

RFID Payment Terminal



Presented by:
Rohit Kale

Introduction

- RFID: an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders.
- Frequency: LF: 125 – 134.2 kHz and 140 – 148.5 kHz
HF: 13.56 MHz
- Standard: ISO 14443 (HF: 13.56 MHz)

Contactless Cards

- Pay as you go
 - Public Transit
 - ePassports, ID Cards
- Advantages
 - Fast and Convenient
 - Contactless

Functioning of Payment Terminal

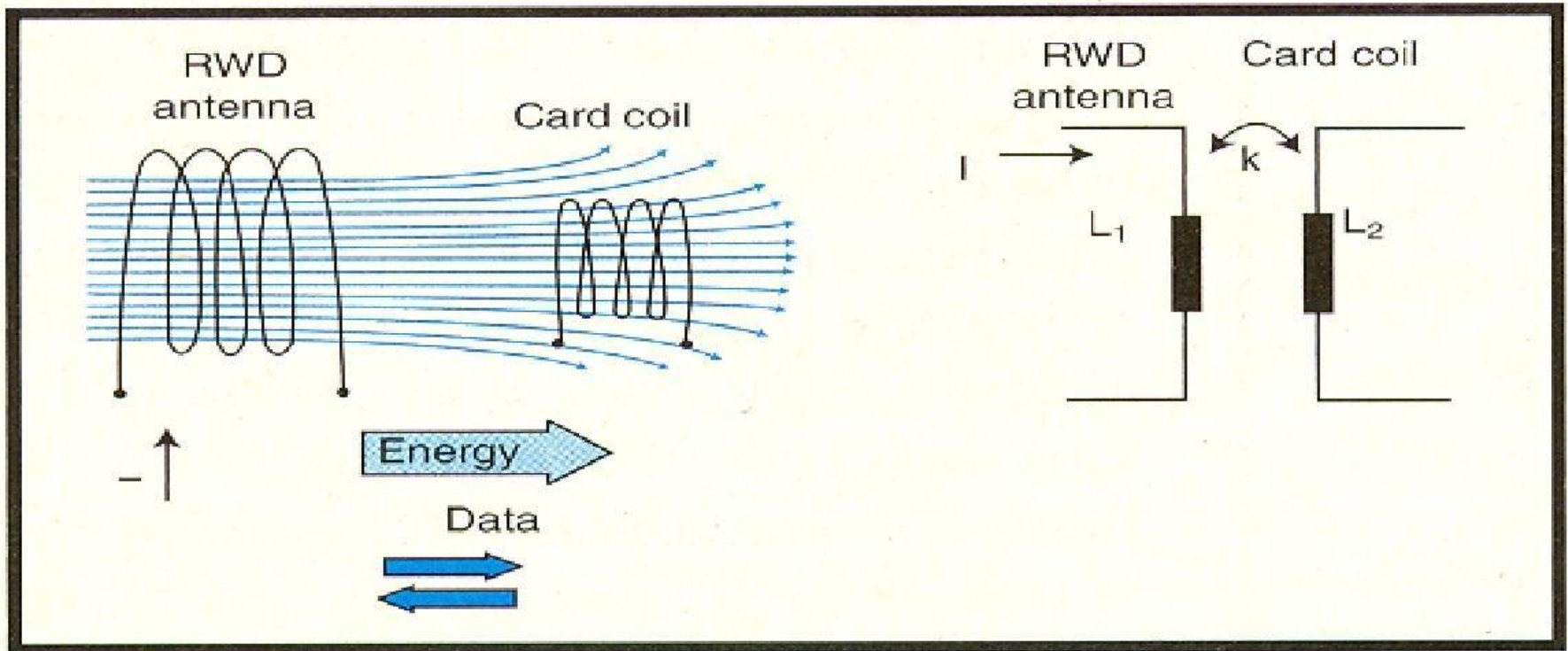


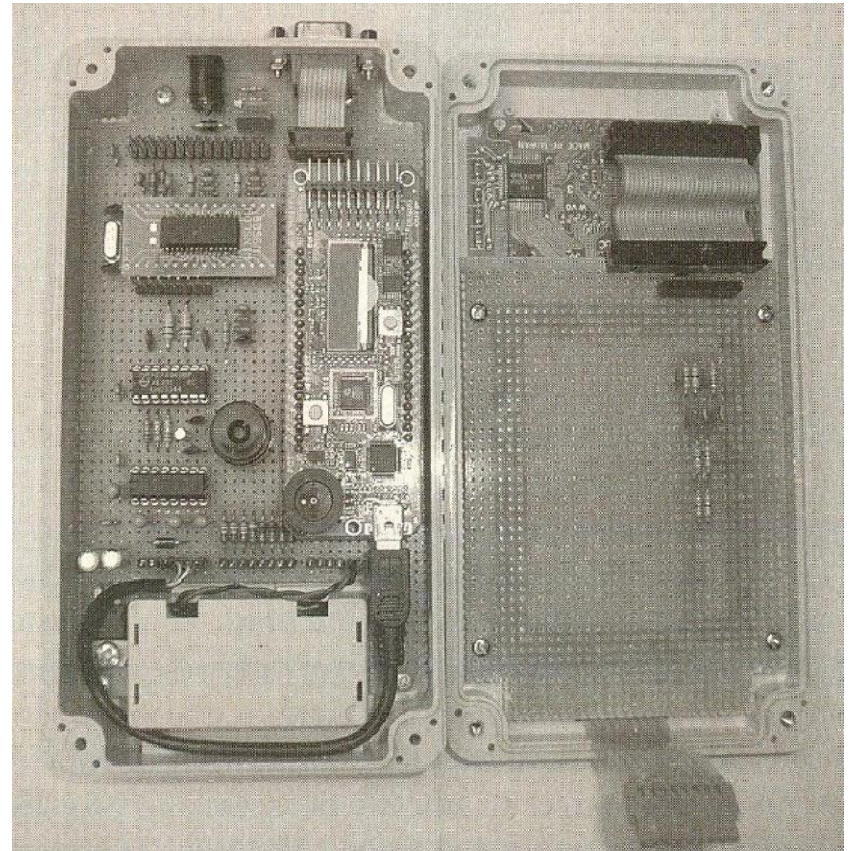
Figure 1—The transformer model is used to transfer energy and data wirelessly between a reader and a contactless card using inductive coupling.

MIFARE Card

- Patented by NXP Semiconductors
- ISO 14443 Compliant
- No Battery needed
- Secured against fraud
 - Mutual Challenge and Response Authentication
 - Data Ciphering
 - Message Authentication
- Memory
 - 1kB of EPROM
 - 16 sectors (4 blocks of 16 bytes)

RFID Reader

- Portable or Fixed
- LCD, Function keypad, Serial Interface
- Range = 10 cm



Hardware Design

- Luminary Micro LM3S811 microcontroller
- 2x16 LCD module
 - Hitachi LCD controller
 - 4 bit bus connection with LM3S811
- 16 key keypad for alphanumeric data
 - Connected to LM using resistor ladder
 - Saves I/O lines
 - Resistors (1 % tolerance) used in increments of 500 ohm

- Communication
 - MAX 232 for RS-232 interface
- 32.768 kHz crystal oscillator
- 9V battery downed to 5 V to power circuit
- Antenna used is a coil of antenna
 - Directly Matched antenna
 - 50 ohm Matched antenna

