

# **SORTING\_OBJECTS\_BASED\_ON\_COLOR\_AND\_- SIZE\_GROUP4**

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Generated by Doxygen 1.5.8

Sun Nov 7 19:12:25 2010



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# Chapter 1

## File Index

### 1.1 File List

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# Chapter 2

## File Documentation

### 2.1 Desktop/final\_grp4/grp4/Group\_4/cover\_field.c File Reference

```
#include <avr/io.h>
#include <avr/interrupt.h>
#include <util/delay.h>
#include <math.h>
#include <avr/delay.h>
```

#### Defines

- #define [FCPU](#) 11059200ul
- #define [FCPU](#) 11059200ul
- #define [RS](#) 0
- #define [RW](#) 1
- #define [EN](#) 2
- #define [lcd\\_port](#) PORTC
- #define [sbit](#)(reg, bit) reg |= (1<<bit)
- #define [cbit](#)(reg, bit) reg &= ~(1<<bit)

#### Functions

- unsigned char [ADC\\_Conversion](#) (unsigned char)
- void [init\\_ports](#) ()
- void [lcd\\_reset\\_4bit](#) ()
- void [lcd\\_init](#) ()
- void [lcd\\_wr\\_command](#) (unsigned char)
- void [lcd\\_wr\\_char](#) (char)

- void [lcd\\_home](#) ()
- void [lcd\\_cursor](#) (char, char)
- void [lcd\\_print](#) (char, char, unsigned int, int)
- void [lcd\\_string](#) (char \*)
- void [lcd\\_set\\_4bit](#) ()
- void [lcd\\_port\\_config](#) (void)
- void [adc\\_pin\\_config](#) (void)
- void [port\\_init](#) ()
- void [adc\\_init](#) ()
- void [init\\_devices](#) (void)
- unsigned int [Sharp\\_GP2D12\\_estimation](#) (unsigned char [adc\\_reading](#))
- void [INIT\\_PORTS](#) ()
- void [timer5\\_init](#) ()
- void [Left\\_Speed](#) (unsigned char val)
- void [Right\\_Speed](#) (unsigned char val)
- void [INIT\\_INTERRUPT](#) ()
- void [FORWARD](#) (void)
- void [REVERSE](#) (void)
- void [LEFT\\_TURN](#) (void)
- void [LEFT\\_TURN\\_SOFT](#) (void)
- void [LEFT\\_REVERSE](#) (void)
- void [RIGHT\\_TURN](#) (void)
- void [RIGHT\\_TURN\\_SOFT](#) (void)
- void [RIGHT\\_REVERSE](#) (void)
- void [STOP](#) (void)
- [ISR](#) (INT4\_vect)
- [ISR](#) (INT5\_vect)
- void [ANGLE\\_ROTATE](#) (unsigned int Degrees)
- void [LINEAR\\_DISTANCE](#) (unsigned int [distance](#))

## Variables

- unsigned char [ADC\\_Value](#)
- unsigned char [sharp\\_left](#)
- unsigned char [sharp\\_center](#)
- unsigned char [sharp\\_right](#)
- unsigned char [sharp\\_center\\_left](#)
- unsigned char [sharp\\_center\\_right](#)
- unsigned char [distance](#)
- unsigned char [adc\\_reading](#)
- unsigned int [value\\_left](#)
- unsigned int [value\\_center](#)
- unsigned int [value\\_right](#)
- float [BATT\\_Voltage](#)
- float [BATT\\_V](#)
- float [white\\_1](#)

- float [white\\_2](#)
- float [white\\_3](#)
- unsigned int [shaftCountRight](#)
- unsigned int [shaftCountLeft](#)
- unsigned int [temp](#)
- unsigned int [unit](#)
- unsigned int [tens](#)
- unsigned int [hundred](#)
- unsigned int [thousand](#)
- unsigned int [million](#)
- int [i](#) = [i](#)+1



