OpenLab Pro

ARMv7 PROJECT

EMBEDDED SYSTEMS

PROJECT 1

Digital Clock With Alarm and Medicine Reminder over Bluetooth using ARMv7-TDMI (LPC2148)

Contents

1 ABSTRACT

This projects aims to design a basic digital clock using ARMv7 based micro-controller (LPC2148/LPC2138) and interface it with display and Bluetooth module for alarm and medicine reminder features.

2 INTRODUCTION

The designed digital clock has a LCD for displaying the time and date. The clock has alarm feature. For people who forget to take their medication it is a very useful thing to have a reminder. The medicine reminder feature will display the message to take medicine on LCD and also it will send the same message over Bluetooth.

3 MOTIVATION

Motivation is the reason for people's actions, willingness and goals. My motivation to work on this project came from the fact that we see a a lot interesting gadgets around us all the time. But being an embedded systems enthusiast I always wanted to design such a gadget myself. So I made a digital clock with all the basic features. This device is no way near industrial standard, but it surely have helped me to apply the concepts I have learned to use in real life.

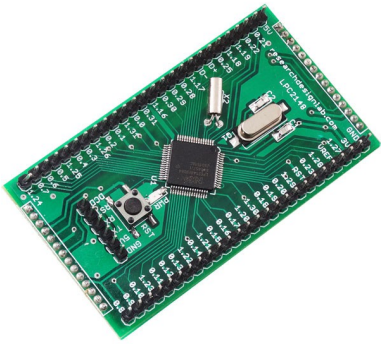
4 FEATURES

1.Can display Time.
2.Can set Alarm.
3.Can edit the Time or Alarm time using keyboard.
4.Can send alarm message over Bluetooth.

5 TOOL'S DESCRIPTION

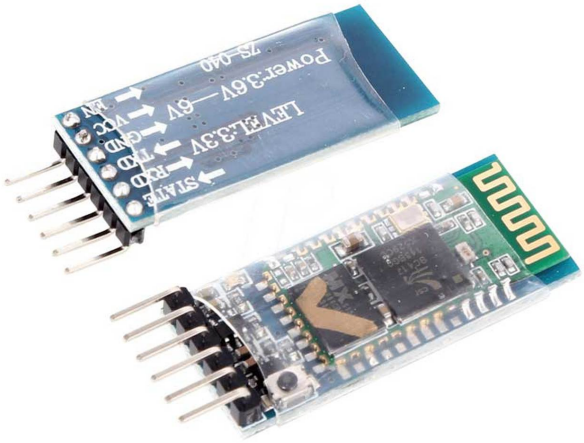
i.LPC2148/LPC2138

The LPC2148 is an ARM7TDMI-S based 32-bit RISC Microcontroller with Thumb extensions 512KB on-chip Flash ROM with In-System Programming (ISP) and In-Application Programming (IAP), 32KB RAM, Vectored Interrupt Controller, Two 10bit ADCs with 14 channels, USB 2.0 Full Speed Device Controller, Two UARTs, one with full modem interface. Two I2C serial interfaces, Two SPI serial interfaces Two 32-bit timers, Watchdog Timer, PWM unit, Real Time Clock with optional battery backup, Brown out detect circuit General purpose I/O pins. CPU clock up to 60 MHz, On-chip crystal oscillator and On-chip PLL.



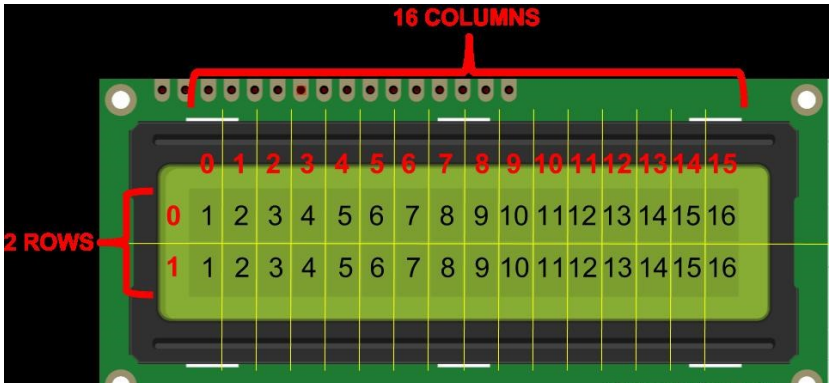
ii.Bluetooth Transmitter/Receiver Module(HC-05/HC-06

