carried out the project work under my supervision.

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ABSTRACT

Queue management system brings you increased revenue by reducing turn-away, reducing no-shows and shifting excess demand to off-peak hours, all resulting in more tables filled by empowering your customers with the freedom to wait for a table where they want and how they want. Thus you decrease their perceived wait time. This results in an increase in the amount of time that they're willing to wait for a table, which in turn results in less turn-away. Products are consumed, but services are experienced. Queue management system gives your customers a more satisfying experience, which can give you an enormous edge over your competition. Queue management system reduces your customers' perceived wait time, even if their actual wait time doesn't change at all.

In this project, Queue Management is achieved by wireless electronic tokens using RF technology with decoders & encoders. The customer delivers the bill at delivery counter, collects an electronic token & goes to wait at his/her place of convenience until the ordered items are ready. Once the items are ready, the delivery person presses a button at the delivery counter corresponding to the token with the customer whose order is ready.

Now a LED glows in the token with the customer, notifying the customer that his/her order is ready. The customer then proceeds back to the delivery counter, returns the electronic token & collects his/her order.

Key words: Queue management system, RF Technology, Decoders, Encoders.

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CHAPTER 1

INTRODUCTION

It is difficult to maintain queues in cash and carry cum self-service restaurants. In such restaurants, the customer waits near the delivery counter till his/her entire order is ready. This creates unnecessary crowding at the counter.

1.1 OBJECTIVE:

We aim to create simple and cost effective electronic tokens as a solution for this issue. When the customer places the order, an electronic token with a specific number is handed over and the customer is requested to get seated.

At the delivery counter, the customer's bill/order sheet is clamped next to a button numbered same as the token given to the customer.

Once all items in the bill are ready, the particular button is pressed and an LED lights up in the token notifying the customer to come and collect the items from the delivery counter.

We aim to achieve a solution to this problem by using Radio Frequency technology to operate electronic tokens.

1.2 QUEUE MANAGEMENT SYSTEM

Queue Management System is all about managing your flow from the point customer enter and until finishing their transaction. We can make a real difference in the way your customers wait and ensure about to improve your customer service & business productivity. The level of service and efficiency has increased with the use of Queue Management System, resulting in an increased customer satisfaction.

The Queue management system solution priority for all service oriented organizations in ensuring the first class services to their valuable and respectable customers. Several industries like banking, airlines, government services divisions, hospital, clinics, insurance companies, restaurants, hotels, retail and other front counter services have been fast deploying Queue management system solutions for the customer services enhancement.

1.3 WORKING PRINCIPLE:

The working principle is based on Radio Frequency transmission. The remote switches for several electronic tokens are connected to the RF Transmitter through encoder. The purpose of encoder is to convert the parallel signals generated by the switches to serial data that is compatible for transmission by RF Transmitter. And also to give a unique address for each token in order to avoid cross activation or clashing of signals send to different tokens.

The transmitted serial data is received by a RF Receiver connected with a decoder whose address pins are connected in the same fashion as the transmitter's encoder while the corresponding switch is pressed in the transmitting section. The decoder converts its specific signal alone, which is identified using the address pin combination. Now the converted parallel data is send to activate the notification LED, which is connected across a data pin of the decoder and the supply. Thus the LED in the token turns-on notifying the customer.

1.4 MERITS:

- **Simple circuiting:** The circuits are simple with fewer components and without the need for any form of coding or software.
- **360 degree acceptance angle:** The remote can be operated from 360 degree angles to the receiver.
- **Better range:** Radio frequency offers long range even in the presence of obstacle.

CHAPTER 2

LITERATURE REVIEW

2.1 Development of an inexpensive remote radio control system for slide projection [1]

An inexpensive remote radio control system for slide projection has been developed. It consists of an electronic receiver/decoder designed for attachment to commercially available slide projectors and a self-contained, portable FM transmitter with a foldable (collapsible) antenna/pointer. The system allows remote lens focusing (forward and backward) and slide change (forward and reverse) to be accomplished over a 100-ft range. It offers desirable freedom of movement to the lecturer or behavioral researcher, by eliminating location restraints imposed by the extension cord.

