

TALKING ROBOT DEVELOPER'S GUIDE

System Design

Flow Charts

Function Manual

Driver Development

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Abstract

This documentation describes in detail how to create a talking robot – a real-time embedded system. The Talking Robot is mainly composed of Z8 microcontroller board, VoiceDirect speech recognition board, SpeakJet speech synthesis chip, real-time clock, and temperature sensor. The user can interact with the Z8 Speaks through speech communication based on speech recognition and synthesis. It has the capabilities to display current temperature, time, calendar, name, music, reset, and other information on the LEDs in the Z8 board upon spoken request as well as speaking corresponding information. This system provides twelve different operations, such as temperature, time, calendar, reset, etc., which have been already set well in the program. Before the user talks with the robot, his or her voice commands need to be trained correspondingly for the preset operations and stored as speech patterns. Then the user can ask the questions for the robot. If the voice does not match any of trained voice commands, a speech instruction – “words cannot be recognized” or “Repeat, look for” will be given to allow the user to try again.

The major features and functionalities of the system are shown as follows:

- Read the temperature from ADC temperature sensor
- Read the Real-Time Clock (RTC) using I2C bus
- Control the speech recognition board using GPIO and hardware switches
- Control speech synthesis through serial data line
- Interact with the user over the speech communication
- Write/Reset the RTC using I2C bus
- Software decoding to reach up to 15 word commands for speech recognition
- Allophone phase editing
- Numerical pronunciation (0 – 69)
- Calendar pronunciation (Jan. 1 – Dec. 31, Monday - Sunday)
- Non-standard language speech synthesis (Chinese, AM/PM)
- Robot music playing

5 Attachments List

The list of the attachments for this documentation is as follows,

Data Sheets

- 1) SpeakJet User's Manual (PDF)
- 2) DS1307 64x8 Serial Real-Time Clock (PDF)
- 3) SparkFun RTC Module Schematic (PDF)
- 4) MAX6610/6611 Temperature Sensors and Voltage References (PDF)

Source code

- 1) Speaks ZDSPROJ file
- 2) main.c, main.h
- 3) gpio.c, gpio.h
- 4) adc.c, adc.h
- 5) timer.c, timer.h
- 6) eeprom.c, eeprom.h
- 7) I2C.c, I2C.h
- 8) rtc.c, rtc.h
- 9) speakjet.c, speakjet.h
- 10) voicedirect.c, voicedirect.h
- 11) zsldevinit.asm

Demonstration Video (4MB)

TalkingRobot_320x240.mpg(4MB)

Developer's Guide

Talking Robot Developer's Guide (PDF) – *this documentation*

Talking Robot Flyer (PDF)