## 2.1.1 Define Documentation

2.1.1.1 `#define cbit(reg, bit) reg &= ~(1<<bit)`

2.1.1.2 `#define EN 2`

2.1.1.3 `#define FCPU 11059200ul`

2.1.1.4 `#define FCPU 11059200ul`

2.1.1.5 `#define lcd_port PORTC`

2.1.1.6 `#define RS 0`

2.1.1.7 `#define RW 1`

2.1.1.8 `#define sbit(reg, bit) reg |= (1<<bit)`

## 2.1.2 Function Documentation

2.1.2.1 `unsigned char ADC_Conversion (unsigned char Ch)`

2.1.2.2 `void adc_init ()`

2.1.2.3 `void adc_pin_config (void)`

2.1.2.4 `void ANGLE_ROTATE (unsigned int Degrees)`

2.1.2.5 `void FORWARD (void)`

2.1.2.6 `void init_devices (void)`

2.1.2.7 `void INIT_INTERRUPT ()`

2.1.2.8 `void INIT_PORTS ()`

2.1.2.9 `void init_ports ()`

2.1.2.10 `ISR (INT5_vect)`

2.1.2.11 `ISR (INT4_vect)`

2.1.2.12 `void lcd_cursor (char row, char column)`

2.1.2.13 `void lcd_home ()`

2.1.2.14 `void lcd_init ()`

2.1.2.15 `void lcd_port_config (void)`

2.1.2.16 `void lcd_print (char row, char column, unsigned int val, int digits)`

2.1.2.17 `void lcd_reset_4bit ()`

2.1.2.18 `void lcd_set_4bit ()`

2.1.2.19 `void lcd_string (char * str)`

2.1.2.20 `void lcd_wr_char (char letter)`

## 2.2 Desktop/final\_grp4/grp4/Group\_4/grp\_4\_try1.m File Reference

### Functions

- `imshow (img1)`
- compute the size of the ball `imshow (img)`
- `if ((img(k, 1, 1)>40 &&img(k, 1, 1)< 110)&&...(img(k, 1, 2)>=0 &&img(k, 1, 2)< 30)&&...(img(k, 1, 3)>=0 &&img(k, 1, 3)< 10)) img_bin(k`
- `elseif ((img(k, 1, 1)~=0 &&img(k, 1, 1)~=0)&&...(img(k, 1, 2)~=0 &&img(k, 1, 2)~=0)&&...(img(k, 1, 3)~=0 &&img(k, 1, 3)~=0))%img_bin(k`
- `else img_bin (k, 1)=0`
- `end end end imshow (img_bin)`
- `imagesc (label)`
- `while (i~=num)%indicator=0`
- `if (STATS(i).Area< 400 &&STATS(i).Area~=0)%count_num`
- `end STATS (num-count_num+1).Area=0`
- `end if (indicator==0 &&STATS(i).Area~=0)%indent`
- `obj (indent)`

### Variables

- `clc`
- `close all`
- `img1 = imread('2nalls2.jpg')`
- `img = imcrop(img1,[87.5100 61.5100 113.9800 41.9800])`
- `j = size(img)`
- `for k`
- `l = 1`
- `STATS = regionprops(label, 'Area')`
- `i = 1`
- `indent = 0`
- `indicator = 0`
- `count_num = 0`
- `for m`
- `end num1 = num-count_num`





### 2.2.1 Function Documentation

2.2.1.1 `elseif ((img(k, 1, 1)~=0 &&img(k, 1, 1)~=0)&&...(img(k, 1, 2)~=0 &&img(k, 1, 2)~=0)&&...(img(k, 1, 3)~=0 &&img(k, 1, 3)~=0))`

2.2.1.2 `end if (indicator == 0 &&STATS (i) .Area~=0)`

2.2.1.3 `if ()`

2.2.1.4 `if ((img(k, 1, 1)>40 &&img(k, 1, 1)< 110)&&...(img(k, 1, 2)>=0 &&img(k, 1, 2)< 30)&&...(img(k, 1, 3)>=0 &&img(k, 1, 3)< 10))`

2.2.1.5 `imagesc (label)`

2.2.1.6 `else img_bin (k, l) [pure virtual]`

2.2.1.7 `end end end imshow (img_bin)`

2.2.1.8 `compute the size of the ball imshow (img)`

2.2.1.9 `imshow (img1)`

2.2.1.10 `obj (indent)`

2.2.1.11 `end STATS (num-count_num+ I) [pure virtual]`

2.2.1.12 `while (i~= num) [pure virtual]`

### 2.2.2 Variable Documentation

2.2.2.1 `clear all`

2.2.2.2 `clc`

2.2.2.3 `count_num = 0`

2.2.2.4 `end i = 1`

2.2.2.5 `img = imcrop(img1,[87.5100 61.5100 113.9800 41.9800])`

2.2.2.6 `img1 = imread('2nalls2.jpg')`

2.2.2.7 `indent = 0`

2.2.2.8 `indicator = 0`

2.2.2.9 `j = size(img)`

2.2.2.10 `for k`

```
1:j(1)
    for l=1:j(2)

%           if (img(k,l,1)>160) &&...
%           (img(k,l,2)>160)
%
%           img_bin(k,l)=1
```

#### 2.2.2.11 l = 1

#### 2.2.2.12 for m

**Initial value:**

```
i:1:(num-1)
%           STATS(m).Area=STATS(m+1).Area
```

#### 2.2.2.13 end num1 = num-count\_num

#### 2.2.2.14 STATS = regionprops(label, 'Area')

## 2.3 Desktop/final\_grp4/grp4/Group\_4/latest\_white.m

### File Reference

#### Functions

- `set (vid,'ReturnedColorSpace','rgb')`
- `preview (vid)`
- `imshow (img)`
- `if ((img(k, 1, 1)>240 &&img(k, 1, 1)< 260)&&...(img(k, 1, 2)>240 &&img(k, 1, 2)< 260)&&...(img(k, 1, 3)>240 &&img(k, 1, 3)< 260)) img_bin(k`
- `elseif ((img(k, 1, 1)~=0 &&img(k, 1, 1)~=0)&&...(img(k, 1, 2)~=0 &&img(k, 1, 2)~=0)&&...(img(k, 1, 3)~=0 &&img(k, 1, 3)~=0))%img_bin(k`
- `else img_bin (k, 1)=0`
- `end end end imshow (img_bin)`
- `imagesc (label)`
- `stop (vid)`
- `delete (vid)`