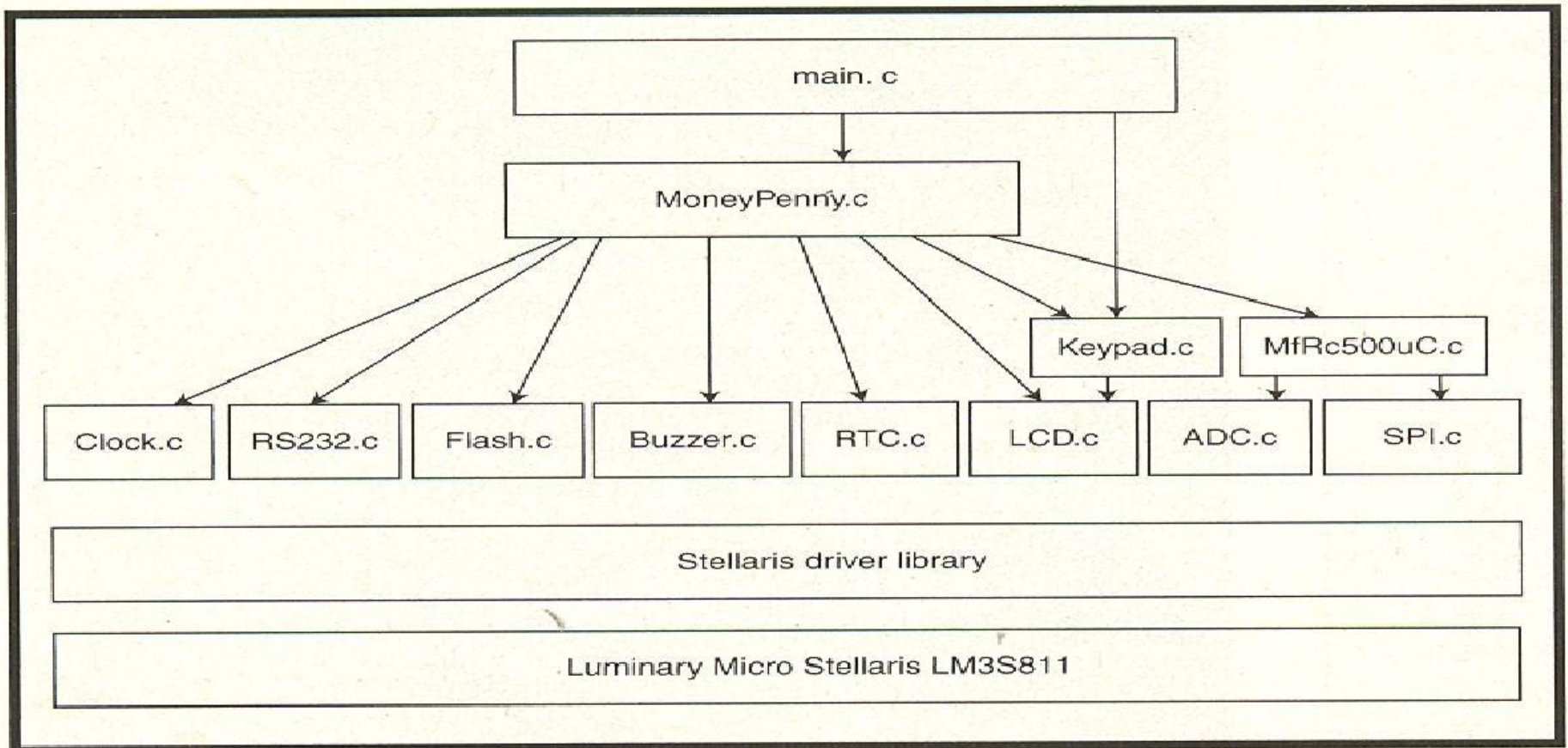


Figure 7—The module hierarchy for the firmware is fairly simple. There are different layers of complexity. Each microcontroller peripheral has its own driver in a separate source file. There is no need for an RTOS.

References

- Circuit Cellar (February 2008)
- <http://www.rfidnews.org/weblog/2004/07/26/pay-at-the-drivethru-technology-continues-to-grow/>
- <http://mifare.net/index.asp>
- <http://en.wikipedia.org/wiki/MIFARE>
- http://www.luminarymicro.com/products/lm3s811_microcontroller.html