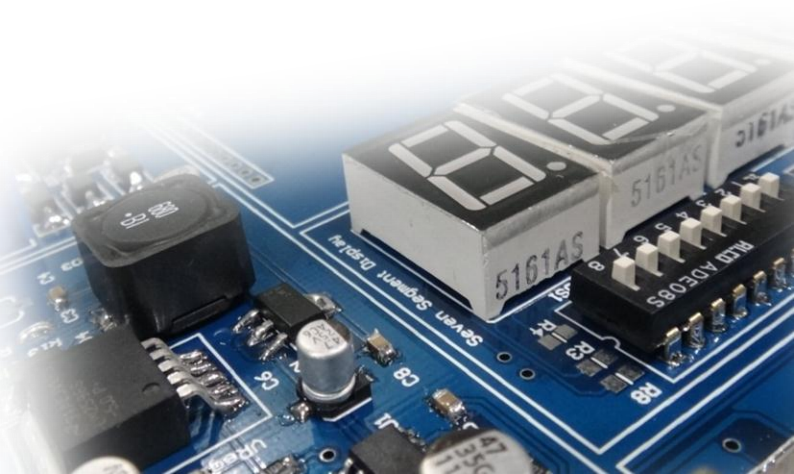
GANDALF Ver.2.0

User Manual

Universal Microcontroller Development Platform



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Thank you very much & best Regards,

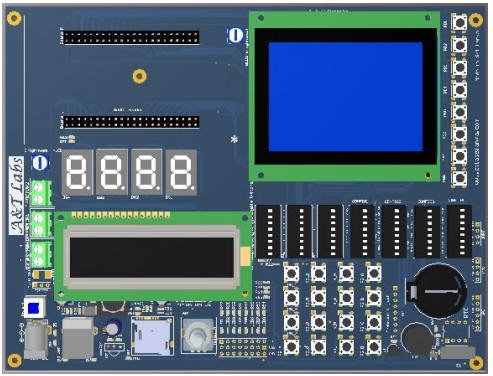
A. Tennakoon
Director, Technology

T. Ambagahawaththa
Director, Technology

Contents

General Information

Gandalf is a universal microcontroller development platform developed by A&T Labs. It supports four major microcontrollers (PIC, Atmega, ST and 8051) as add on boards. These add-on boards can be directly plugged in to Gandalf board and can be used as a development board and each add-on board can function as an individual small scale development board as well.




