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Design and Construction of Food and Beverage Purchasing System Using the Drive Thru Method

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Abstract

The Drive Thru sales system is quite well known in Indonesia and is used by several fast-food restaurants such as: McDonald's, Kentucky Fried Chicken, Pizza Hut and others. This system provides fast service where when consumers buy food or drinks, they don't need to get off their vehicle. After analyzing that there are problems such as the Drive Thru system only uses voice when ordering, which will be an obstacle for consumers who have speech impairments such as speech impairments. The Drive Thru system was developed using push buttons as a tool for selecting menus, using ultrasonic sensors to detect arriving consumers while providing information via speakers, conveyors are used to make it easier for waiters to deliver orders that are ready to be taken by consumers, adding a conveyor to minimize slow restaurant waiters responding which will result in long queues.

1 INTRODUCTION

In Indonesia today many emerging restaurants (places to eat), both from within the country and restaurant franchise (franchise) from abroad. Restaurant is a place where food and drinks are sold at a certain price and with other supporting facilities [1]. Among the various types of restaurants, fast food restaurants are the most popular restaurants [2].

The development and improvement of services at fast food restaurants from year to year is increasingly becoming a public concern [3], [4]. This can be seen from the intense competition in terms of product quality, price, promotion, and distribution. The increase in population in large urban areas in Indonesia encourages changes in people's consumption behavior in the field of food. For people in large cities, tend to choose the concept of practical ready-to-eat food, better known as the concept of fast food.

Fast food business in Indonesia is currently growing and expanding to small cities or regions in Indonesia. The number of fast-food retail companies also increases competition in the food and beverage business in Indonesia. Responding to the increasingly fierce competition today, fast food retail companies need a strategy to improve the quality of food, beverages and

services in order to still be able to provide satisfaction to their customers and out of competition. In the drive thru method at this time many only use voice or voice for how to order [5], and this is an obstacle to customers who have limitations in speaking such as speech impairment can not memasan through voice.

Some of the components used in this study to build a system is Arduino Mega 2560, ultrasonic sensors, infrared sensors, push buttons, keypads, LCD (Liquid Crystal Display), speakers, LED, Thermal Printer, Relay Conveyor, Servo, and Buzzer. The Arduino mega 2560 is the Control Center for all components used [6]. Ultrasonic sensors are capable of converting sound waves into units such as distance, altitude and speed [7]. This distance/length measurement technique using ultrasonic waves in the air includes the pulse echo method, a pulse beam sent to a transmission medium and reflected by an object at a certain distance. Infrared sensor systems basically use infrared as a medium for data communication between the receiver and transmitter [8]. The system will work if the infrared rays emitted are blocked by an object resulting in infrared rays can not be detected by the receiver. LCD component used to display information [9]. LCD is divided into two types, namely text LCD and graphic LCD. Text LCDs can only be used to display text or certain symbols, while graphic LCDs allow their presentation in the form of images.

Keypad is often used as an input on some equipment based on microprocessors or microcontrollers. Keypad is an important part of an electronic device that requires human interaction [10]. DF Player mini is an mp3 module with a simplified output directly to the loudspeaker [11]. Thermal printer is functioning as in the printer is usually able to print characters letters, numbers and barcodes [12]. This Printer that utilizes heat to produce writing or images on paper. All the necessary components can improve the service on the food and beverage purchasing system using the DRIVE THRU method.

2 METHOD

In conducting research in order to obtain the desired results, then if a research framework is needed, in this research framework will be described the stages of a study conducted to facilitate the steps of making the tool to be made, so that it can be used as a guideline in solving existing problems, the research framework to be carried out is described in Figure 1.

