iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** IX **Month of publication:** September 2020

DOI: https://doi.org/10.22214/ijraset.2020.31513

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue IX Sep 2020- Available at www.ijraset.com

Contactless Payment & SMS based Coffee Machine

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Abstract: ***Above paper has aimed to implementation of coffee machine using NFC and 4G GSM technology. 4g gsm machine gives access through only NFC to avoid misuse of system. Through data getting on mobile handset, distributor knows well how many times drink dispensed or else not dispensed. The identity card ID which contains NFC tags are given to every employee. Every employee's just show NFC tag and get drink.***
Keywords: 4G based GSM, NFC tag, Mobile module, LCD display, LEDs, NFC antenna, SMS

I. INTRODUCTION

Café coffee day (CCD) is Asia's largest consolidated, big coffee company and has the good colossal network of coffee estates in overall India. Some modern machines also provide tea, espresso, lattes, cappuccinos. Public coffee vending machines required payment other functionality like coin-operated machines. Including some accept bills and credit cards. 4G GSM & NFC is a sub-part of celesta café coffee day machine. GSM communication is happen by mobile handset SMS facility. Message sending to distributor. NFC helps to contactless payment. NFC tag/card is placed on NFC antenna. It is new feature & easy for customer use. Microcontroller detect if any touch key on cap sense board pressed for selection of drink. LEDs are used to indicate drink dispensing time purpose. This type of machine mostly used in office & possibility to achieve at a low cost. It requires less time to serve drinks. It is used for office purpose mainly.

II. SYSTEM DIAGRAM

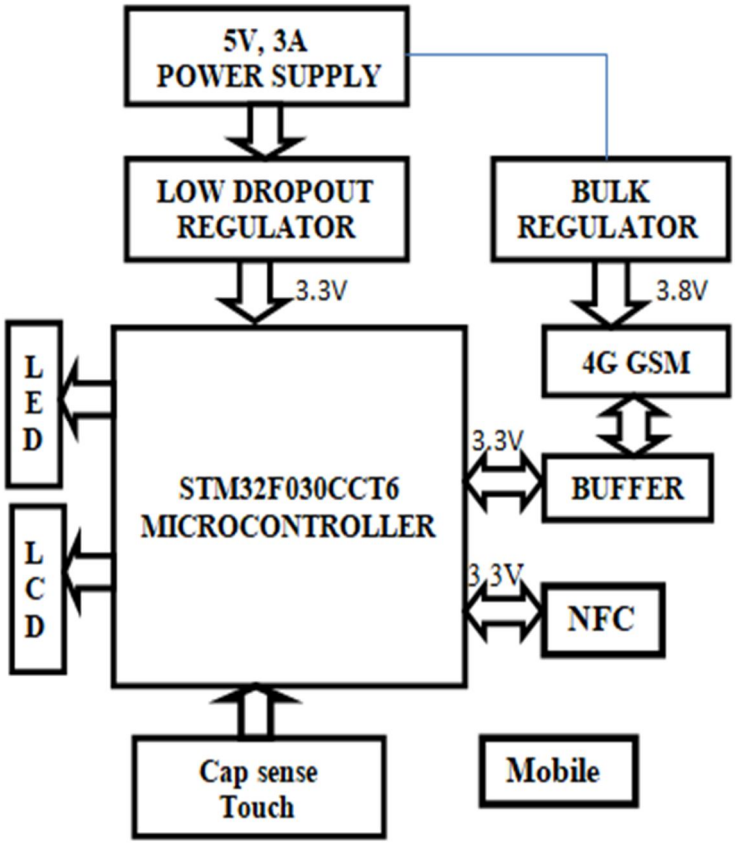


Fig.1. Block Diagram Of Proposed System

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III. HARDWARE SPECIFICATIONS

A. Microcontroller

STM32F030CCT6 is 32 bit, M0-cortex series controller is used to control system. The supply voltage is 3.3V. It communicates to GSM & NFC via Universal Asynchronous Receiver Transmitter (UART). It detects any other key pressed by user then with the help of microcontroller LCD 4-bit data transfer. By host there are 3 different colour of LED indicator control.

