Smart and Safe System in Restaurant(SSSR)

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1 System Introduction

People love to spend their time in restaurant. It is the meeting point for them and can have food together. Mainly it is an escapade from the all too monotonous home cooking. But in this COVID crisis, due to public lockdown, many a business have been hit and generation of income for the state has become difficult. Even people get restless by staying at home all day and there is no public place that can guarantee safety. But if there were places that could ensure safety for the people then the situation would have been better.
This project mainly aims to build a smart and safe restaurant which tries to achieve the following objectives:

- Enable the customers to get notified about the availability of seats in Restaurant (Comfort)
- Enable the Restaurant manager to know if there is a possibility of infection and spread of the disease (Safety)

2 System Analysis

From a customer perspective, a safe and smart restaurant is expected to:

- Provide information on how safe is the restaurant
  - Based on the number of the customers denied entry, the safeness of restaurant is determined
  - If the numbers increased, then alert customers and suggest them another restaurant.
- Provide information regarding the availability of seats
  - Display the number of available tables
  - If group can be accommodated, allow entry to the group
- Provide access to hand sanitizer
  - When customer places his/her hand below the sensor, then based on hand detection sanitizer is sprayed for 2s

From a Restaurant manager perspective, a safe and smart restaurant is expected to:

- Provide information about customers to health officials in advance if there is a possibility of spread of any warned disease(in this case,COVID-19)
  - Entry of customer is checked based on 3 things : Does he/she have a face mask? Does he/she have a normal body temperature? Does he/she have record of spreadable disease?
- Warn the customer in case of discrepancy created
  - Check for any erroneous / inconsistent input from customer
  - In severe cases, also allow access to alarms/notification to Police
- Based on the occupants in the given table, check if disinfectant must be sprayed
  - If number of occupants in a table is zero and bill has been generated, notify the manager that the table must be cleaned/disinfected