HC-05 is a Bluetooth module which is designed for wireless communication. It has range up to ¡100m which depends upon transmitter and receiver, atmosphere, geographic urban conditions. It is IEEE 802.15.1 standardized protocol. It uses serial communication to communicate with devices. It communicates with microcontroller using serial port (USART).



iii.16*2 LCD Display

LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used for basic display. The 16×2 translates to a display of 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 pixel matrix.



iV.4*4 Keypad Matrix

The 4*4 matrix keypad usually is used as input in a project. It has 16 keys in total, which means the same input values. The 4*4 Matrix Keypad Module is a matrix non- encoded keypad consisting of 16 keys in parallel. The keys of each row and column are connected through the pins outside – pin Y1-Y4 as labeled beside control the rows, when X1-X4, the columns.

V. Push button Switch and Resistors

We need one push button switch and two 10 kilo ohm resisters in our project.

Vi.3.3V Power Supply

Overview of Wheels Used in Robotics. The wheel is the most common moving element among other possibilities including legs, flying, swimming and rolling. A wheel provides at least speed, accuracy and stability for a robot, three characteristics very important in designing and build robots.

Vii.Mini Breadboard

Anatomy of a Mini Breadboard. ... These tie points take the form of holes within the breadboard, into which wires and components can be pushed. They're useful for basic prototyping, but breadboards don't accommodate anything with two closely spaced rows of pins, such as the header on the Raspberry Pi.

Viii.Jumper Wires

A jump wire (also known as jumper wire, or jumper) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering

ix.Proteus Simulator and Library for HC-05

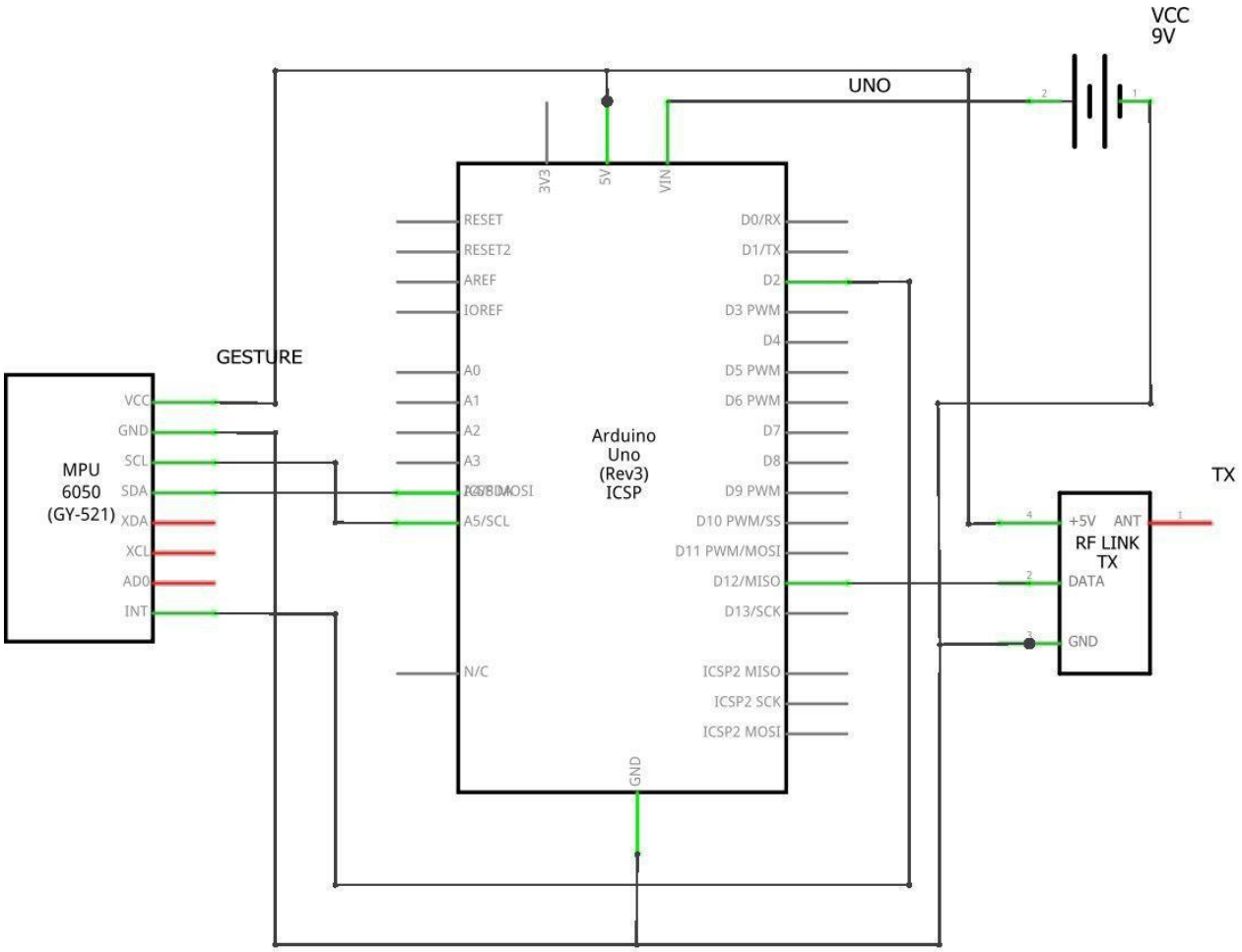
18650 Battery Holder - Wire - 2 Cell. This 18650 battery case holds two (2) 18650 lithium-ion batteries connected in series, providing approximately 7V output (3.7V x 2). The holder includes output leads approximately 6” long for soldering or connecting to your circuit.

x.Keil uVision 4/5

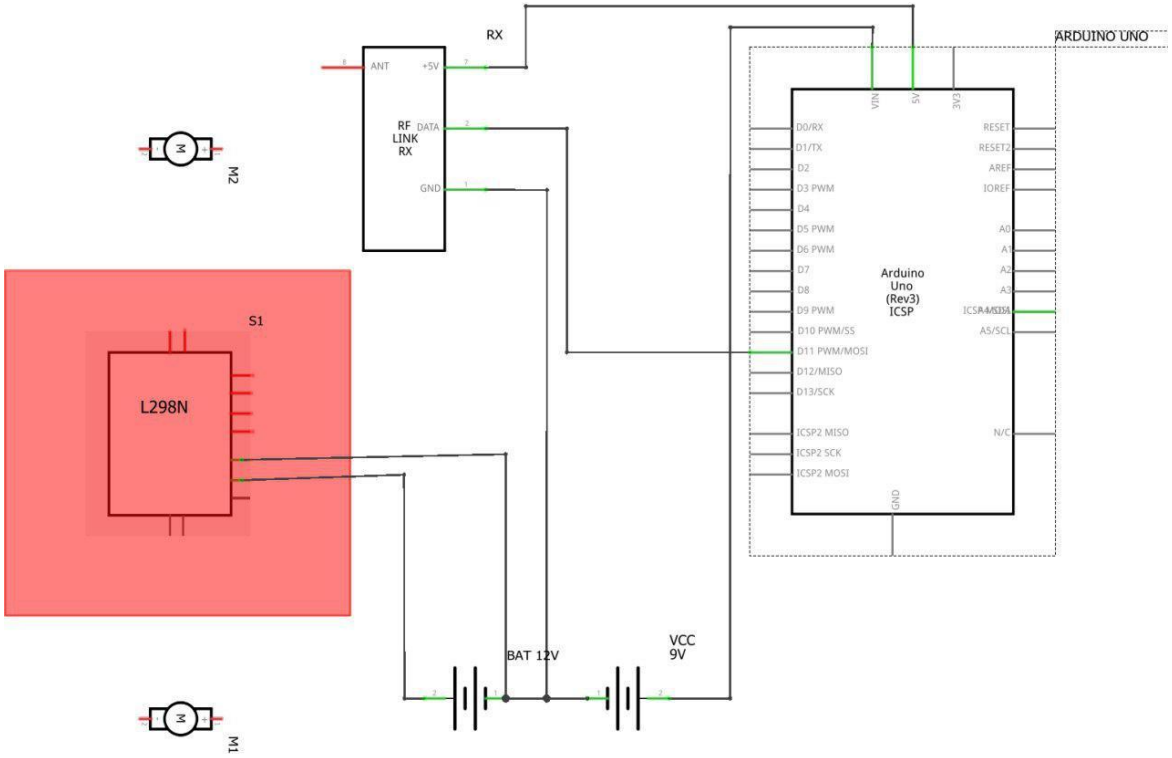
EBL 18650 3.7V Li-ion Rechargeable Batteries 4 Counts with iQuick 18650 16340.Skywolfeye 18650 Rechargeable Batteries.

