

# International Journal of Engineering Sciences & Research Technology

(A Peer Reviewed Online Journal)  
Impact Factor: 5.164



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INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH  
TECHNOLOGY  
DESIGN AND IMPLEMENTATION OF RESTAURANT RAPID SETTLEMENT  
SYSTEM

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DOI: <https://doi.org/10.29121/ijesrt.v10.i10.2021.3>

ABSTRACT

Catering has always been the focus of society and schools. How to improve the efficiency of catering checkout, ensure catering safety, improve the queuing time of diners, improve the work efficiency of catering checkout personnel and improve the satisfaction of diners has always been a difficult problem to solve. How to use information means to provide catering time management in line with young people puts forward higher requirements for catering quick order settlement. With the in-depth development of information work, catering rapid settlement needs to rely on information means to optimize the order rate, simplify the settlement time and reduce the number of queuing. In this context, after full investigation in the early stage, based on the existing workflow, sort out the catering queuing time and the number of seats in the hall, and further optimize the settlement rate in combination with relevant rules and regulations, so as to improve the restaurant turnover and the time utilization of diners. Combined with the current epidemic, as a densely populated place, the restaurant should not stay for a long time, so improving the settlement rate of the restaurant is an indispensable event. Based on the requirements of fast settlement of the restaurant, check the user's operation habits and use scenarios, use the single chip microcomputer as the underlying architecture, use opencv machine vision and deep learning, and develop the background program based on C / C ++, so as to make a fast settlement system of the restaurant.

## 1. INTRODUCTION

### 1.1 Design background

With the rapid development of modern technology and the wide application of artificial intelligence, the application of intelligent technology is more and more widely. In the restaurant, everyone wants to save the tedious queuing time, and the fast settlement system can complete the settlement of a customer in about 3 seconds. In these 3 seconds, the robot can identify dishes, feed back to the single chip microcomputer, show the payment code, settlement, etc. Today, opencv deep learning is slowly entering our life, in which the identification of dishes fed back to the single chip microcomputer chip is opencv deep learning. For example, in life, opencv deep learning is adopted from vehicle counting at intersections to face recognition at banks. This is a huge challenge, so we decided to launch a challenge: try to combine opencv deep learning and embedded technology to build a restaurant fast settlement system.

## 2. IMPLEMENTATION MODE

### 2.1 Opencv identification module

This request is used to store the dish map, realize the accurate identification of uploading multi dish map, and return the specific dish name, location and confidence information. Dish identification includes three sub interfaces: single dish warehousing, dish retrieval and dish deletion.

Sub interface description: this interface realizes the storage of a single opencv identification module dish picture. When warehousing, the picture and the summary information that can be associated with the local dish picture library need to be submitted synchronously (the specific variable is brief, which can pass in the local tag ID, picture URL, picture name, etc.). Use the request URL parameters, content type parameters and the parameters



placed in the body to return the required token, picture address or Base64 information. Call the token obtained by the authentication port, attach the picture link, the request method is post, change the base64 code of the local picture, and send the dish identification to the warehouse. Mark the picture ID and judge whether the test dish is equal to the dish in the input library according to the length of the text string. In the subsequent process, if this dish is not needed to be stored in the library, the token obtained by the authentication port is also called in the sub serial port to be deleted as in the identification step.

## 2.2 Single chip microcomputer module

### 2.2.1 Weighing module and display module

This design adopts hx711, which is a 24 bit a / D converter chip specially designed for high-precision electronic scale. The chip integrates the peripheral circuits required by other similar chips, and has the advantages of high integration, fast response speed, strong anti-interference ability and so on. The interface and programming between the chip and the back-end MCU chip are very simple, simple digital control and serial communication; All controls are input by pins, and the internal registers of the chip do not need to be programmed. The weighing display structure is LCD display. The system has a large amount of data, but there is no demand for color and does not display color images. Therefore, TFT is not used, and LCD1602 is selected as the weighing data display device.

### 2.2.2 IC card reading

IC card is an integrated circuit card. IC card chip has the ability to write data and store data, and can judge the content in IC card memory. The RF reader will send a set of fixed frequency electromagnetic waves to the IC card. There is an LC series resonant circuit in the card, and its frequency is the same as that emitted by the reader. In this way, the LC resonant circuit will resonate under the encouragement of electromagnetic waves, so that there is charge in the capacitor; At the other end of the capacitor, a unidirectional conduction electronic pump is connected to send the charge of the capacitor to another capacitor for storage. When the accumulated charge reaches 2V, the capacitor can be used as a power supply to provide working voltage for other circuits, send out the data in the card or receive the data from the reader / writer (after the IC card is inserted into the IC card reader / writer, each contact is connected correspondingly, and the IC card starts to work) To complete the payment.

## 3. SERIAL COMMUNICATION MODE

### 3.1 Communication rate

First of all, we adopted the baud rate of 9600 for the test. The transmission is relatively stable, the signal does not lose frames, and the rate feels weak. After switching to 115200 baud rate for test, the transmission is stable, the signal does not lose frames, and the rate is very fast. Therefore, the baud rate of 115200 is used as the rate of serial port.

### 3.2 code

Serial port code adopts packet form to transmit data to MCU. We use hex 0xff 0xff as the header, and name the task name of each data transmission as the serial number. For example, the data sent to the upper computer this time is the dish weighing module (the serial number also adopts hex to facilitate the entry and settlement of amount data). We write the package address as the address corresponding to each task, so that the incoming data can be removed. The subsequent naming and data package are written as what we need and execute, such as the amount of dishes with serial number 0x01 0x08-1, and the corresponding money is 8 yuan. Since a fixed length packet is used for setting, there is no packet length. Finally, the integrity of the packet is verified by the checksum. When serial number + packet address + packet command / data = the hexadecimal value of the checksum, the packet is complete. If the integrity of the packet cannot be verified, it needs to be re sent through the serial port until the verification is successful.

## 4. CONCLUSION

After testing, by identifying dishes, weighing dishes, calculating dish prices, displaying dish prices and paying successfully, the process is within 3 seconds, which greatly reduces the time of diners and improves service quality and service efficiency. Boldly try to combine existing technology with cutting-edge technology. Use opencv deep learning to identify dishes, and then use serial port coding to transmit them to MCU for calculation. This method



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is superior to the settlement system under the ordinary mode, and also ensures the special management under the epidemic situation. At the end of the article, I would like to thank Mr. Cui Xiangyu for his guidance and support.