B. 4G GSM Module

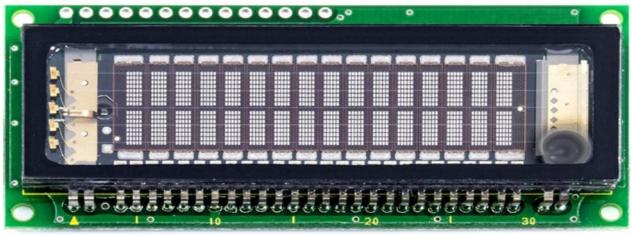
The module EC20 is operated at 900/1800 MHz frequency. It's working voltage is 3.8V and it supports USB, PCM, USIM interface. GSM module gives network status. AT commands use for any data send through the GSM antenna on mobile or network.

C. NFC Controller

This module PN5321 acts as contactless communication with 13.56 MHz based on the 80C51 microcontroller core. NFC controller is active type. Parameter distance of detection of NFC tag is varied by depending on matching antenna.

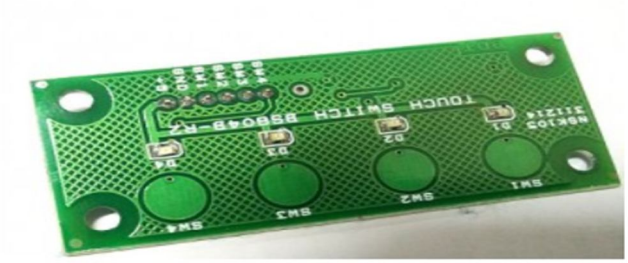
D. 16 x 2 LCD Display

Vacuum fluorescent display(VFD) consists of a 16 character by 2 line with 5 x 8 dot matrix display. The module configured with parallel mode. LCD display is used to displaying data.



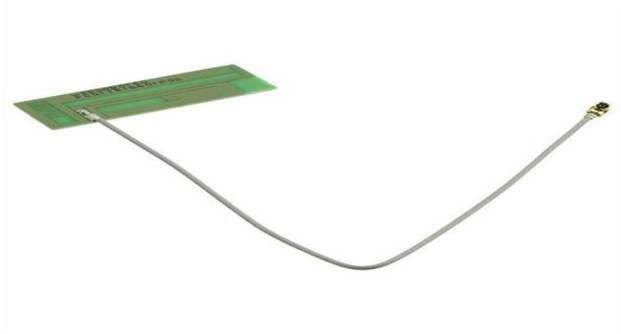
E. Cap sense Touch Switch Board

Cap sense touch switch is microcontroller input. If it is pressing touch key switch considering as input, it gives signal to microcontroller. It works on level hold or toggle type output. This board contains 4 touch key.



F. GSM Antenna

GSM antenna is used for sending data on network or mobile handset. It's frequency at 1800 MHz and it is PCB type.



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G. NFC Antenna

Circular antenna is used to sending data regarding voltage or current to other device. NFC tag placed on NFC antenna.



H. NFC Tag

NFC tag is having inducting coil which creates magnetic field and communicates with host interface. NFC tag is passive device. It has 1K byte memory chip.

I. LEDs

Red, Green and Blue LED is used for purpose of dispensing selected drink indication.

J. Power supply

Power supply is given to all system which rated at 5V,3A dc. LDO regulator is used for conversion of 5V to 3.3V supply & given to microcontroller and other buck regulator is used to convert 5V to 3.8V for GSM module.

IV. FEATURE

A. 4G GSM enable coffee machine
B. Contactless payment through NFC
C. Secure payment
D. Distributor gets all recorded data on mobile

V. SOFTWARE IMPLEMENTATION

A. IDE: STM32 CubeMx

This software is used for hardware gpio pins, communication pins configured with software. NFC Rx-Tx, GSM Rx-Tx, GPIO like Switch, led configured.

B. Tools: Keil µ Vision

It is used for programming of project function. It is based on embedded c code.

VI. WORK FLOW OF SYSTEM

Initially after switching on the power supply, power led glows, gsm & nfc initiates also LCD starts to display select drink & drink option. Then choose any drink option on cap sense touch board. Place nfc card & start dispensing selected drinks with respect to leds also glow. Led blinking time shows dispensing is processing. After dispensing, drink data send to distributor mobile number. If nfc card is not detected then no any dispensed drink.