Universal Development Environment ,


External Power and USB Powering


UART via USB connector ,


Real Time Clock with CMOS Battery,


Seven Segment Display, Alpha Numeric Display and GLCD Connector

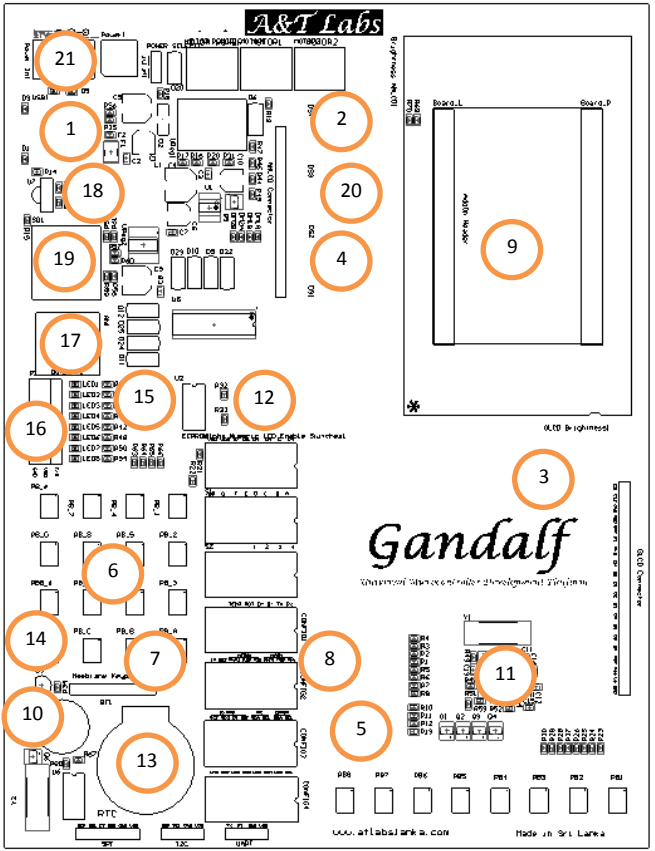
Package Contents

Development Board	Gandalf Development Board
Add on Board	Pipino: PIC Microcontroller Development Add on
CD	Product CD
Cables	USB Cable
Accessories	16x2 Alpha Numeric Display
Documentation	User Manual

System Specification

Power	External Supply 7~ 18V USB Power
Dimensions	200mm*170mm

Features


A&T Labs
Gandalf
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RTC
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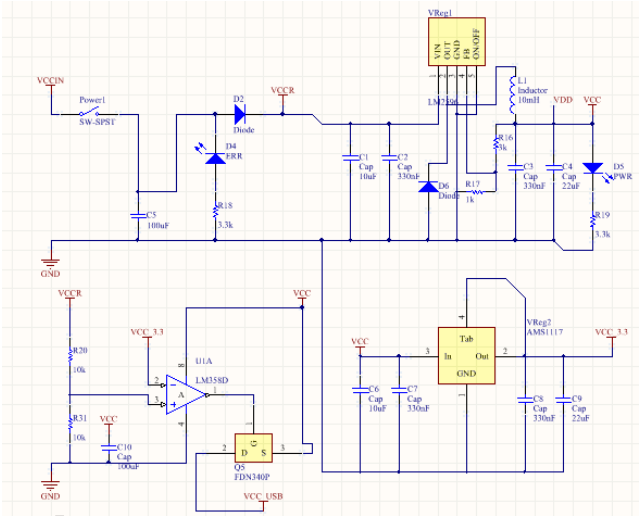
1. Power Supply (SMPS)
2. Motor Controller Module
3. GLCD Connector and Space
4. Alpha Numeric LCD
5. 8 x Push button switches
6. 4 x 4 Push Button Grid
7. Membrane Keypad connector
8. Configuration Switches
9. Add-on Board Connector
10. Buzzer
11. USB/UART module
12. EEPROM module
13. RTC with CMOS Battery
14. Temperature Sensor
15. 8 x LEDs
16. 8 x Servo Motor & Digital I/O Connector
17. Analog Potentiometer
18. IR Sensor
19. Memory Card (SPI Flash)
20. Seven Segment Display
21. USB Connector

Powering Up Gandalf

Gandalf Universal Development Board has two main powering options. It can be either powered by an external power source of 7 to 18 volts or can be powered via USB cable. System automatically detects its power source and switches between sources. The High priority power source is the External power .Therefore the system switches its source as external source whenever external power is connected.

- Following diagram shows the correct polarity for the DC power input. If reverse polity supply applied error LED will indicated that polarity is wrong.



Using Power Connector

The Development Board is powered by LM2596S, a switch mode power supply. Input power should be turned on/ off by the power (toggle) switch. The Power module has following features.

- Incorrect Polarity protection
- Incorrect polarity indicator
- Power on indicator
- Input range 7 ~ 18V DC
- Power line noise protection
- Surge protection
- Short Circuit protection

USB Power

The System can be run using USB power; the source switching is done by the protection enabled circuit itself.

Other Options

The add-on boards have their own programming/power connectors such as ICSP. These power connections can also be used to power up the Gandalf development board. However, for the long run, it is advised to use the USB or External source power for the Gandalf Board.

