

A Multi Domain Project on Traffic Sign Recondition System for Driving Vehicles

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Abstract:

The purpose of this project is to design an intelligent wheel robot, which can recognize and follow a pre-defined forward sign while automatically bypassing any encountered obstacle. By distributing those forward signs, the path of the robot is determined. With this concept, an image based auto pilot system with immunity against electromagnetic interference is constructed. The rotation of the robot for automatic target detecting is achieved by using image processing. The experimental results showed that the robot could successfully detect forward sign and response properly. Simply redistributing the recognizable signs by the robot, a new path for robot is constructed.

The robot will take different signs like left, right, forward, back ward & stop according to an image. Therefore, it has great flexibility for applications. The control system of the robot is integrated with programs of computer vision motion control. The image process program compares with the webcam image inputs with the forward signs features from training program to detect the forward sign. Once a forward sign is detected by image processing program image motion control program will rotate the robot to aim the forward sign and then move towards it.

Similarly for remaining signs also the image process program compares with the webcam inputs and the controller will move the robot in different directions (like left, right, backward, stop) based on image. When an obstacle is detected by the IR sensors, image motion control program will launch a bypass process that means automatically the robot will take either left or right. The robot is driven with the processor ARM7 , where all the instructions are given through c coding and emulating in the processor. Zigbee is used as wireless communication device for the robot to act for the instructions given.

A voice module is interfaced to have the voice announcement for the direction when the image get matched.

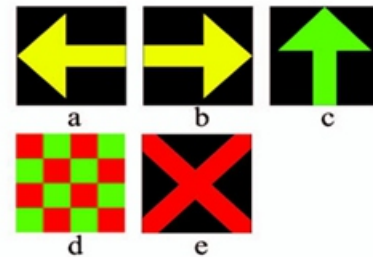
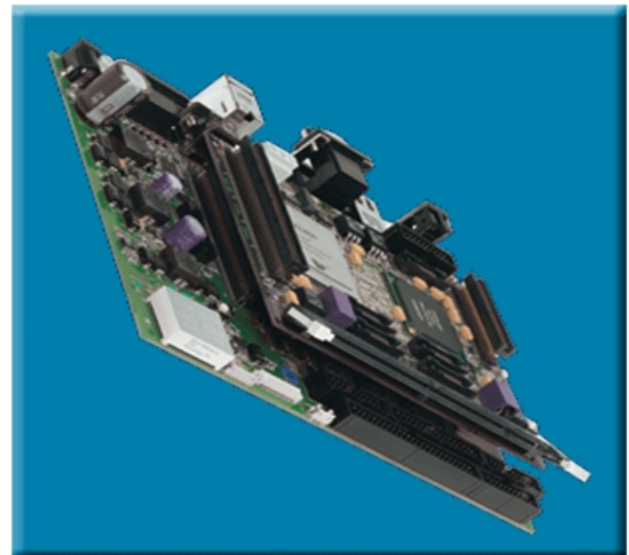


Fig. 2. Traffic lights. a) turn left, b) parking, c) follow straight ahead, d) end of trial, and e) STOP.

ARM PROCESSOR:



ARM7TDMI Processor Core:

- Current low-end ARM core for applications like digital mobile phones
- TDMI
- oT: Thumb, 16-bit compressed instruction set

oD: on-chip Debug support, enabling the processor to halt in response to a debug request

oM: enhanced Multiplier, yield a full 64-bit result, high performance

oI: Embedded ICE hardware

- Von Neumann architecture

The LPC2148 are based on a 16/32 bit ARM7TDMI-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 interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate.

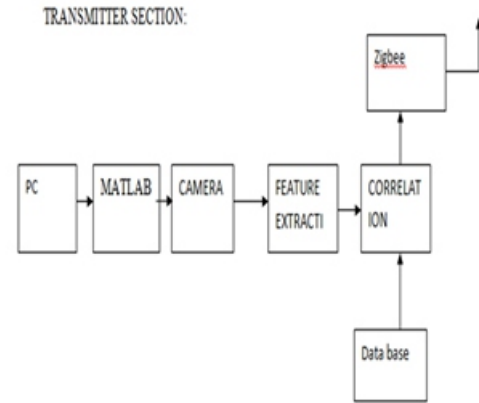
For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB The LPC2148 are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory.

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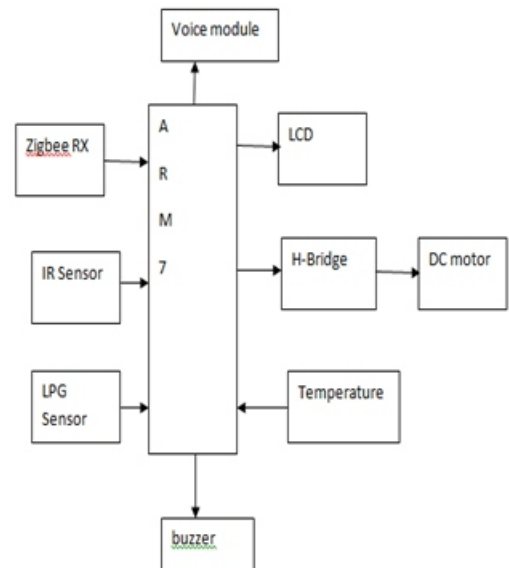
With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT,PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale.