#### Variables

- `vid = videoinput('winvideo',2,'RGB24_640x480')`
- `img = getsnapshot(vid)`
- `figure`
- `j = size(img)`
- `count = 0`
- `for k`
- `l = 1`
- `STATS = regionprops(label, 'Area')`

### 2.3.1 Function Documentation

2.3.1.1 `delete (vid)`

2.3.1.2 `elseif ((img(k, 1, 1)~=0 &&img(k, 1, 1)~=0)&&... % (img(k, 1, 2)~=0  
&&img(k, 1, 2)~=0)&&... % (img(k, 1, 3)~=0 &&img(k, 1, 3)~=0))`

2.3.1.3 `if ((img(k, 1, 1)>240 &&img(k, 1, 1)< 260)&&...(img(k, 1, 2)>240  
&&img(k, 1, 2)< 260)&&...(img(k, 1, 3)>240 &&img(k, 1, 3)< 260))`

2.3.1.4 `imagesc (label)`

2.3.1.5 `else img_bin (k, l) [pure virtual]`

2.3.1.6 `end end end imshow (img_bin)`

2.3.1.7 `imshow (img)`

2.3.1.8 `preview (vid)`

2.3.1.9 `set (vid, 'ReturnedColorSpace', 'rgb')`

2.3.1.10 `stop (vid)`

### 2.3.2 Variable Documentation

2.3.2.1 `count = 0`

2.3.2.2 `figure`

2.3.2.3 `img = getsnapshot(vid)`

2.3.2.4 `j = size(img)`

2.3.2.5 `for k`

**Initial value:**

```
1:j(1)
    for l=1:j(2)

%           if ( (img(k, l, 1)>160) &&...
%           (img(k, l, 2)>160) )
%
%           img_bin(k, l)=1
```

**2.3.2.6** `l = 1`

**2.3.2.7** `STATS = regionprops(label, 'Area')`

**2.3.2.8** `clear vid = videoinput('winvideo',2,'RGB24_640x480')`

## 2.4 Desktop/final\_grp4/grp4/Group\_4/Main.c File Reference

```
#include <avr/io.h>
#include <avr/interrupt.h>
#include <avr/signal.h>
#include <util/delay.h>
#include <math.h>
#include "cover_field.c"
#include "servo.c"
#include "zigbee.c"
```

### Functions

- void [uart0\\_init](#) (void)
- [SIGNAL](#) (SIG\_USART0\_RECV)
- void [init\\_uart0](#) ()
- int [main](#) (void)

### Variables

- unsigned int [value\\_left](#)
- unsigned int [value\\_center](#)
- unsigned int [value\\_right](#)
- unsigned int [value\\_center\\_left](#)
- unsigned int [value\\_center\\_right](#)
- unsigned int [temp](#)
- unsigned int [count](#)
- unsigned int [temp1](#)
- unsigned int [rev\\_dis](#)
- unsigned int [flag\\_turn](#) = 0
- unsigned int [flag](#) = 0
- unsigned int [r\\_count](#) = 0
- unsigned int [flag\\_rx](#) = 1
- unsigned char [data](#)
- unsigned int [flag\\_x](#) = 0

## 2.4.1 Function Documentation

2.4.1.1 void init\_uart0 ()

2.4.1.2 int main (void)

2.4.1.3 SIGNAL (SIG\_USART0\_RECV)

2.4.1.4 void uart0\_init (void)

## 2.4.2 Variable Documentation

2.4.2.1 unsigned int count

2.4.2.2 unsigned char data

2.4.2.3 unsigned int flag = 0

2.4.2.4 unsigned int flag\_rx = 1

2.4.2.5 unsigned int flag\_turn = 0

2.4.2.6 unsigned int flag\_x = 0

2.4.2.7 unsigned int r\_count = 0

2.4.2.8 unsigned int rev\_dis

2.4.2.9 unsigned int temp

2.4.2.10 unsigned int temp1

2.4.2.11 unsigned int value\_center

2.4.2.12 unsigned int value\_center\_left

2.4.2.13 unsigned int value\_center\_right

2.4.2.14 unsigned int value\_left

2.4.2.15 unsigned int value\_right



## 2.5 Desktop/final\_grp4/grp4/Group\_4/serial1.m File Reference

### