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Hardware Implementation of Coffee Machine using 4G GSM and NFC

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Abstract: ***This paper aimed to implement coffee machine using 4G GSM and NFC technology. This machine gives access through only NFC to avoid misuse of system. According to data getting on mobile handset, distributor knows how much times drink dispensed or not dispensed. The identity card which contains NFC tags is given to each employee. Employee's show NFC tag and get drink.***
Keywords: 4G GSM, NFC, Mobile handset, LCD display, LEDs, NFC antenna, Short Message Service (SMS).

I. INTRODUCTION

Coffee Day global is Asia's huge consolidated coffee company and has the second colossal network of coffee estates in India. Some modern machines also provide tea, espresso, lattes, cappuccinos. Public coffee vending machines typically require payment, functioning as coin-operated machines. Some of them accept bills and credit cards. 4G GSM+NFC is part of celesta café coffee day (CCD) machine. GSM communication is done through mobile handset SMS. NFC helps to contactless payment. It is new feature & easy for customer use. Microcontroller detect if any touch key pressed for selection of drink. LEDs are used to indicate drink dispensing time purpose. This machine basically used in office & possibility to achieving at a low cost. It requires less time to serve drinks.

II. SYSTEM DIAGRAM

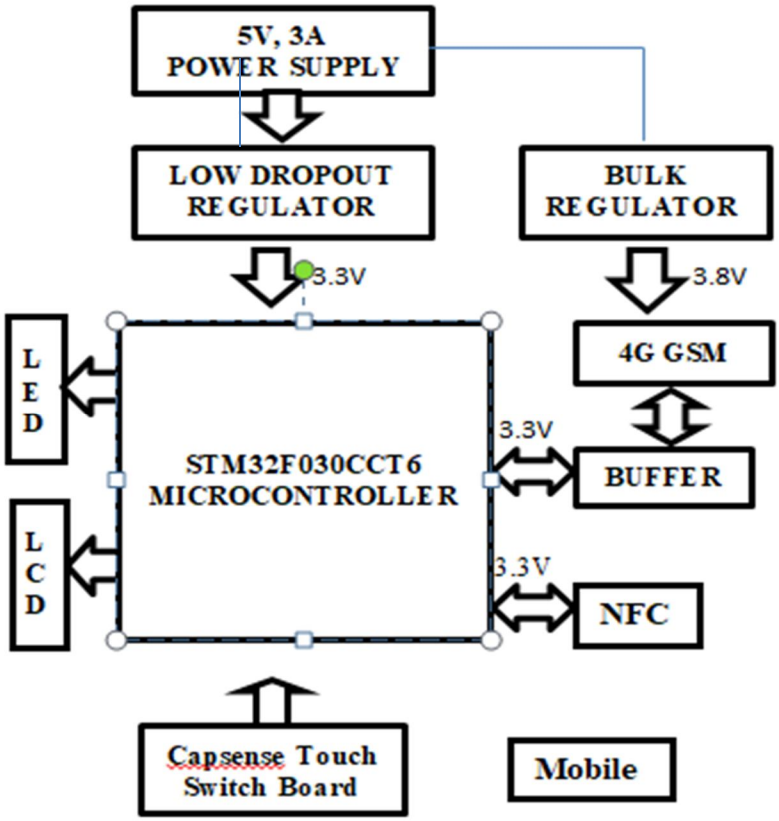

Fig.1. Block Diagram Of Proposed System

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III. HARDWARE SPECIFICATIONS

A. Microcontroller

This 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 if any key pressed by user, LCD 4-bit data transfer with the help of microcontroller. There are 3 different colour of LED indicator control by host.

B. 4G GSM Module

The module is operated at 900/1800 MHz frequency. It operates on 3.8V and supports USB, PCM, USIM interface. GSM module gives network status. By using AT commands any data send through the GSM antenna on mobile or network.

C. NFC Controller

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

D. 16x2 LCD Display

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

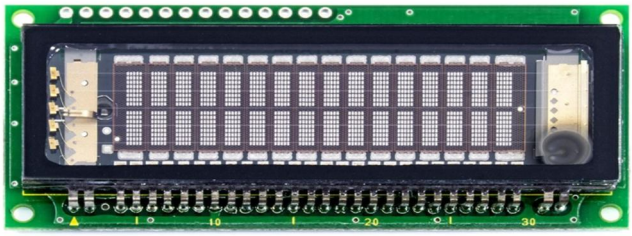

Fig.2.LCD Display

E. Capsense Touch Switch Board:

It is input to microcontroller and by pressing touch key switch as input, it gives out signal to microcontroller. It works on level hold or toggle type output. This board contains 4 touch key.

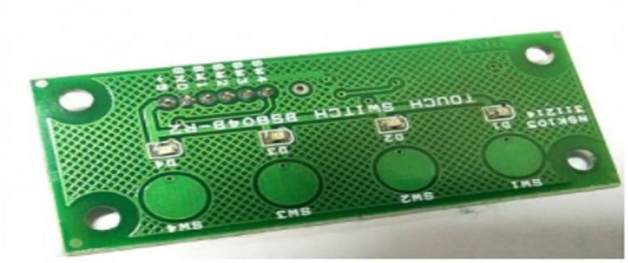

Fig.3. Capsense Touch Switch Board

F. GSM antenna-Pulse

This antenna is used for sending data on network or mobile. It is operated at 1800 MHz and it is PCB type.

Fig.4. GSM antenna

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G. NFC antenna-Taoglas

Circular type of antenna is used to sending data in terms of voltage or current to other device. NFC tag placed on NFC antenna.

Fig.5. NFC antenna

H. NFC Tag

This 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.

Fig.6. NFC Card

I. LEDs

Red, Green and Blue LED are used for while dispensing selected drink indication purpose.

J. Power Supply

5V,3A dc power supply is given to all system. LDO regulator is used for 5V to 3.3V supply 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. Distributor gets all recorded data on mobile

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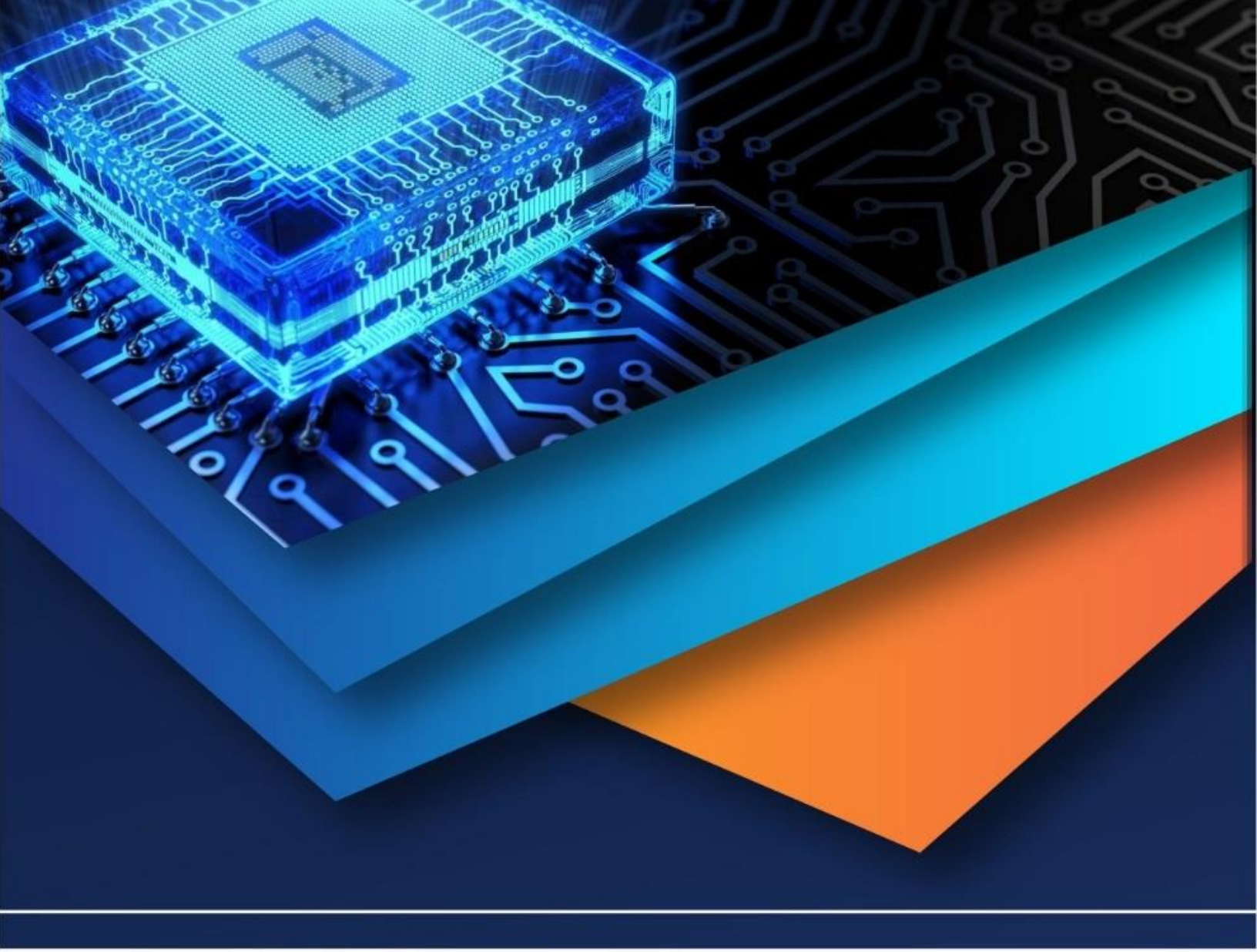

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