GARBAGE MANAGEMENT SYSTEM USING ARM PROCESSOR

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Abstract—This proposed paper gives a new method of designing The Garbage Management System Using ARM Processor. The paper is based on building automation related to instrumentation and control. We are designing this system to provide proper and low cost solutions for disposal of garbage. In this system we are using master slave concept for automation. We are using ARM processor as master and microcontroller unit as slave. Slave unit is placed on each floor of the building and one master unit is there to control and access all the slave units. RS 232 is used for communication between master and slave. We are introducing a new automated garbage disposal technique.

Index Terms—ARM7 Processor, 8051 Microcontroller RISC- Reduced instruction set for computing, MAX 232 Links.

I. INTRODUCTION

Managing waste/garbage can be challenging for industrial,Commercial and institutional (ICI) sectors. Organizations must deal with a wide variety of materials, large volumes of waste, and behaviors of many customers, visitors, and/or students from within and outside of the province. In many cases, the most efficient and cost effective way to manage garbage is to not have to deal with it at all; therefore waste diversion and garbage minimization are often a primary focus for most integrated garbage management plans, garbage management is largely regulated by legislation and policy implemented at the municipal level, but there are significant provincial regulations that may come into play. In existing system one has to step down to ground floor for disposal of garbage this is very time consuming for today's busy people. To provide proper and low cost solution to this problem we are designing Garbage management system.

II. DESIGN CONSIDARATION

The Block Diagram of Proposed system is as shown in figure1.It consists of:
• Master.
• Slave.
• Garbage container wet measuring by Load cell.
• Duct cleaning setup. .
• Communication link MAX 232.

In this system we are using master slave concept for automation. We are using ARM processor as master and microcontroller unit as slave. Slave unit is placed on each floor of the building and one master unit is there to control and access all the slave units. Slave unit will control the door actuator on each floor and similarly instruct the user to

operate the door through key provided. It will send this data to master for further process.
The main components of the system are as follows:

A. Master

ARM processer is for master Control, it takes signals from Overhead water tank for tank level monitoring, bottom level Load cell for garbage container full signal and from each floor it will get feedback of door open and or close signal through MAX 232 link.LCD display will show the status of the system. The I/O lines will be controlling the on off Functioning of solenoid valve. The LPC2148 are based on a 16/32 bit ARM7TDMl-S CPU with real-time emulation and Embedded trace support, together with 128/512 kilobytes of Embedded high speed flash memory. A 128-bit wide memory inters face and unique accelerator architecture enables 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30 with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB POBT, PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale. With a wide range of serial communications, interfaces, they also very well
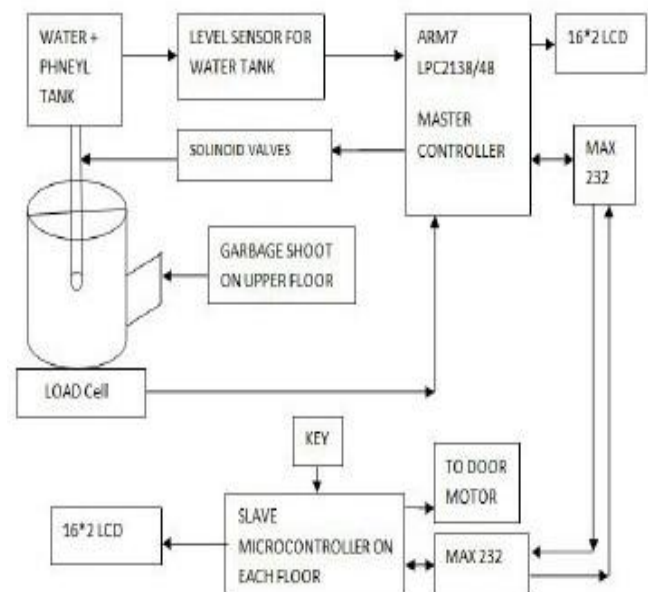

Fig. 1: Block diagram

suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed complex Instruction Set Computer (CISC). The LPC2141/2/4/6/8 flash memory provides minimum of 100,000 erase/write cycle and 20 year of data retention.

