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96acknowledging Gsm Controlled Robot

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Abstract
"Acknowledging GSM controlled Robot" discussed a kind of design of robot based on ARM. The system uses the ARM7 as a controlling unit to combinative with GSM TC35i modules. Sending and receiving of data that associated with system shows the trend of the GSM control system in the future. Using GSM networks, a control system has been proposed that will act as an embedded system which can monitor and control appliances and other devices locally using built-in input and output peripherals. So we can eliminate the need of being physically present in any location for tasks involving operation of appliances.
Keywords— LPC2148 (ARM7), GSM modem, Driver IC and DC motor, P IR sensor

I. INTRODUCTION

In the existing method we were control the robot by using the RF remote control which consumes more power and which is not secured for wireless transmission of commands for controlling robot. We cannot use this robot where radio frequency signals are not present.Mobile robots perform various ways of tasks to serve humans such as home robot, inspection robot, security robot, school education robot, rehabilitation robot, and so on. The conventional mobile robots have used front-steering and rear- wheel driving mechanism to response all needed robot obvious motions, but the motion restriction is a major problem in the use of such mechanism. The controlling the ROBOT by GSM SMS is a most suggested mechanism for mobile robot, which have the capability of changing directions for the long range distances.

In this project we are going to control the ROBOT by using GSM SMS from the remote location. Commands send by from the users mobile. These commands are receives by the GSM system present on the robot. The commands the fed to the microcontroller which process on the commands the according to that robot will work.

The system uses a compact circuitry built around LPC2148 (ARM7) microcontroller. Programs are developed in Embedded C. Flash magic is used for loading programs into Microcontroller.

II. BLOCK DIAGRAM

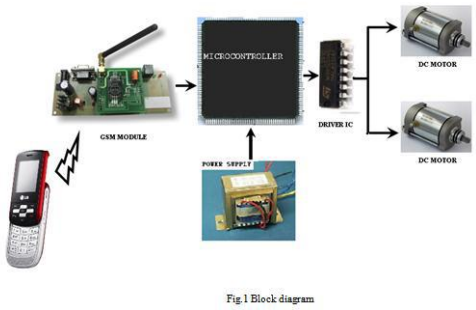

Fig.1 Block diagram

A. LPC 2148

The LPC2148 microcontrollers is based on a 32-bit ARM7TDMI-S CPU with real-time emulation and with embedded high-speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative is 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty.

Due to their tiny size and low power consumption, LPC2141/42/44/46/48 is ideal for applications where miniaturization is a key requirement. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADCs, 10-bit DAC, PWM channels

and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems.

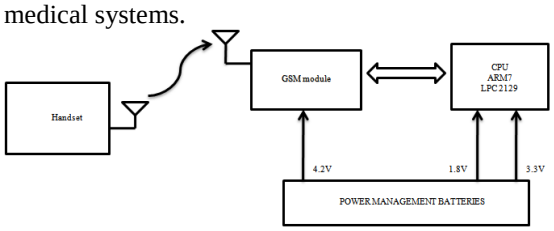

Fig. 2 Hardware Structure

B. Regulated Power Supply

Mainly the ARM controller needs 3.3 volt power supply. To use these parts we need to build a regulated 3.3 volt source. Here we use a LM317 voltage regulator IC. LM317 is the standard an integrated three-terminal adjustable linear voltage regulator. LM317 is a positive voltage regulator supporting input voltage of 3V to 40V and output voltage between 1.25V and 37V. A typical current rating is 1.5A although several lower and higher current models are available.

C. GSM

GSM TC35i wireless communication module is used. Having gained the domestic network card of Radio equipment, it operates in dual-band GSM900 and GSM1800, with power consumption of 2W and 1W respectively. The DC power supply ranges from 3.3v to 4.8V. The Current consumption is as below 3.5mA at sleep state, 25mA at leisure state 300m (Average) at launching state, and the maximum is 2.5A.

Combining RF and baseband, this module provides users with a standard AT command interface and a fast, secure and reliable transmission of data, voice, SMS. The Data input / output interface of TC35 is in effect a Serial Asynchronous Receiver Transmitter. It has fixed parameters and is in line with ITU-T RS232 interface standard 8 data bits and 1 stop bit, no parity; the baud rate is selectable between 300bps and 115kbps. It sends standard AT commands through the serial port of a microprocessor LPC2148 to TC35i module serial port, to fulfill the Locator's function of sending and receiving text messages, therefore realizing the communication with mobile phone users outside.

D. DC Motor

In any electric motor, operation is based on simple electromagnetism. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current carrying conductor and an external magnetic field to generate rotational motion.

E. Driver IC

L293D is a dual H-Bridge motor Driver, so with one IC we can interface two DC motors which can be control in both clock wise and anti clock wise direction. We can also make use of all the four I/o's to connect up to four DC motors.

L293D has an output current of 600mA and peak output current of 1.2A per channel. Moreover the protection of the circuit from back EMF output diodes are included within the IC. The output supply (VCC2) has a wide range from 4.5 V to 36V, which has made L293D as the best choice for DC motor driver.

F. PIR Sensor

All the objects with a temperature above absolute zero emits heat energy in the form of radiation.PIR sensor do not generate or radiate any energy for detection purpose. They work entirely by detecting the energy given off by other objects. They detect the infrared radiation emitted from an object which is differ from but often associated with the objects temperature.