2.2 A robust active queue management algorithm based on sliding mode variable structure control [2]

As an effective mechanism acting on the intermediate nodes to support end-to-end congestion control, active queue management (AQM) takes a trade-off between link utilization and delay experienced by data packets. Most of the existing AQM algorithms are heuristic, and a lack systematic and theoretical design and analysis approach. From the viewpoint of control theory, it is rational to regard AQM as a typical regulating system. Although the PI controller for AQM outperforms the RED algorithm, the mismatches in the simplified TCP flow model inevitably degrade the performance of a controller designed with classical control theory. In this paper, a robust SMVS controller for AQM is put forward based on sliding mode variable structure control (SMVS), its superiority is insensitive to the

noise and variance of the parameters, thus it very suitable to a time-varying network system. The principle and guidelines on design of a SMVS controller are presented in detail. The integrated performance is evaluated using ns simulations. The results show that SMVS is very responsive and robust against disturbances. At the same time, a complete comparison between the SMVS controller and PI controller is made. The conclusion is that both the transient and steady performance of the SMVS controller is superior to that of the PI controller, thus the SMVS controller is in favor of the achievement of AQM objectives.

2.3 Understanding the Roles of the Customer and the Operation for Better Queue Management [3]

Queuing, a familiar element of most service delivery systems has the potential for significantly affecting the customer's overall satisfaction with the service encounter. A customer's degree of satisfaction with waiting or with the service received in its entirety is dependent on the actual performance of the delivery system, the customer's expectations regarding that performance and the customer's perception of the service encounter. The actual operational performance of different queuing configurations has been previously addressed, as have the issues of managing customers' expectations and perceptions regarding their queuing experiences. This earlier research has identified several factors which can affect a customer's perception of waiting and consequently his or her satisfaction with that wait. Defines which queuing factors can be controlled by the firm, which factors can partially be controlled by firm and which factors are outside the firm’s control, and suggests tactics for managing queues for each category of factors.

2.4 Restaurant Revenue Management

Applying Yield Management to the Restaurant Industry [4]

In principle, restaurant operators should be able to apply the time-based philosophy of revenue management to restaurant meals. To do so, however, requires a revision in the way most restaurateurs traditionally have viewed sales. Most restaurants track item contribution margin, sales per server, revenue per day part, or similar operating ratios. A different type of measure, revenue per available seat-hour, integrates the duration of the meal as a factor in the revenue calculation. Certain elements of current-day restaurant practice, such as differential pricing (e.g., early bird specials, AARP discounts), promoting special events (such as wine tastings on off nights), and managing table turnover carry the seeds of revenue management, but few restaurants have established the necessary strategic approach to assemble those tactics into a coherent revenue-management strategy. This article seeks only to establish a framework for such a strategy, and not to set a practical road map for its execution

2.5 Queue management system [5]

A queue management system comprises a plurality of portable modules, at least one docking station, a queue manager, signal transmitting means, at least one module detector and a communication means. Each portable module includes a memory means containing a unique identification code, an indicator means, transmitter means for transmitting the identification code over a short range, and

docking means for downloading the identification code. The docking station registers the person in a queue by downloading the identification code for the portable module when docked. The queue manager maintains the queue sequence for each queue and includes a communication means for receiving the downloaded code. The signal transmitting means is associated with the queue manager for transmitting the signals to each portable module to instruct the person carrying the portable module to join the queue. The module detector detects transmitted identification codes from any portable module in its vicinity. The module detector is arranged at the queue to detect when the person carrying the portable module joins the queue. Finally, the communication means is arranged between the queue manager and the module detector to communicate any detected identification code to the queue manager.

2.6 Gee Air: a universal multimodal remote control device for home Appliances [6]

In Department of Computer Science, Zhejiang University, Zhejiang, China, Gang Pan, Jiahui Wu, Daqing Zhang, Zhaohui Wu, Yingchun Yang and Shijian Li, conducted a study for a universal multimodal remote control device for home appliances called the GeeAir. The control is via a mixed modality of speech, gesture, joystick, button, and light. The Gee Air enables different user groups to control home appliances effectively, satisfying even the unmet needs of physically and vision-impaired users while maintaining high usability and reliability. The experiments demonstrate that the Gee Air prototype achieves prominent

performance through standardizing a small set of verbal and gesture commands and introducing the feedback mechanisms.

2.7 Remote Control of Home Appliances with Mobile Devices [7]

Remote control based on mobile devices as mobile phones or PDA's, is considered more and more useful in many computerized applications. This paper deals with the implementation of functions, based on mobile devices, for the remote control of commercial home automation systems. Different solutions are considered and some problems concerning their implementation are discussed. A preliminary development of the interface used to control X10 modules or to interrogate a home database of the device state is here described. Some guide-lines for the interface design are also reported.