Pipino and Other Add-on boards

Gandalf Development board supports a set of Add-on Boards;

- Pipino, PIC Add-on: Supports 16Fxxxx, 18Fxxxx 28/40 Pin DIP packages and as standalone PIC board
- Fordo, ATMEGA Add-on: Supports Atmega 2560,standalone Arduino board
- Sam, ST Add-on: Supports STM32F405, STM32F429 and more , and as a standalone board
- Merry, TI Add-on: MSP430, C5535 and more, as a standalone board
- Bilbo, 8051 Add-on: 8051 micro controller and as a standalone board
- Gimli Senior, FPGA Add-on: Xilinx Spartan 3
- Gimli Junior, FPGA Add-on: Altera Cyclone 2

Placing an Add-on Board

Step 1: Align “*” sign on Add on Board with “*” sign of Gandalf.

Step2: Align Male header lines of Gandalf with the Female header lines.

Step3: Gently push the Add-on board so that it will fully fits to Gandalf Board.

Programming

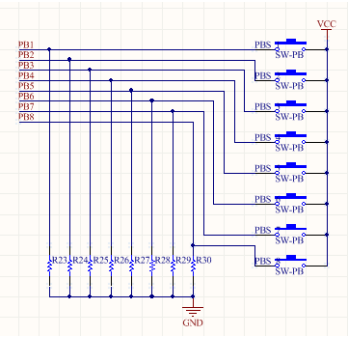
Gandalf development board has a USB connector; by this you can program the microcontroller. Apart from that, each add-on board has its own ICSP/JTAG/FTDI connector where you can use the conventional programming method for programming.

Input Modules

Gandalf Board contains 5 Input modules.

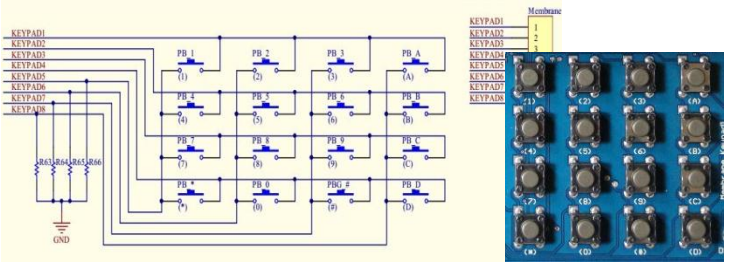
8x Push Button Switches

Push button switches are pulled down and under normal conditions its output is logic '0'. By default these switch module is in activated mode to the development board.



4x4 Push Button Grid

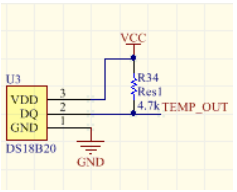
4x4 push button grid shares its connections with membrane keypad connector. A source code which use to handle the 4x4 membrane keypad can be used to handle this module as well. By default this switch module is in activated mode to the development board.



Temperature Sensor DS18B20

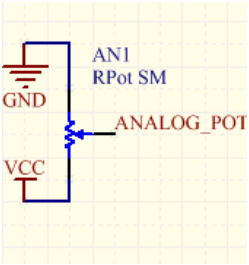
Gandalf board contains “One wire” communication based temperature sensor, DS18B20, which has 8, 9, 10, 12 bit resolution. There are a number of software libraries available for one wire communication with DS18B80 sensor. For further information, please follow DS18B80 datasheet.

To activate this module, you need to turn on the “Temp” Switch of “CONFIG1” configuration switch panel.



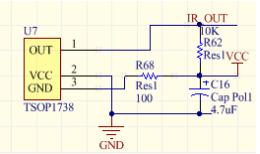
Analog Potentiometer

Analog Potentiometer is installed to the development board as the analog input module. Output of this module is within the range of 0 to VCC provided. This module is activated by the configuration switch “POT” in “CONFIG1”



IR Sensor TSOP1738

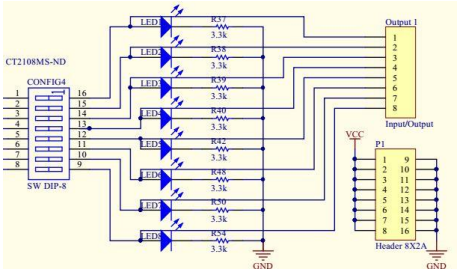
Configuration switch “IR” in “CONFIG2” is used to activate the IR Sensor TSOP1738. This can be used to decode remote controller signals and various applications