III. SOFTWARE DESIGN

The title "Acknowledging GSM controlled Robot" suggests is aimed to construct a control system that enables the complete control of the interface on which it is based. The general objectives are to co-ordinate appliances and other devices through Short Message Service (SMS), to effectively receive and transmit data via SMS, to get acknowledgement from robot in the form of sms, so user will confirm that the given task is completed.

A. Technical Algorithm

The main aim is to design a SMS controlled robot. The robot movement is totally controlled by using SMS. Hence all the motion and the directions of the robot are depending upon commands send by the user. Correct commands should be sending by the user. Otherwise there will have problem in controlling the robot.

1. Command Transfer

The command sent by mobile user is received by GSM modem. Then GSM modem sends message to controller through RS-232 cable. First GSM modem send message to MAX-232 since RS-232 cable doesn't understand logic state so it converts logic state given by modem into voltage stage then that value is send through RS-232 cable to MAX-232 before sending data to controller. Now this convert's voltage state into logic state which understands by controller. Then based on received

value the direction of robot is changes by using DC motors.

2. Motion Control

Controller is interfaced to DC motors through Driver IC's. These IC can also be called as line driver. Based on the messages sent through mobile the direction of robot is changed for forward direction, backward direction, right direction, left direction. For all directions specific messages will be sent through mobile for changing direction of robot. The GSM modem is interfaced to controller through RS-232 cable to UART of the processor.

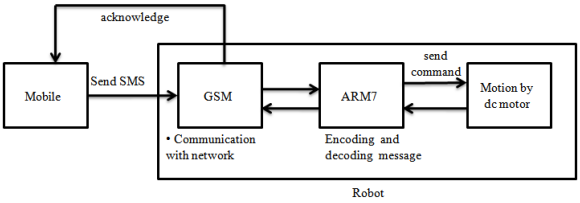

Fig. 3 System Structure

DC Motors cannot be interfaced directly to microcontrollers since these do not support logic states. Since if sudden high state is applied to motor gets struck so the motor is interfaced to controller for smooth direction changing the name of that IC is L293D (line driver). To this single IC two DC motor can be connected. Totally four pins of processor is used to connect to this IC. By giving different logic values to these the motor directions can be change as shown below. Hence the direction of robot is changes by using mobile through messages.

TABLE I

A	B	Description
0	0	Motor stops or breaks
0	1	Motors runs anticlockwise
1	0	Motors runs clock-wise
1	1	Motor stops or breaks

3. Acknowledgment

After performing the specific task the microcontroller generates the acknowledging message for the user. It sends by the microcontroller using GSM modem. The acknowledge is positive or negative depending upon the completion of the work by the robot.

The PIR sensor used to detect obstacle come in front while robot doing its work. If it happened then microcontroller generates a message and sends to user. User sends the direction changing command to robot to change the direction.

B. Program Flow

Before running the main program, LPC2148 controller must initialize the runtime environment, which is, writing start code for ARM chips, including the exception vector table, stack initialization, the storage system initialization and target board initialization, usually written in assembly language. If you use the controlling the robot on the basis of GSM while using the SMS service, the program flow chart is shown in Fig. 4.

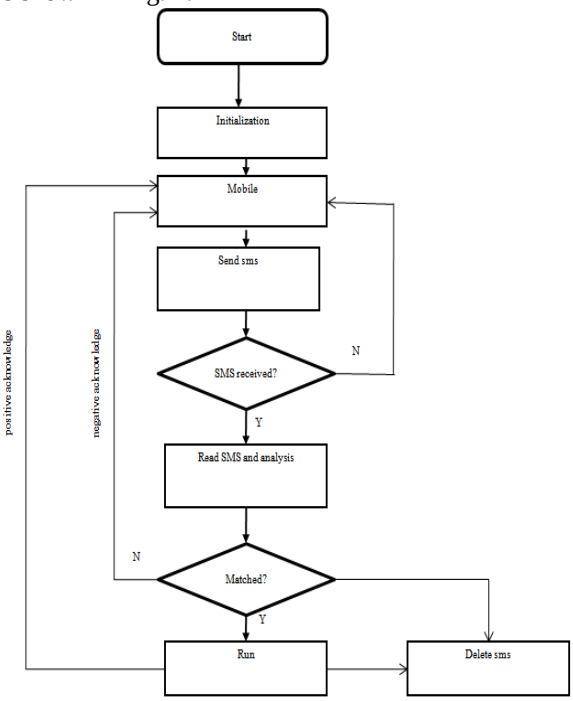

Fig. 4 Flow Chart

The key of software design is to write function Functions. Functions are realized by calling the corresponding function, which includes two parts: sending and receiving text messages, matching and executing the command. The message is first generated by the user and sends to the robot. If any message is received by the GSM then microcontroller will do next step otherwise it will wait for message. After receiving the message, it will read and analyzed by the microcontroller. If it is error free command then it will run that commands and process according to that. After processing on the message microcontroller generate the positive acknowledgement that shows the completion of task. Otherwise if there is any error in command then negative acknowledgement will generate by the microcontroller and send to user mobile.

IV. CONCLUSION

The project "Acknowledging GSM Controlled Robot" has been successfully designed and tested. It has been developed by integrating features of all the hardware components used. Low cost, easy to use for rural areas, automated operation,

and Low Power consumption are the features of the robot. GSM as wireless data communication platform, the system is small, stable and reliable, with small delay, which can effectively overcome the past disadvantages of poor real-time and high operating costs existed in the system.

V. ACKNOWLEDGMENT

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