2.8 ZigBee Smart Home Automation Systems [8]

ZigBee is a kind of wireless network automation and distance control application technology targeted at low data transmission rates, low power consumption, and low cost. Initially, ZigBee was developed to support low data rates, low power consumption, a safe and reliable and low-cost wireless network. To address this need, ZigBee Alliance developed standardized application software in wireless IEEE 802.15.4. ZigBee still acts as the official testing and certification agency of ZigBee equipment. ZigBee is the sole standard-based technology to meet most distance detection, control and sensor network applications. The ZigBee standard is likely to gradually supersede Bluetooth in future marketplaces that require low power usage. ZigBee operates in the ISM band of 2.4 GHz, adopts a

direct sequence spread spectrum, and is expandable for as many as 255 units. It can transmit data in 10–75 m, at the rate of 10–250 kbps, decreasing with distance. The main advantage of ZigBee is power saving: one ZigBee device battery can last months to years. ZigBee is much like Bluetooth, but the main difference is that Bluetooth transmission rate is 1 Mbps, suitable for complicated applications. Thus, in simpler applications, such as home appliance control, ZigBee can be a substitute.

2.9 Research and Design on Remote Control of Home Furnishing Automation Based on the Switch Socket [9]

In order to realize the automation of home furnishing, and fully consider the feasibility and the expansion of demand, the wireless sensor network technology in intelligent home furnishing, will switch socket set for network communication interface, analyzing the wireless sensor in the switch socket at the network communication interface structure, proposed the socket to switch remote control technology, using TMS320F206 chip as the processor, AT86RF230 for wireless communication chip wireless sensor as a switch socket at the network communication interface. Experiments show that the remote control home furnishing can meet the requirements of low power consumption, transmission distance, accurate positioning, and electromagnetic compatibility requirements.

2.10 A context-aware multi-model remote controller for electronic home devices [10]

Chin-Feng Lai of National Cheng Kung University, Tainan city, Taiwan, Yueh-Min Huang and Han-Chieh Chao of National Ilan University, Ilan, Taiwan published a paper on the study for context-aware multi-model remote controller for electronic home devices. The paper was a result of difficult to define a universal standard conformed to home networks and also to eliminate reliance Web or PDAs to control the devices. In such situation, users must rely on computer equipment and face the battery problem of handheld devices.

CHAPTER 3

METHODOLOGY

The project works by the use of encoders and decoders to wirelessly control electronic tokens using RF technology. The prototype consists of three electronic tokens with different address pin combinations each and a transmitting section, which is capable of controlling the tokens by altering between the address pin combinations of each token. It has three individual switches for each token, which help encoder to switch between different address pin combinations.

