Development of Wireless Sensor Node for Automization in Restaurant Services

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Abstract: To emphasize modernization in restaurant and hotel management, the electronics and information and communication technologies are significantly developed. Recently in restaurant and hotel management services encompasses many process to be atomized, out of which the catering and food servicing has prime importance. Considering this fact into account, the zigbee technology based wireless sensor network is designed to atomize the catering and food system, different WSN nodes have been designed using AVR Atmega 16 and established on each table. Each node is associated with touch screen note pad wherein the detailed menu card is electronically mode available. The WSN nodes are wirelessly connected to the control room or counter. The customer can place the order with the code numbers provided. The order coming from each table WSN node is processed centrally and conveyed to the kitchen for preparation and service wit corresponding table code. This system helps to realize not only atomisation but also user's friendly and reduces the time and man power.

Keywords: WSN node, Zigbee, Restaurant Services, AVR Atmega.

1. Introduction:

Nowadays, we all suffering a big disease in the world called as COVID-19. The coronavirus disease is an infection disease mainly transmitted through droplets generated when infected person sneezes, coughs or exhales. The solution is to avoid infection keep safe distance, clean your hand. Therefore, many researchers and designers are interested to develop smart and automatic instruments for sanitization, distance alarming, provide wireless or touch less services[1]. Considering this fact it is proposed to develop a smart wireless sensor network for automation in restaurant services. The development of the computer communication is the rapid development of microelectronics technology and due to great reliability and preciseness in data processing, the field of Wireless Sensor Network (WSN) is becoming more pervasive[2]. On deployment of wireless sensor network the field such as, agriculture, medical, chemical, defense, security environmental monitoring, traffic monitoring, food processing and preservation, automobiles, home automation, consumer and domestic appliances etc could be significantly modernized [3-4]. The Wireless Sensor Network combines input output devices, sensors, computing and communication into a single tiny device. These wireless sensor network senses the physical environment with the help of sensor or some manually added the information using keypad and takes the suitable control action based on its observations and accordingly performs the operations. Because of these ubiquitous features WSN technology is proved to be effective in designing of automation in traditional hotel services system. Moreover, traditional restaurant management system usually used to take customers orders by written on a paper, which needs a person to go near customer table and show menu card. So it may be time consuming to reach the order kitchen person after placing the order or some time mistake to write or listening order. Therefore, wireless sensor network is suitable solution to send the order proper person without mistake. The customer send his own order self to available wsn node on table. It is also found that many wireless network devices are available in the market to establish wireless sensor network [5-6]. The devices such as Bluetooth, Zigbee, WiFi module etc. However, for garden or large area restaurant or hotel Zigbee is suitable solution to develop network. Therefore, considering the facts of embedded technology [7-10], AVR Atmega 16 based smart WSN node design for restaurant services and presented in this paper.
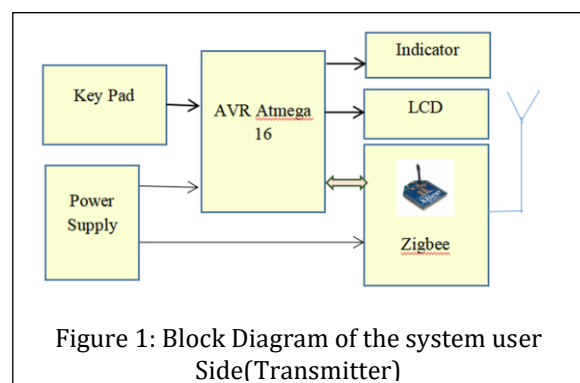
2. Hardware Design:

Figure 1: Block Diagram of the system user Side(Transmitter)

The present system distributed in to three section and represent in the form of block diagram. Figure 1 depicts the block diagram of user or customer side. The receiver section is divided into two part kitchen and counter side and shows in figure 2 ad figure 3. the system is designed using AVR Atmega 16 as computing device. The 4 x 4 keypad is deployed for customer and kitchen side to make order from customer. the kitchen side also use keypad to send status of order to counter and customer table. The Zigbee is used to transmit the data
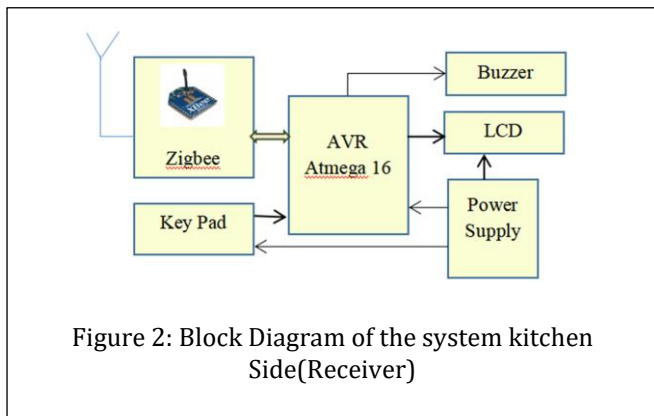