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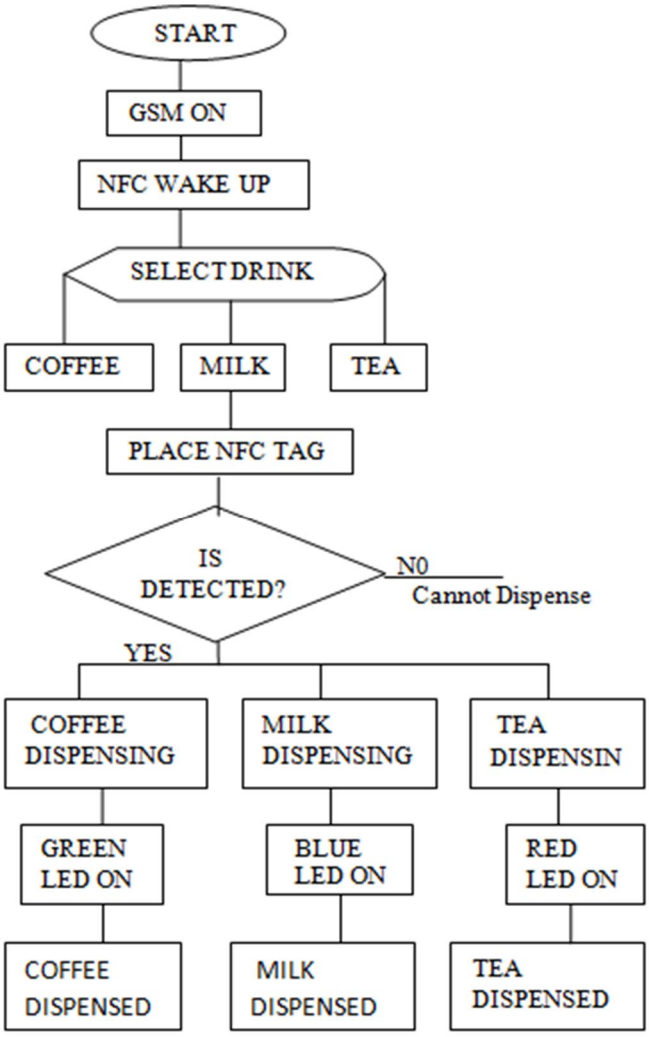


Fig.2. Work Flow Of Proposed System

VII. CODE

```
#include "main.h"
#include "gsm.h"
#include "nfc.h"
#include "lcd.h"

void SystemClock_Config(void);
static void MX_GPIO_Init(void);
static void MX_USART1_UART_Init(void);
static void MX_USART2_UART_Init(void);
static void MX_USART5_UART_Init(void);
volatile uint16_t NFC_Rx_Index=0;
extern unsigned int Bike_MCU_UARTPutstring(uint8_t *);
unsigned char NFC_Rx_Buffer[NFC_Rx_Buff_Size]={0};
unsigned char NFC_Rx_Buffer2[NFC_Rx_Buff_Size]={0};
unsigned int ReadyWait;
unsigned char recvd_uid[5];
```

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```
void Power_On_Seq(void)
{
    ReadyWait = 1;
HAL_GPIO_WritePin(GPIOB,GPIO_PIN_10,GPIO_PIN_SE);
    HAL_Delay(600);
HAL_GPIO_WritePin(GPIOB,GPIO_PIN_10,GPIO_PIN_RESET);
  //HAL_Delay(15000);
}

int main(void)
{
            int iMDM=0;
            int flag = 0;
            int i;
Power_On_Seq();
     LCD_Init();
     HAL_Delay(1000);
     LCD_Clear();
     LCD_SetCursor(3,0);
     LCD_String("WELCOME To");
     LCD_SetCursor(3,1);
     LCD_String("Rohit Cafe");

     HAL_UART_Transmit(&huart5,"ON\r\n",4,200);
     Bike_GSMInit();
     HAL_UART_Transmit(&huart5,"GSMInt\r\n",8,200);

     if(SVM_NFC_Wakeup() == 0)
    {
      HAL_UART_Transmit(&huart5,"nfc_wake\r\n",10,200);
     }