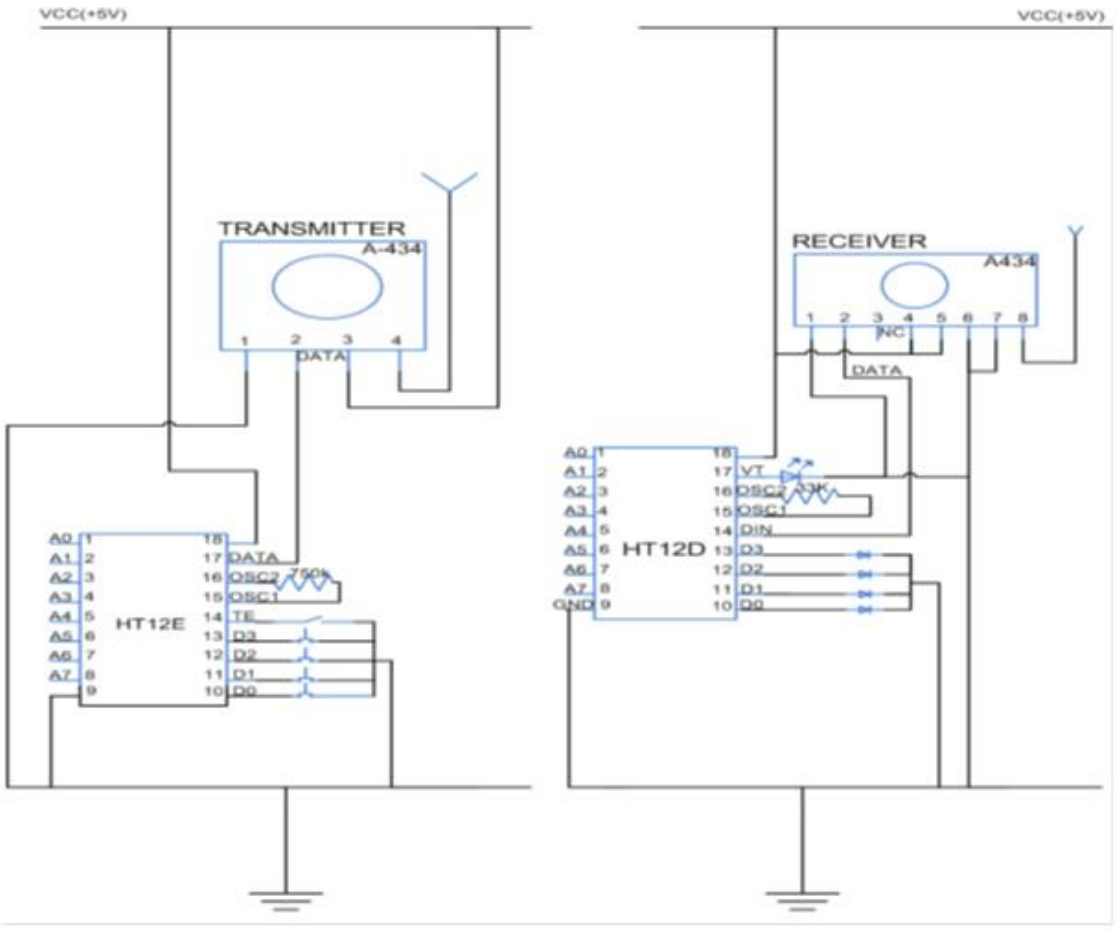

Figure 3.1 Transmitter-Receiver Circuit Diagram[11]

CHAPTER 4

COMPONENT DESCRIPTION

TABLE NO: 4.1 LIST OF COMPONENTS

Serial No.	Name	Range	Quantity
1	Encoder HT12E	4 channel	5
2	Decoder HT12D	4 channel	5
3	RF Transmitter	434 MHz	5
4	RF Receiver	434 MHz	5
5	Switch SPST	-	4
6	Decoder HT12D	4 channel	1
7	RF Receiver	434 MHz	1
8	Resistors	750 KΩ, 27 KΩ, 1 KΩ.	1 1 4

4.2 EXPLANATION OF COMPONENTS:

4.2.1 ENCODER:

The encoder used for our project is HT12E. In this encoder, there are total of 18-pins. Out of the 18, 8-pins (A0-A7) are used as the address pins, 4-pins (AD8-AD11) are used as address/data pins, one pin (VSS) for ground, one pin (VDD) for 9 volt DC power supply, 2-pins (OSC1, 2) for the oscillatory circuit, one pin (DOUT) as the output signal and one more pin (TE) is used for the trigger pulse.

The data pins (AD8-AD11) are used to provide the input data. The VSS pin is connected to ground. The VDD pin is connected to the nine volt battery (positive). The DOUT pin is connected to the data pin of the RF Transmitter. The TE pin is also connected to the ground. The oscillatory circuits, OSC1 and OSC2 are connected across a 750 KΩ resistor.

To transmit signal continuously when the user presses the switch, we have selected this HT12E encoder. We will explain how the signals are continuously transmitted. When the user presses the button, the trigger pulse pin comes to active low state and sends a synchronizing bit through the RF transmitter.

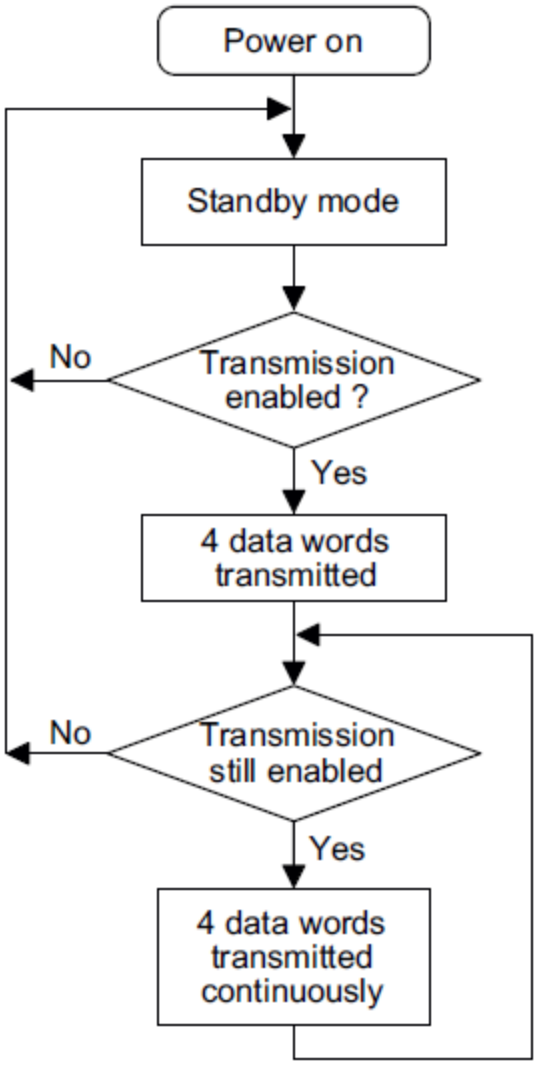

Figure 4.2.1 Encoder Flow Chart[12]

When the power supply is ON the encoder will be in stand-by mode. Once the trigger is received, the transmission is enabled. When the button or switch is pressed, the four data is transmitted. The encoder checks for the status of the button, if it is in on state, the transmission of the four data are still continued as shown in Figure 4.2.1. By disabling the oscillators, the decoder comes to stand-by

mode. Stand-by mode is nothing but the encoder remains in the ON state by using very less power of 1µamps.