B. Slave

AT89S51 microcontroller is used as slave unit. It willControl the door actuators on each floor and similarly instruct the user to operate the door through the key provided. It will send this data to master for further processing. The AT89S51 is a low-power, high-performance CMOS 8-bit microcontroller with 4K bytes of In-System Programmable Flash memory. The device is manufactured using Atmel high-density nonvolatile memory technology and is compatible with the industry- standard 80C51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By com-Bining a versatile 8-bit CPU with In-System Programmable Flash on a monolithic chip, the Atmel AT89S51 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S51 provides the following standard features: 4K bytes of Flash, 128 bytes of RAM, 32 I/O lines, Watchdog timer two data pointers, two 16-bit timer/counters, a five-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry., we have done programming by Kiel software.

C. Load cell

The Load cell is used to measure weight of garbage container placed at the bottom of duct. As the user press the Key present on the floor for door opening then the master will check whether the container is full or empty by load Cell sensor. If the container is full door could not open and Display shows Garbage container full message .If the container is empty then master will give signal to slave controller to access the door through key provided.
Cell Output mV: 2l
Load capacity: 10kg
Excitation volt: 5V
Operating temperature Max: 70 Ł C, Min:-20 ŁC
Length: 130mm

D. Float type level sensor

The level sensor measure the level of tank placed at the Top of the duct. It containing water + phenyl mixture which Will get spread over the internal duct thus cleans the duct After someone drop the wet garbage, as soon as door closes the master controller clean the internal duct by making on the solenoid valve for the predetermined time. The Variable Resistor and float stem are wired to send a signal as the float rises, the voltage of the signal changes. Most of the time, the Signal voltage is the lowest when the tank is empty, and the highest when it is full.

E. MAX232

The MAX232 is dual driver/receiver that includes a capacitive voltage generator to supply. TIA/EIA- 232-Fvoltage levels from a single 5-V supply. Each receiver converts TIA/EIA- 232-F inputs to 5-V TTL/CMOS levels. These receivers have a typical threshold of 1.3 V, a typical hysteresis of 0.5 V, and can accept 30-V inputs. Each driver converts TTL/CMOS input levels into TIA/EIA-232-F levels. The driver, receiver, and Voltage-generator functions are available.

F. Communication Protocol (RS232)

As this was before the days of TTL logic, it should not be Surprising that the standard does not use 5 volt and ground Logic levels. Instead, a high level for the driver output is Defined as being +5 to +15 volts and a low level for the driver output is defined as being between 5 and 15 volts. The receiver logic levels were defined to provide a 2 volt noise margin. As such, a high level for the receiver is defined as +3 to +15 volts and a low level is 3 to 15 volts. The RS232 standard also limits the maximum slew rate at the driver output. This limitation was included to help reduce the likelihood of crosstalk between adjacent signals. The slower the rise and fall time, the smaller the chance of cross talk. With this in mind, the maximum slew rate allowed is 30 V/ms. additionally, a maximum data rate of 20k bits/second has been defined by the standard. Again with the purpose of reducing the chance of cross talk. Due to its relative simplicity and low hardware overhead (as compared to parallel interfacing), serial communications Is used extensively within the electronics indus-try. Today, the most popular serial communications standard in use is certainly the EIA/TIA232E specification. This standard, which has been developed by the Electronic Industry Association and the Telecommunications Industry Association (EIA/TIA), is more popularly referred to simply as RS232 where RS stands for recommended standard. In recent years, this suffix has been replaced with EIA/TIA to help identify the source of the standard.

III. WORKING

In this system we are using master slave concept. Use of ARM processer is for master and 8051 as slave controller for each floor. We will implement it only for one floor. Arm processor takes signals from overhead water tank for tank level monitoring, bottom level load cell for garbage container full signal. And from each floor it will get feedback of door open and or close signal through RS 232 link.LCD display will show the status of the system. The I/O lines will be controlling the on off functioning of solenoid valves .Slave unit will control the door valve on each floor and similarly instruct the user to operate the door through the key provided. It will send this data to master for further

processing. The whole process happens as follows. Once the user press a key the respective floor door will get open for some time. As you drop the wet garbage door closes. Master controller will then cleans the internal duct by making on the solenoid vale for the predetermined time. So that water+ phenyl mixture will get spread over the internal duct thus cleans the duct. During this time no one can allow to open the floor door this will be done through the RS 232 interface.

IV. CONCLUSION

We designed proper and low cost solution for disposal of garbage in large buildings. Our system totally based on Building automation. It is user friendly, and also we can Change the system as per user requirement. Human efforts are reduced because of automation we provided. ARM processor for building automation is a new concept or technology we used here. It is semi-automated system but in future it will be totally or fully automatic.

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