           //HAL_Delay(1000);
           LCD_Clear();
           //HAL_Delay(1000);
           HAL_Delay(1000);
           LCD_Clear();
           LCD_SetCursor(2,0);
           LCD_String("SELECT DRINK");
           LCD_SetCursor(0,1);
           LCD_String("COFFEE TEA MILK");
           while(1)
           {
           while(Flag_SW)
           {
           //LCD_Clear();
           if(flag++ == 1)
           {
           LCD_Clear();
```

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```
                                    LCD_SetCursor(0,0);
                                    LCD_String("PLACE NFC CARD");
                                    LCD_SetCursor(4,1);
                                    LCD_String("AND HOLD"); //tap & hold
}
                            SVM_NFC_CardRead_UID(recvd_uid);
if(uid_err_flag == 0)
  {
    iMDM=0;
                                    HAL_UART_Transmit(&huart5,"read\r\n",6,200);
  }
else if(iMDM == 50)
 {
                                    HAL_UART_Transmit(&huart5,"no card\r\n",9,200);
Flag_SW = 0;
flag = 0;
/* Cannot dispense */
LCD_Clear();
                                    LCD_String("Cannot dispense");
MsgSend("Cannot dispense");
MsgSend("NONE deducted");
                                    HAL_Delay(1000);
LCD_Clear();
                                    LCD_SetCursor(2,0);
                                    LCD_String("SELECT DRINK");
                                    LCD_SetCursor(0,1);
                                    LCD_String("COFFEE TEA MILK");
 iMDM=0;

break;
}
iMDM++;

switch(Flag_SW)
{
case 1:if(uid_err_flag == 0)
{
                                                LCD_Clear();
                                                LCD_SetCursor(5,0);
                                                LCD_String("COFFEE");
                                                LCD_SetCursor(0,1);
                                                LCD_String("DISPENSING....");
                                                //HAL_Delay(1000);
                                                Flag_SW = 0;
                                                flag = 0;
                                                HAL_GPIO_WritePin(GPIOB,RED_LED_Pin,GPIO_
 PIN_SET);
                                                HAL_Delay(3000);
                                                HAL_GPIO_WritePin(GPIOB,RED_LED_Pin,GPIO_
 PIN_RESET);
```

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```
                                        //HAL_Delay(100);
                                                LCD_Clear();
                                        LCD_SetCursor(2,0);
                                        LCD_String("SELECT DRINK");
                                        LCD_SetCursor(0,1);
                                        LCD_String("COFFEE TEA MILK");
                                        MsgSend("COFFEE DISPENSED");
                                        //MsgSend("COFFEE rate 10 deducted");
                                                }
break;

case 2:if(uid_err_flag == 0)
                                                LCD_Clear();
                                        LCD_SetCursor(6,0);
                                        LCD_String("TEA");
                                        LCD_SetCursor(0,1);
                                        LCD_String("DISPENSING.....");
                                        //HAL_Delay(1000);
                                                Flag_SW = 0;
                                        flag = 0;
                                        HAL_GPIO_WritePin(GPIOB,BLUE_LED_Pin,GPIO
 _PIN_SET);
                                        HAL_Delay(3000);
                                        HAL_GPIO_WritePin(GPIOB,BLUE_LED_Pin,GPIO
_PIN_RESET);
                                                //HAL_Delay(100);
                                        LCD_Clear();
                                        LCD_SetCursor(2,0);
                                        LCD_String("SELECT DRINK");
                                        LCD_SetCursor(0,1);
                                        LCD_String("COFFEE TEA MILK");
                                                MsgSend("TEA DISPENSED");
                                                //MsgSend("TEA rate 10 deducted");
}
                                        //LCD_Clear();
                                        //HAL_Delay(1000);
break;

case 3:if(uid_err_flag == 0)
{
                                        LCD_Clear();
                                        LCD_SetCursor(6,0);
                                        LCD_String("MILK");
                                        LCD_SetCursor(0,1);
                                        LCD_String("DISPENSING.....");
                                        //HAL_Delay(1000);
                                                Flag_SW = 0;
                                        flag = 0;
                                        HAL_GPIO_WritePin(GPIOB,GREEN_LED_Pin,GPI
 O_PIN_SET);
```

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```
                                                HAL_Delay(3000);
                                                HAL_GPIO_WritePin(GPIOB,GREEN_LED_Pin,GPI
        O_PIN_RESET);
                                        HAL_Delay(100);
                                                LCD_Clear();
                                        LCD_SetCursor(2,0);
                                        LCD_String("SELECT DRINK");
                                        LCD_SetCursor(0,1);
                                        LCD_String("COFFEE TEA MILK");
                                                MsgSend("MILK DISPENSED");
                                                //MsgSend("MILK rate 10 deducted");

}
    break;
        default:
    break;

}
        }
                }
                                                HAL_Delay(100);
}
```

VIII. CONCLUSION

This vending machine easier for customer with advance features. Notifications send like dispensed drink or not dispensed on mobile. Distributor gets dispensed drinks information. This newly updated system saves time and effort.