4.2.2 RF TRANSMITTER & RECEIVER:

The RF transmitter used is of 434MHz. The reason why we have selected RF for data transmission is that it is very cheap and reliable. It is also used to serve longer connectivity range being very compact. The data is transmitted as signals for the particular frequency and baud rate, the receiver can only receive the signals if it is configured for that frequency. Amplitude shift keying is employed between the transmitter and receiver pair which 434MHz. A finite number of amplitudes is used by the Amplitude Shift Keying method, each having unique pattern of binary digits. So the communication exists only between the transmitter and the receiver section as shown in Figure 4.2.2.

Figure 4.2.2 RF Transmitter-Receiver Block diagram[13]

One way communication is allowed between the transmission and the reception nodes. The RF modules are connected with the respective set of four channel encoder and decoder IC's with them. The serial output from the encoder is given as the input to the RF transmitter. The RF receiver receives the serial signal from the transmission node and gives it to the decoder. The decoder converts the serial data into parallel data.

4.2.3 Transmitter Section:

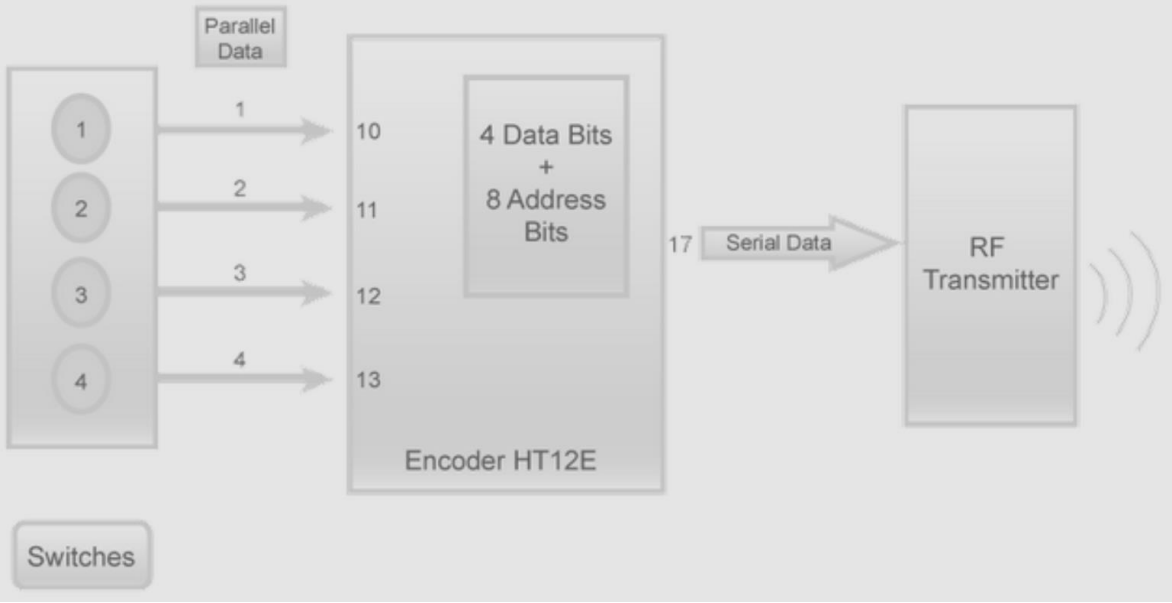

Figure 4.2.3 Transmitter Section[14]

The input data from the switches along with 8 address bits constitute a set of 12 parallel signals. The encoder converts this parallel signals in to serial bit. When the trigger pin 14 becomes active low, if it is provided with ground, enables the transmission of this serial bit. This serial bit data is given to the RF transmitter.

Upon receiving the serial data from the encoder, the transmitter transmits it wirelessly to the RF receiver as shown in Figure 4.2.3.

4.2.4 Receiver Section:

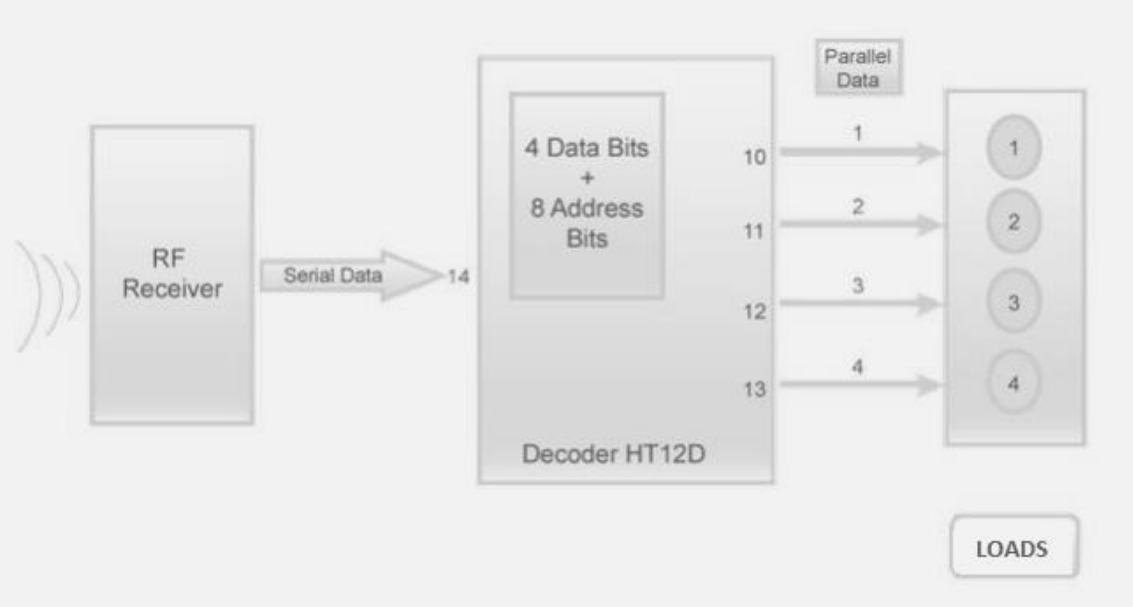

Figure 4.2.4 Receiver Section [15]

The decoder will be in stand-by mode when there is no signal received from the transmitter section and utilizing 1µamps current for a supply of 5 volt. When the RF receiver receives the signal from the transmitter, it is given to the pin-14(DIN) of the decoder as shown in Figure 4.3.4. Once the signal is received the oscillator gets activated. Then the decoder decodes the serial data and checks the address three times. The decoder puts the data bit on its data pin only when the address bits of the encoder (pins 1 – 8) and its local address bits (pins 1 - 8) matches and makes the pin 17 (VT) high. If a LED is connected to

the pin 17, it will glow indicating that the transmission is valid. The desired output is generated at the data pin of the decoder IC.

4.2.5 Decoder:

The decoder HT12D used for out project has same configuration as the encoder as we discussed previously except the pin 14 is the data input (DIN) and pin 17 is the valid transmission pin (VT). The resistor used to connect the oscillator here is 27 KΩ.

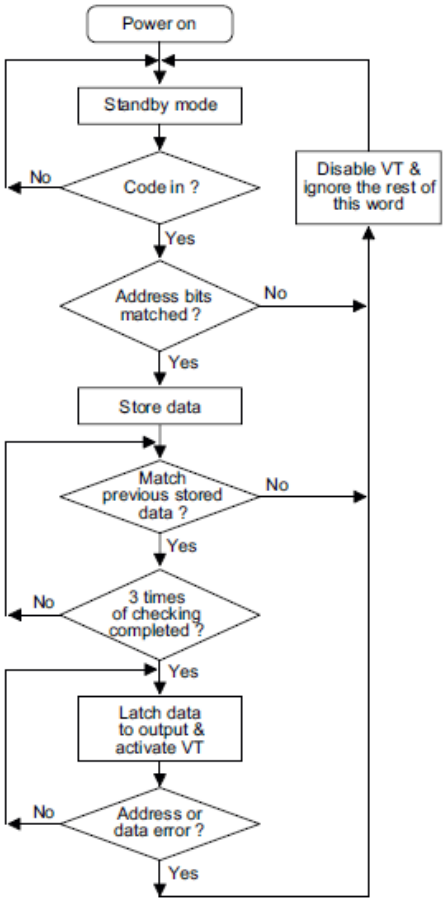

Figure 4.2.5 Decoder Flow Chart [16]

As explained previously when the input signals are received by the decoder the oscillators gets activated and starts to decode serial data input as shown in Figure 4.3.5. It checks the serial data input with its local address bits for three times and put it on the output data pins and activates the VT pin for indication. The data that is decoded by decoder becomes the latched data and remains unchanged until it receives other set of data.