3 System Architecture Design

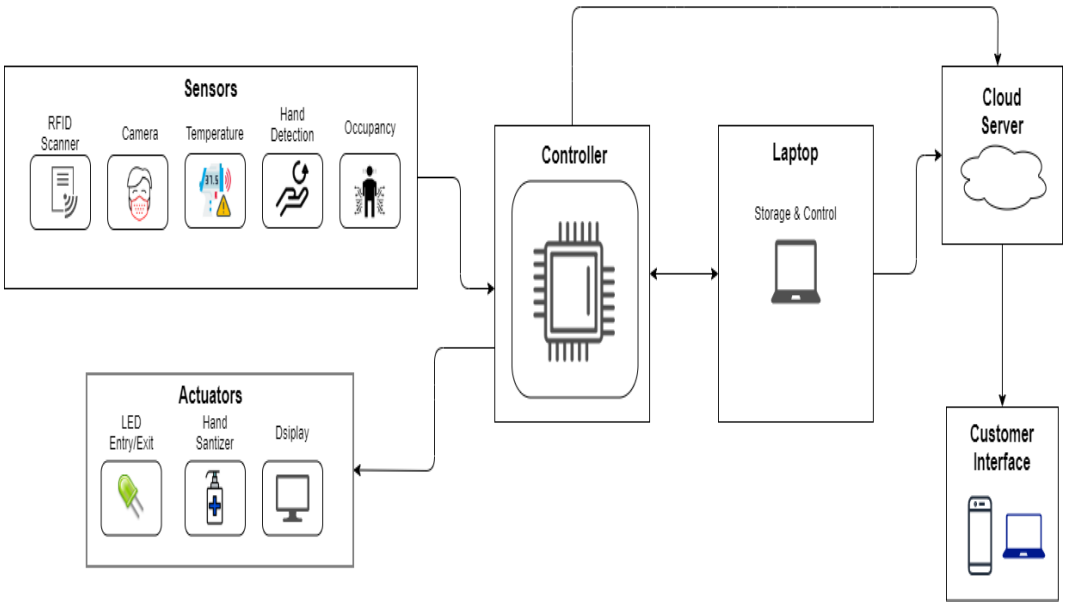

Fig. 1. System Architecture view of SSSR

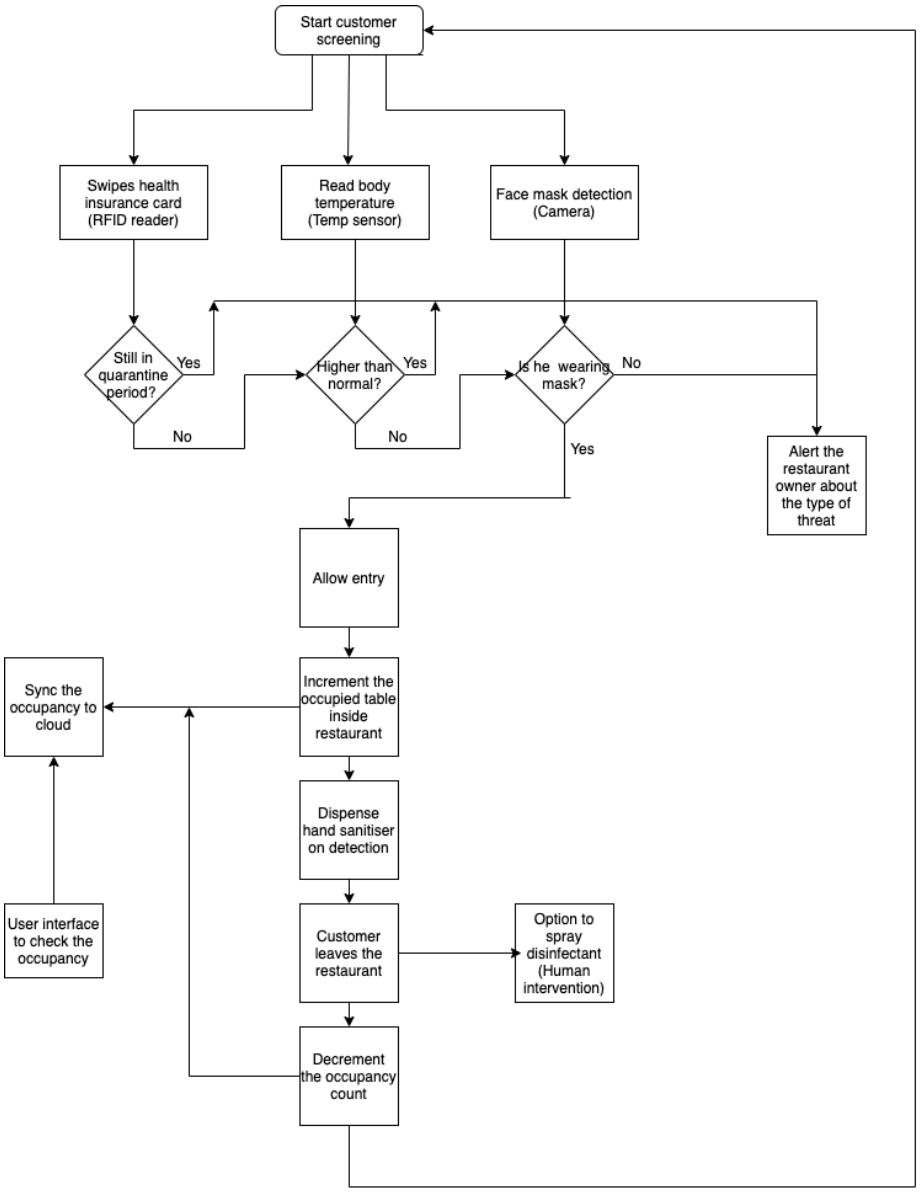

Fig. 2. Flow Chart of SSSR

System Architecture is divided into following sections:

- Restaurant control section: Comprises of sensors,actuators and a local controller
  In order to determine the entry of a customer, 3 checks done via sensors mentioned below:

  - Camera: Check if Customer is wearing a mask or not
  - RFID Scanner: Check via the Customer's Health insurance card, if there is any recent history of communicable disease
  - Temperature Sensor: Check customer's body temperature

  A LED is interfaced as output for the inputs gathered from these sensors to allow customer or not. LED ON implies door is opened, else closed.
  A Display unit is kept near manager to display if any of the above check failed for a customer.
  After the entry, a display unit shall display the customer table number. Hand detection is done, and sanitizer is sprayed
  Based on the occupancy of the table through occupancy sensors and bill generated, a message to the manager for disinfecting the table is issued.
- Data Processing section: Comprises of local controller, CPU and server
  The sensor signals sent are all processed by the local controller and suitable commands are sent to actuators. The warning messages to the manager are sent from Local controller to the CPU, which allows the control by Manager
  The number of tables available in the restaurant is updated periodically in the server. Also, the number of Customer denied entries are fed to CPU, to analyze the risk level. The risk level is also updated in the server.
- Customer interface section: Comprises of Server and Customer's interface(Mobile app or a website)
  The Risk level of the restaurant and the number of available tables in the restaurant are periodically updated in the server. Based on these data, a customer can decide if he/she should really go to the restaurant or not

4 Conclusion and Future scope

Although a basic, not too advanced safe and smart system in Restaurant, this project aims to generalize safety system for a pandemic disease. The scope can also be extended to include many other alarm and control mechanisms via CPU such that more control can be bought up within the restaurant and when things get out of control, automatic notification to get external agents support, can be implemented. Also, the safety system can also be extended to many non-residential buildings with some minor modifications, and thus with such a generic platform, many buildings can be merged to form a smart area / city.