Output Modules

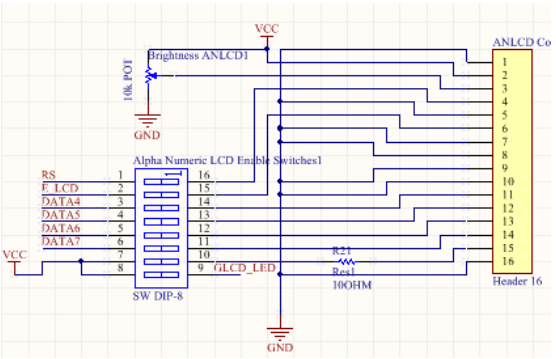
8x LEDs

8 LEDs are installed to the Gandalf board via “LEDx” switches in “CONFIG4”. Each LED can be enabled or disabled via the corresponding switch in “CONFIG4”.



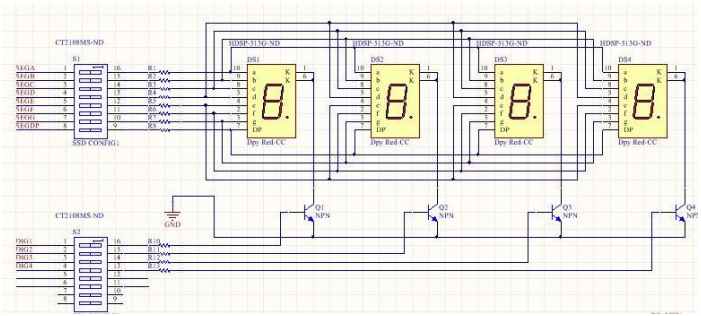
Alpha Numeric LCD

Gandalf Development board supports The Alpha Numeric Display (provided with the board). This device can be enabled via "LCD CONFIG" switches.



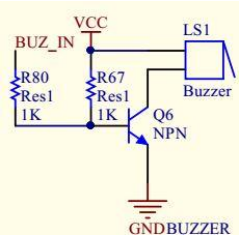
4x Seven Segment Display

4 Seven Segments can be driven using Gandalf development board. This should be enabled using the "SSD CONFIG1" & "SSD CONFIG2" switches. SSD provided are Common Cathod SSD connected with multiplexing capability. The header file 'ssd.h' is provided to interface with SSD module.

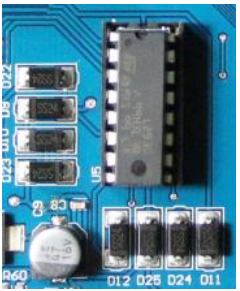


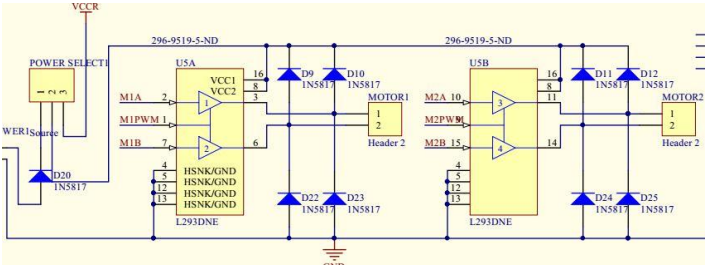
Buzzer

The buzzer can be triggered up by PWM signals and can use to generate audible alerts as well as tones. Configuration switch “BUZ” in “CONFIG2” is used to activate the buzzer.



H-Bridge Motor Controller L293



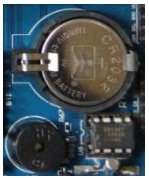


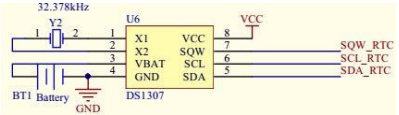
Gandalf consists with L293 H-Bridge motor controller. This module can be used to drive either two DC motors or one 4-input Stepper motor. The peripheral power source can be selected as internal power or external power using the power selector configuration jumper. It is advised to use external power while running DC and Stepper motors. Configuration switches are in the “CONFIG2” dip switch.