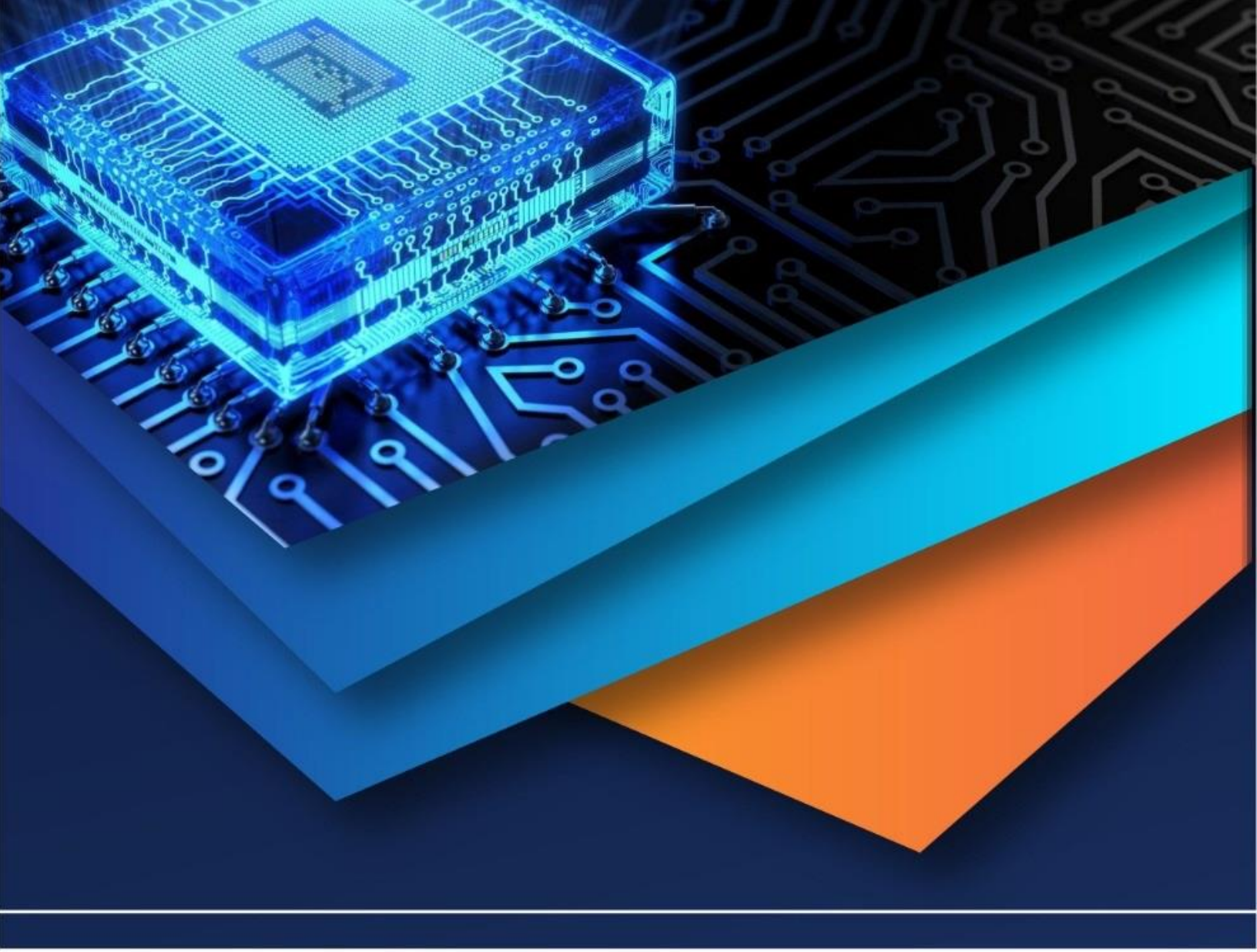
IX. FUTURE SCOPE

If any fault detected in machine Then for detecting location of machine we can place gps module. Extra facility like Bluetooth enabled & audio enabled machine.

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