6 SYSTEM ARCHITECTURE

Transmitter



Receiver


RX
ARDUINO UNO
ANT
+5V
RF
LINK
RX
DATA
GND
M2
M1
S1
L298N
BAT 12V
VCC
9V
Arduino
Uno
(Rev3)
ICSP
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
ICSP2 MISO
ICSP2 SCK
ICSP2 MOSI
RESET
RESET2
AREF
IOREF
A0
A1
A2
A3
A5/SCL
N/C
VIN
5V
3V3
GND

7 WORKING PROCESS

In this project, a robot that is controlled by the gestures made by the hand, is designed. The working of the robot is explained here.

As mentioned earlier, the gesture controlled robot is a wireless operated robot and has two parts: Transmitter and Receiver. When the robot is powered on, the transmitter part, which consists of Arduino, MPU6050, Encoder and RF Transmitter, will continuously monitor the MPU6050 sensor.

This data is captured by the Arduino, which then transmits a corresponding data to the Encoder, based on the orientation of the MPU6050 Sensor. The parallel data received by the encoder is converted into serial data and this serial data is transmitted by the RF Transmitter.

At the receiver section, the RF Receiver receives the serial data and transmits it to the Decoder IC. The Decoder will convert the serial data to parallel data and this parallel data is given to the motor driver IC. Based on the data, the movement of the motors, and hence the movement of the robot is defined

8 RESULT

We achieved our object without any hurdles the control of a robot using gesture. The robot is showing proper response whenever we move our hand .Different hand gesture to make the robot move in specific direction are as follow:

Move Forward

Move Backward

Move Right

Move Left

9 FUTURE SCOPE

Future work will build upon the improvement of the correctly recognized the gestures. One approach might be the implementation of a gyroscope into the system, in order to separate the acceleration due to gravity from the inertial acceleration and second approach can be that we can install a GPS in the system to track the position of robot. The use of more accelerometers attached to the arms is another possibility.

10 CONCLUSION

Hand Gesture Control becomes an example of companionship between man and machine in the race of man vs. Machine further enhancing the technology to the next level from Speech recognitions and wired connections to wireless hand gesture control technology. There is a rapid growth on application development considering gesture recognition system. So in this paper, we propose a model of a robot based on "Human Gesture Recognition" utilizing hand gestures to communicate with the robot. The 3- axis accelerometer selected to be the input device of this system captures the human gestures. When compared with the other input devices accelerometer is easier to work and offers the possibility to control a robot by wireless means. The low price and short set-up time are other advantages of the system but an important limitation to consider is the reliability of the system. Physical hardship to the user is avoided through the use of accelerometer as with the twist of the hand, the user gets the ability and freedom to turn the robot into the desired direction.