CHAPTER 5

RESULT

A test run made on the working prototype, whose receiver section is connected to a LED. The LED is connected directly to the decoder's data pin. In the first case, close proximity test without any obstacle was conducted for the receiver (token) control. The results were powerful with spontaneous response. Next the receiving and transmitting circuits were kept approximately 100 feet apart and tested. Within the 100 feet test range, there were several obstacles like cupboard, doors, windows, etc. The results were satisfactory and the response was with a very small negligible time delay.

5.1 FIGURE OF WORKING PROTOTYPE

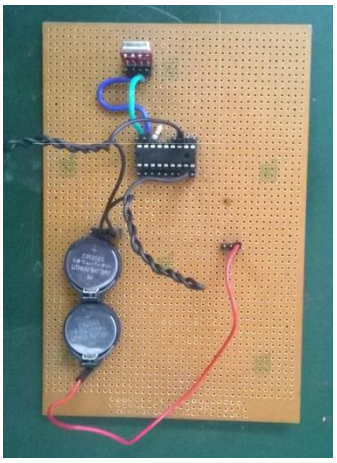

Fig. 5.1.1 Transmitter Prototype

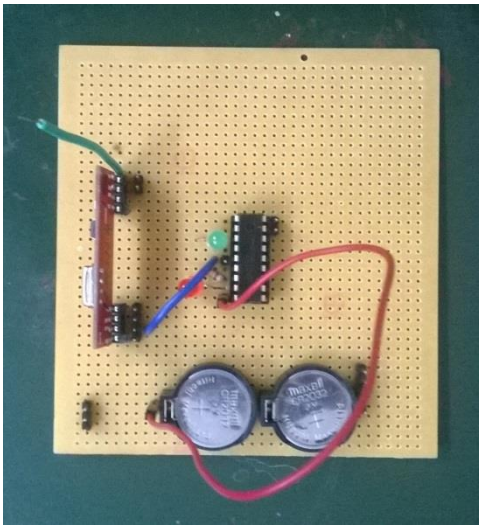

Fig. 5.1.2 Receiver Prototype

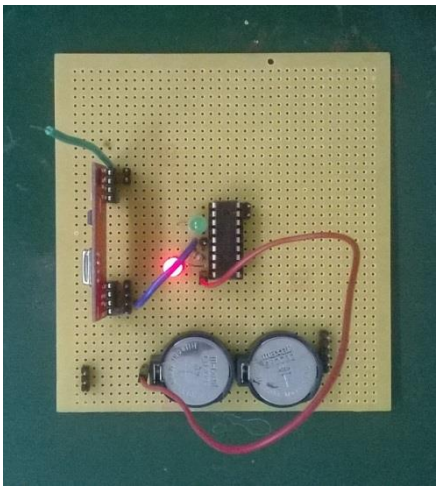

Fig. 5.1.3 Receiver Live

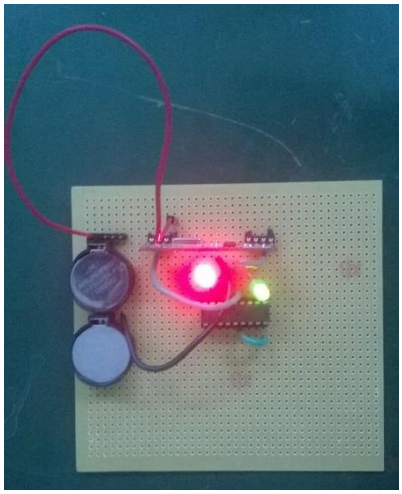

Fig. 5.1.4 Receiver Live & Active

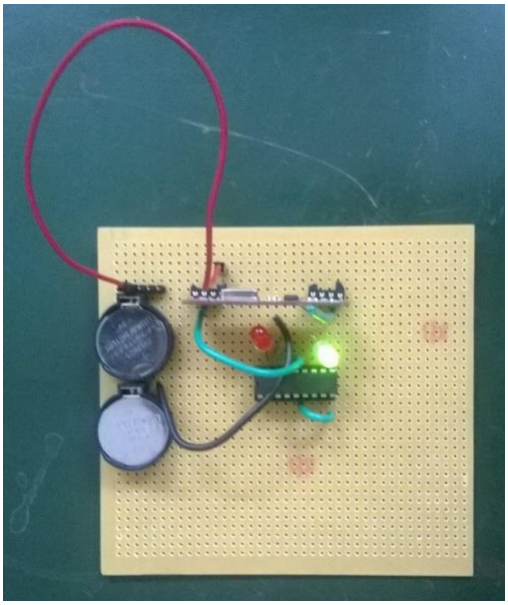

Fig. 5.1.5 Receiver Active

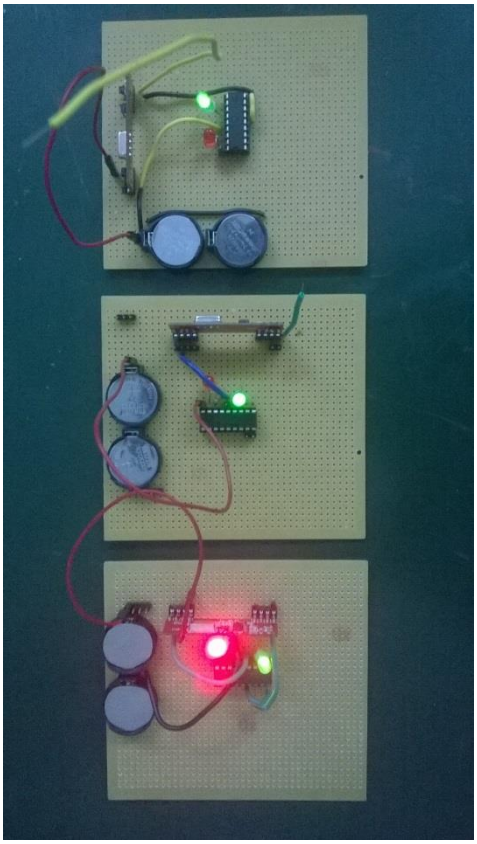

Fig.5.1.6 Two Receivers Active and One Receiver Live & Active

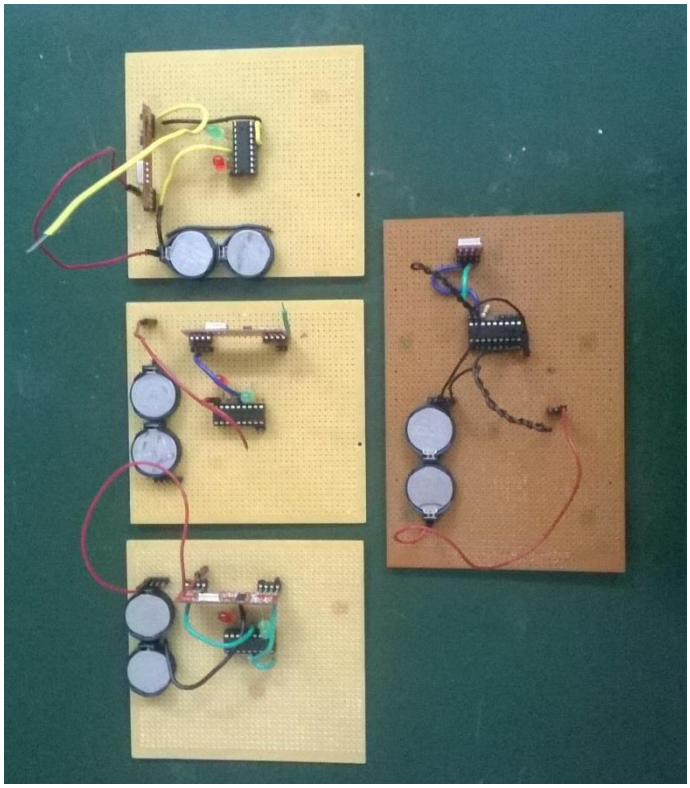

Fig. 5.1.7 Complete Setup

CHAPTER 6

COST ESTIMATION

TABLE NO: 6.1 COST ESTIMATION

Serial NO.	Components	Quantity	Unit Rate	Price
1	Encoder	5	35	175
2	Decoder	5	35	175
3	RF Transmitter	5	140	700
4	RF Receiver	5	140	700
5	Battery	12	20	240
6	Multi Strand Wire	1.5m	6	10
7	Bulb holder	1	15	15
8	Plug	1	10	10
9	Dot Matrix board	6	40	240
10	Switches	5	10	50
11	Soldering lead	2	50	100
12	Resistor	1pack	1	1
13	Connector	6	4	24
14	Insulation Tape	2	10	20

Total Cost	2460

CHAPTER 7

CONCLUSION

The most frequent complaint of the customer is the waiting lines. In addition waiting line is unrewarding .clearly something to be done about it. Waiting lines cannot and should not eliminate altogether. Some amount of waiting is should remain part of the attraction, but it should be made more manageable. With the introduction of queue management system, waiting itself can be managed.

Customer should spend their time elsewhere inside the restaurant like using the magazine shelf or kids play area, while waiting for a table. This will allow a more satisfying day for the customers and it makes waiting time to be more useful and revenue generating.

CHAPTER 8

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