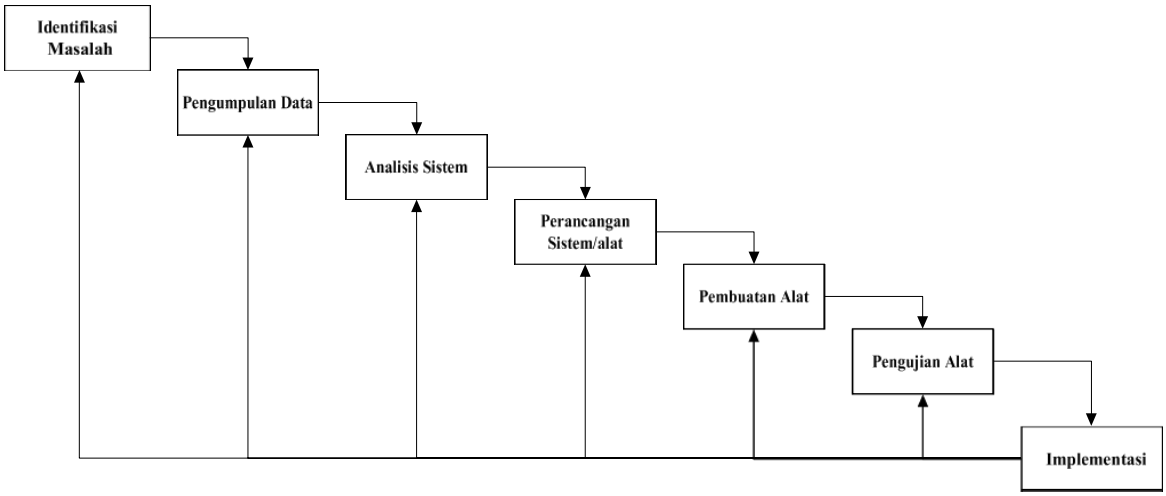
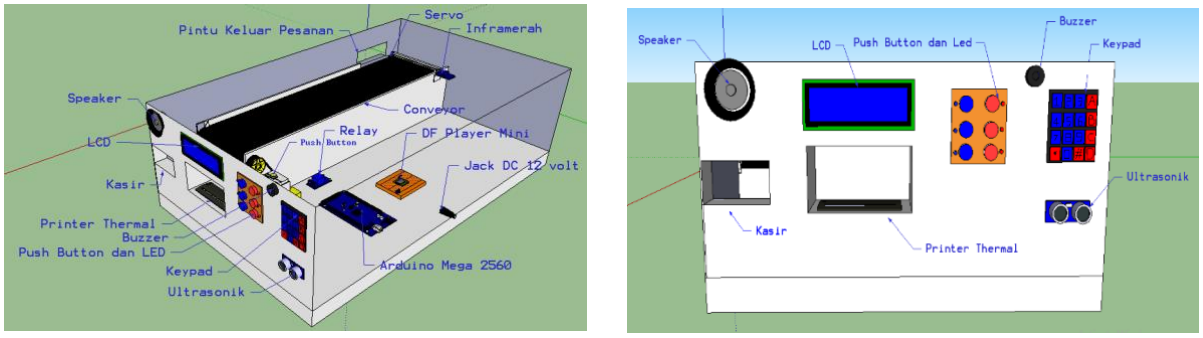


Figure 1. Research Framework

The design of this tool is the initial stage of installation and analysis of the problems encountered based on literature that supports the design of the tool. The physical design of the tool made can be seen in Figure 2.



(a) Looks Overall Tool (b) View From The Front

Figure 2. Looks Overall Tool and View from The Front

Testing of this system can be done from testing the permodul tool to testing the tool as a whole. Testing of such a device is carried out the following steps:

1. Ultrasonic Sensor Testing
   Ultrasonic sensors serve as a detector of incoming customers [13]. Testing of this sensor is done by means of if the customer is below 5cm then the DF plyer and LCD are active, if the customer is above 5cm then the DF player and LCD are not active. Customer distance below 5cm represents logic 1 and customer distance above 5cm represents logic 0. The results of ultrasonic sensor testing can be seen in Table 1.
   Table 1 Ultrasonic Sensor Test Results

No	Ultrasonic Sensor	Df Player Mini	LCD
1	0	Inactive	Inactive
2	1	Active	Active

   The results of testing and measurement of the module shows that the active state of the ultrasonic sensor is detected to be worth 1 while inactive is worth 0, where at the time of value 0 DF player and LCD in an inactive state while the value 1 DF player and LCD in an active state.

2. Push Button Menu Testing
   Push Button menu serves as input food menu according to the menu provided, each push button has a different menu. The test results of Push Button menu can be seen in Table 2. The results of testing the push button menu shows, if one push button is pressed, it will produce a menu according to the table and will activate the led.

   Table 2 Reading Results Push Button Menu Options

Push Button	Menu	LED
1	Fried Chicken	Active
2	Chicken Geprek	Active
3	Chicken Soup	Active
4	Orange Juice	Active
5	Iced Tea	Active
6	Coca-Cola	Active

3. Push Button Start Testing
   Push button start serves as an input to activate the relay and move the conveyor, as table 3.
   Table 3 Reading Results Push Button Start

Push Button	Logic Relay	Conveyor
7	0	moves

   Push button start test results show that the state of the push button 7 is pressed then the Relay is 0 and the Conveyor moves. If the relay is in the active state is detected a value of 0.

4. Keypad Testing
   The Keypad serves as an access to determine the amount of candy, cancel orders, delete menu options, continue menu options, and print proof of payment. Each button on the keypad has a different function. The results of testing the keypad can be seen in Table 4.
   Table 4 Keypad Test Results

Keypad Keys	Function	Thermal Printer	Df Plyer
0-9	Total	Inactive	Inactive
*	Clear Menu Options	Inactive	Active
#	Next Select Menu	Inactive	Inactive
A	Print Proof Of Payment	Active	Active
B	Cancel Order	Inactive	Active

5. Infrared Sensor Testing
   The infrared Sensor serves as a detector of conveyor-driven order packages. Testing of this sensor is done by detecting the order package then the relay berlogika 1, conveyor stops, active servo, active buzzer, and active df player. If the infrared sensor detects the order package then the sensor is worth 1 and if the infrared sensor does not detect the order package then the sensor is worth 0. The infrared sensor test results can be seen in table 5.
   Table 5 Infrared Sensor Test Results