With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.

BLOCK DIAGRAM

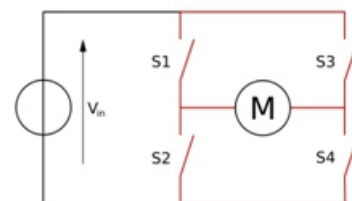


RECEIVER SECTION



DC MOTOR:

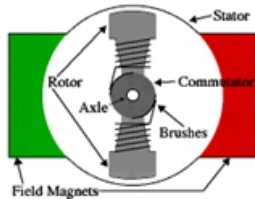
An electric motor is a machine which converts electrical energy into mechanical energy.



Principles of operation:

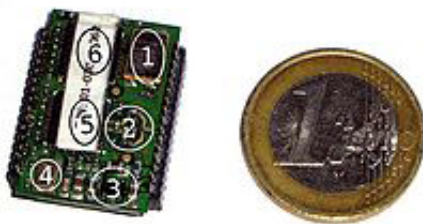
In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when

this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities repel.



(North and North, South and South) repel. 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.

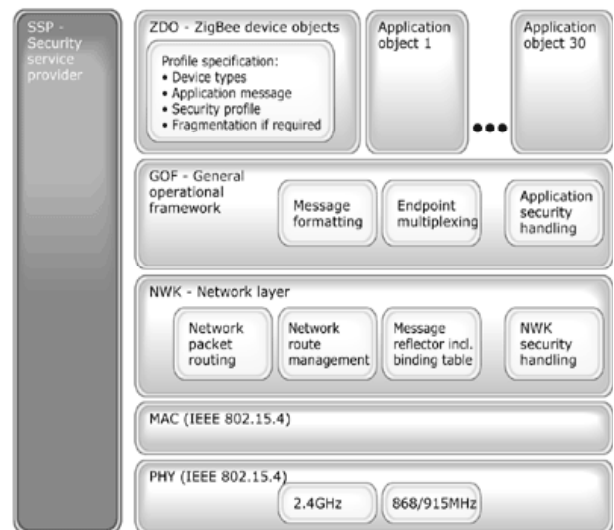
ZIGBEE TECHNOLOGY:



ZigBee module. The €1 coin, shown for size reference, is about 23 mm (0.9 inch) in diameter. ZigBee is a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4-2003 standard for wireless personal area networks (WPANs), such as wireless headphones connecting with cell phones via short-range radio.

The technology defined by the ZigBee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth. ZigBee is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking. The ZigBee Alliance is a group of companies that maintain and publish the ZigBee standard.

ARCHITECTURE:



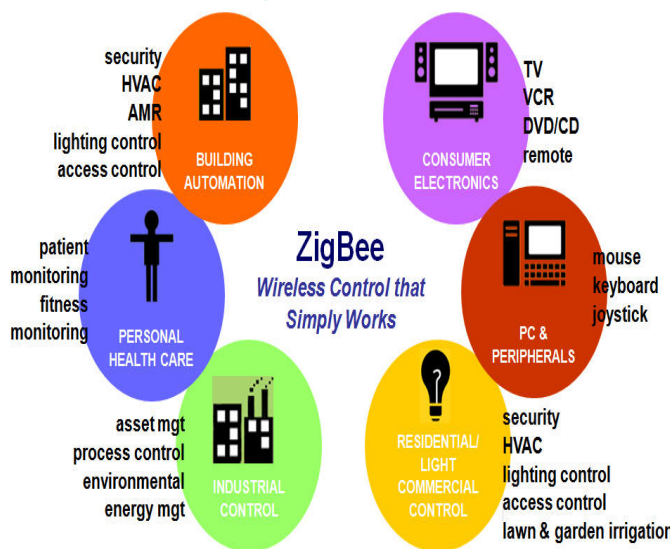
ZigBee is a home-area network designed specifically to replace the proliferation of individual remote controls. ZigBee was created to satisfy the market's need for a cost-effective, standards-based wireless network that supports low data rates, low power consumption, security, and reliability.

It may be helpful to think of IEEE 802.15.4 as the physical radio and ZigBee as the logical network and application software. Following the standard Open Systems Interconnection (OSI) reference model, ZigBee's protocol stack is structured in layers.

The first two layers, physical (PHY) and media access (MAC), are defined by the IEEE 802.15.4 standard. The layers above them are defined by the ZigBee Alliance. The IEEE working group passed the first draft of PHY and MAC in 2003.



Applications of Zigbee:



Recognition methods in image processing:

Image recognition is the process of identifying and detecting an object or a feature in a digital image or video. This concept is used in many applications like systems for factory automation, toll booth monitoring, and security surveillance. Typical image recognition algorithms include:

- Optical character recognition
- Pattern and gradient matching
- Face recognition
- License plate matching
- Scene change detection

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