Title: TV Remote Controlled Bot

Author: Shashank Dabriwal, Munish Minia

Introduction:

A TV remote control is an object able to emit IR (infra-red) rays which an be used to operate some other device wirelessly from a short line-of-sight distance.

TV remotes send commands only one way, in a low-speed burst for distances of up to 30 feet.

The device which we will be using is the Firebird-V bot.

These days, almost all audio and video equipment can be controlled using an infrared remote control.

RC5 is the most popular protocol for transmitting data via infrared light. It was developed by Philips in the late 1980's.

Description:

The aim of the project was to design an IR remote controlled car (Firebird V) having Atmega 2560.

The TV remote control which is an IR device was used to issue commands from a distance to the Firebird V bot which on receiving a particular command performs the appropriate corresponding action.

The actions may include making the bot move forward, backward, taking a right turn, to stop, to start a buzzer or to issue commands to other attached devices or call other functions.

The Firebird-V bot can be made to perform several other tasks and actions once the bits from particular TV remote buttons are received by sensor and then identified and decoded.

Description of the RC-5 protocol:

The RC5 code is a 14-bit word, it uses bi-phase modulation (also called Manchester coding) of a 36 kHz IR carrier frequency. All bits have an equal length of 1.778 ms (rounded off to 1.8 ms), with half of the bit time filled with a burst of the 36 kHz carrier and the other half being idle. A logical zero is represented by a burst in the first half of the bit time. A logical one is represented by a burst in the second half of the bit time.

The command comprises 14 bits:

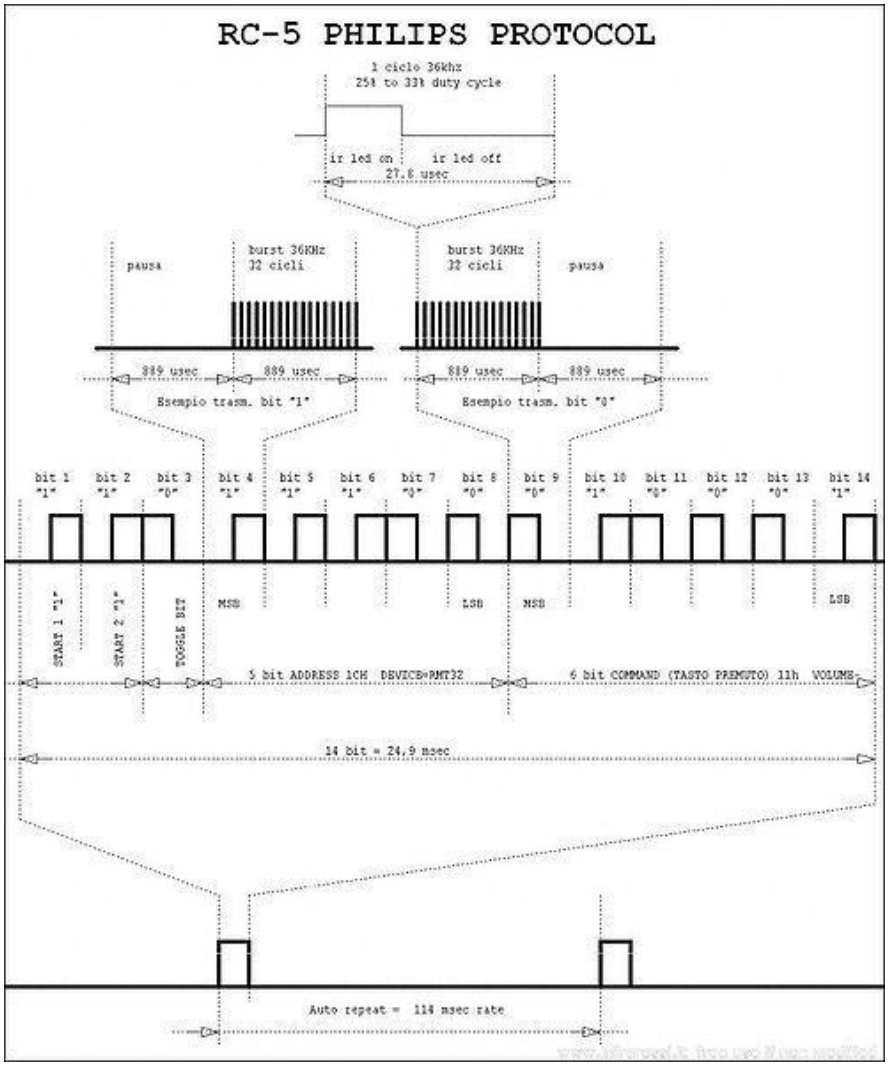
A start bit, which is always logic 1 and allows the receiving IC to set the proper gain.

A field bit, which denotes whether the command sent is in the lower field (logic 1 = 0 to 63 decimal) or the upper field (logic 0 = 64 to 127 decimal).

A control bit, which toggles with each button press. This allows the receiving device to distinguish between two successive button presses.

A five-bit system address, which selects one of 32 possible systems.

A six-bit command code, that (in conjunction with the field bit) represents one of the 128 possible RC-5 commands.



The part of the 14 bit code which is of major interest to us is the last part of the code ignoring the first 3 bits which has a unique value for each of the buttons of a TV remote control. This is to be extracted, identified and decoded from the 14 bit sequence.

On pressing the TV remote button an IR signal is produced which is received at the third pin of the sensor and an interrupt **ISR (INT7_vect)** is raised which calls necessary functions for reading IR input and identifying the bit sequences corresponding to the button press.

The pulses are received bit by bit and we store the necessary bits so as to revoke the appropriate action corresponding to the address code sequence received.

References:

http://www.dharmanitech.com/2009/01/ir-remote-controlled-car-pwm-motor.html

http://www.aaroncake.net/circuits/irremote.asp

http://www.epanorama.net/links/irremote.html

http://www.st.com/stonline/products/literature/anp/17249.pdf

http://www.freescale.com/files/microcontrollers/doc/app_note/AN3402.pdf

http://en.wikipedia.org/wiki/RC-5

IR Remote Controlled Car (PWM motor control using MOSFET H-bridge)- By CC Dharmani
(http://docs.google.com/Doc?id=ddmkwx3z_24dh6npfg2)