Figure 2: Block Diagram of the system kitchen Side(Receiver)

from customer table called as transmitter and received at kitchen section called as receiver. When a customer come to a table menu card provided on table with menu code. It is graphical LCD also provided on table which can scroll up-down by push button to view menu card and code. After finalize order customer can place order using keypad by entering menu code. The table WSN node transmit the data on kitchen receiver node with table ID and kitchen worker make the order ready as per the received order. The order send at the same time counter receiver as well for belling and verifying the status of the order. The worker can see the order on Graphical LCD or Screen. The data received on PC screen using end node in graphical user interface (GUI) or X-CTU terminal on Zigbee. The zigbee is suitable for long distance communication. Therefore, manager can see the order status of the table. It can be featured with providing voice order on table by interfacing Mic on the system. The Indicator provided in customer side to visualize order ready. However, in kitchen side buzzer connected to kitchen receiver to alarm after new order received and kitchen person make ready to take new order. After finished the order the billing process done at counter and total amount display at customer table. Therefore, Implementing such system in restaurant to propose smart ordering.

3. Software Design:

Present wireless sensor node is the realization of an embedded system, wherein firmware is equally important. To ensure embedded technology both hardware and software should co-designed. The WSN node designed using AVR ATmega 16 microcontroller for smart
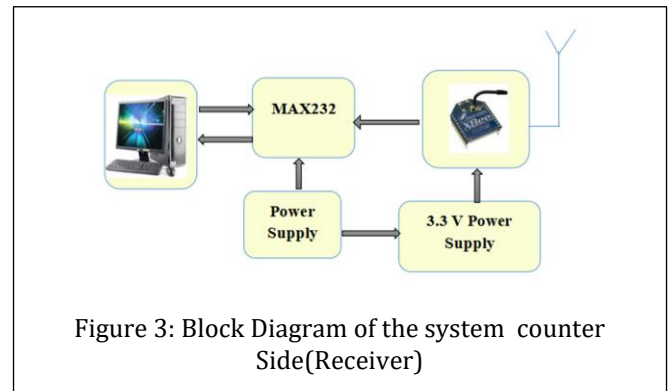

Figure 3: Block Diagram of the system counter Side(Receiver)

restaurant management. Therefore, the required firmware for WSN node designed in embedded C environment by
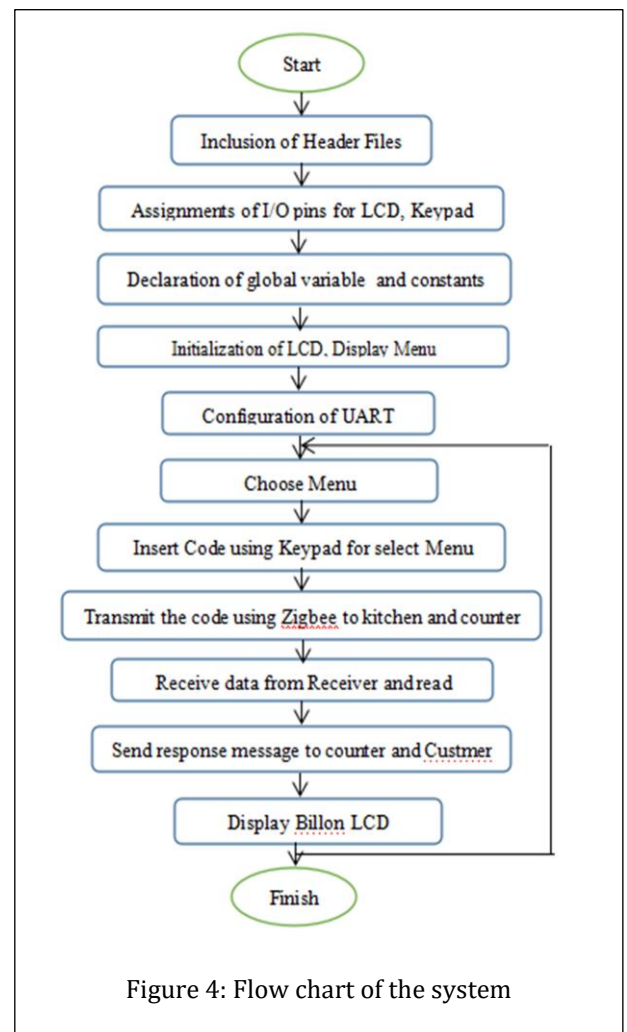