Other I/O Modules

RTC with CMOS Battery

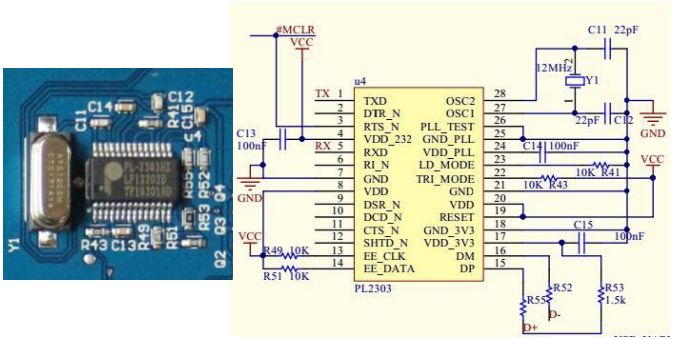
RTC, DS1307 is integrated to Gandalf development board. Enable “RTC” switches in “CONFIG3” dip switch. ”SD CARD” configuration switches must be in off position for proper operation.





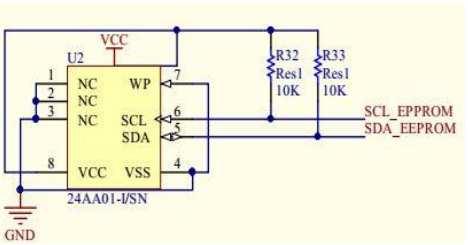
USB/UART/USART Module

USB/UART/USART module is powered by an FTDI communication chip. This module can be used as USB/UART/USART communication interface between a computer to the Gandalf. The very same port is also used as the programmer connector. Enable “Rx” & “Tx” in “CONFIG1” switch.



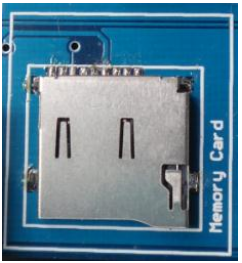
EEPROM

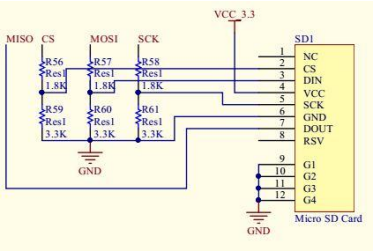
EEPROM, 24AA01 is integrated to Gandalf development board. The communication interface is I2C. Please refer device data sheet for further information. Configuration switches are in “CONFIG3”. ”SD CARD” configuration switches must be in off position for proper operation.



Memory Card Slot (SPI Flash)

SPI Card slot is installed in the Gandalf development board. You can use simple SPI communication methods (when using PIC16F877) to store information in an SD card. However If you are using PIC18F and MicroC IDE, use can use the MicroC Multimedia card library to work with your SD Card. Please refer a SPI flash datasheet for further information. To activate the device turn on “SD CARD” switches in “CONFIG3” and turn off both “RTC” & “EEPROM” configuration switches.

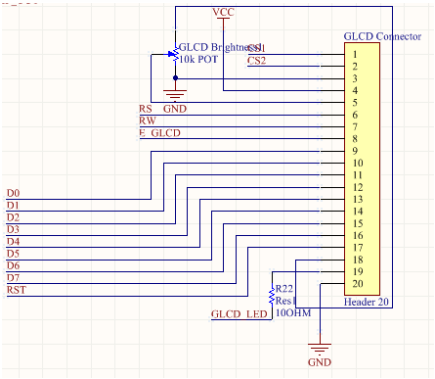




Onboard I/O Connectors

GLCD Connector

KS108 graphic LCD can be connected to the GLCD connector.



Notes