Sensor Inframerah	Relay	Conveyor	Servo	Buzzer	Df Player
1	1	Stop	Active	Active	Active
0	0	moves	Inactive	Inactive	Inactive

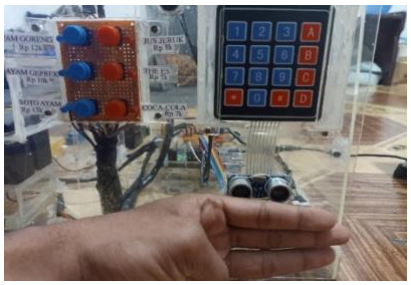
   The test results from the table above show that the active state of the infrared sensor is detected to be worth 1 while not active is worth 0, where at the time of value 1, relay is worth 1, the conveyor stops, active servo, active buzzer, and active df player while at value 0, relay is worth 0, conveyor moves, servo is not active, buzzer is not active, and DF player is not active. If the relay in the active state is detected is worth 0 while inactive is worth 1.

6. Overall System Testing

The program is stored in the Arduino mega 2560 in the form of input reading instructions, then Arduino will process based on the stored program and the output signal. Reading instructions from ultrasonic sensors, Push buttons, keypads, infrared sensors, to the output in the form of Df Player, LCD, LED, Thermal Printer, Relay Conveyor, Servo, and Buzzer. All are fully controlled by the arduino mega 2560 based on programs stored in the memory of the arduino mega 2560.

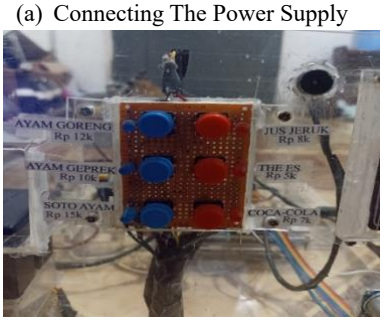
Testing of the system that starts from the installation of components and programs, it can be seen from the relationship formed from the program module that runs the system components such as ultrasonic sensors, Df Player, LCD, Push Button, LED, Keypad, Thermal Printer, Relay, Conveyor, infrared Sensor, Servo, and Buzzer.

(a) Connecting The Power Supply



(b) Ultrasonic Sensor Detects Customer

(c) LCD display welcome



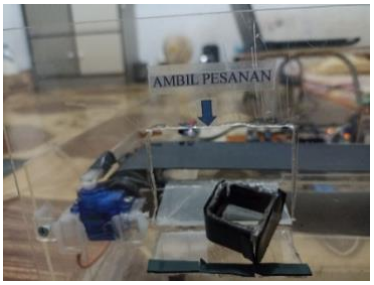
(d) Menu on Push Button

(e) LCD and LED display

(f) LCD display canceled orders

(g) Invoice Proof Of Payment

(h) Waiter Pressing Push Button Conveyor



(i) Order at the place of pick-up

Figure 3. Overall System Testing

Based on Figure 3 above can be shown the steps of the overall system of tools that have been made. The first step is to connect the system to a 12volt dc power supply to activate the system if the power supply is connected to an electric current, then the indicators of some components in the system will light up and can be seen in Figure 3(a). Once the system is active, then the ultrasonic sensor will detect incoming customers and can be seen in Figure 3(b). If the ultrasonic sensor detects, then df player mini sends data to the speaker which will issue a sound “welcome, please select your MENU”, and the LCD displays the information and can be seen in Figure 3(c). After detecting the customer, then the customer selects several menus by pressing the push button as desired and can be seen in Figure 3(d). If the customer chooses push button 1 then the LED indicator on the push button will light up and appear on the LCD and can be seen in Figure 3(e). If you want to cancel the order press ' B ' on the keypad, the LCD displays the information “order canceled”, as well as the speaker issued a sound “order canceled, thank you” and can be seen in Figure 3(f). After selecting the menu and determining the amount, then press ‘A ' on the keypad so that the Thermal Printer prints the receipt of proof of payment. Then, the speaker makes a sound “please make a payment by looking at the payment receipt at the cashier. After printing the invoice as proof of payment and can be seen in Figure 3(g). After making a payment, the next restaurant waiter will press the push button to run the conveyor. Conveyor waiter used as a means of sending orders to customers who will be taken at the exit of taking the package. After the conveyor moves to carry the order package, then the infrared Sensor will detect the order package carried by the conveyor, then the conveyor will stop and the servo drives the order package. Servo pushes the order package to the front of the exit. Taking package orders can be done with a buzzer and speaker sound " please take your order, thank you for shopping at our restaurant” and can be seen in Figure 3(h). After the servo pushes the order package to the front door of the pickup, then the customer can take the order taken by the customer transaction on this drive thru system and can be seen in Figure 3(i).

3 RESULTS

Arduino Mega can work well as a shopping system controller with drive-thru method. Ultrasonic sensors can detect customers who are going to shop effectively. LCD can display the selection information and Item Quantity by customer clearly. Speakers equipped with DF Player mini modules can play MP3 files well. The infrared Sensor can detect the order so that the conveyor stops and runs the servo smoothly. Thermal printers can print payment invoices neatly and efficiently.

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