Figure 4: Flow chart of the system

using Code Vision AVR IDE. Algorithm of the firmware depicted in figure 4. As per the requirement different menu assign for number and sequentially called. UART configured for transmitting and receiving the data. The Zigbee is configured in hoping mode, it is help full for long distance communication. The each Zigbee configured with different ID and share the data base station as well. All the functions and tasks are designed as per requirement and perform the allotted task sequentially.

4. Result Discussion:

The goal of the project is to design smart Wireless Sensor Node for Restaurant services based on Zigbee technology. To cater this need a microcontroller based embedded system designed for restaurant application and depicted in figure 5. It is use for costumer or user table as transmitter as well as receiver for kitchen side. Only require the change in firmware. The Transmitter transmit the code of corresponding menu and base station that is receiver received the menu order with code shows in figure 6. the smart LCD used to display the order. The key 0 to 9 use for menu code selection. However, key 'A' assign for view the menu list, Key 'B' assign for change the menu list, Key 'C' save the order, Key 'D' use for send the order, key '*' assign for cancel the order and Key '#' use for bill amount. The results and working function of the system successfully verified.
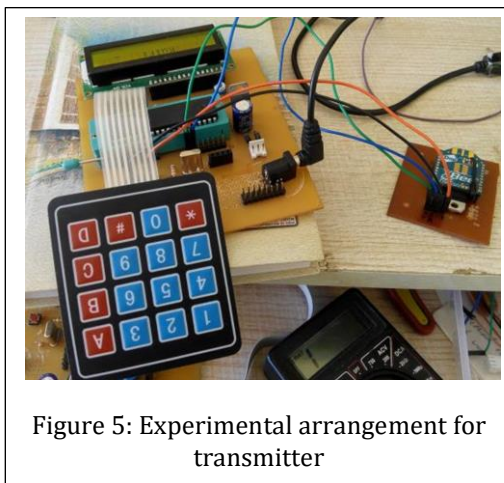
5. Conclusion:

Figure 5: Experimental arrangement for transmitter

Ensuring an embedded technology, wireless sensor node developed for smart restaurant services. The zigbee use for transmit and receive data. The alarm system work properly after receiving the message at kitchen side. For the verification two user module and one kitchen module designed ans successfully tested. In feature work it provide user table automatic sensitization system, speech recognition module send voice order to receiver side.
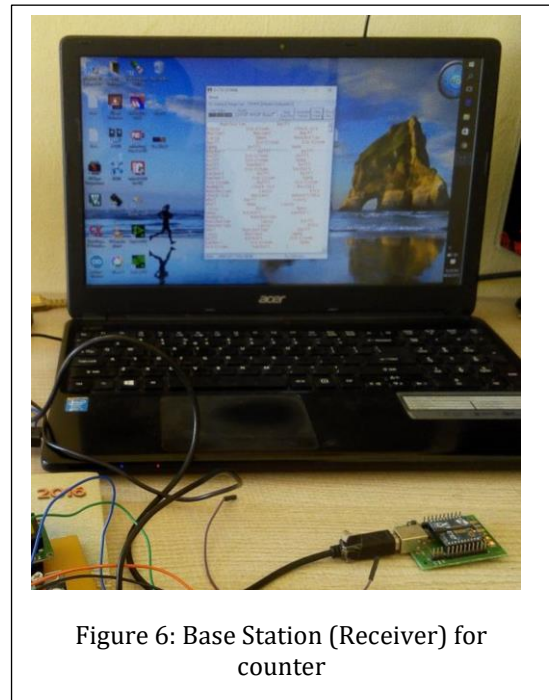

Figure 6: Base Station (Receiver) for counter

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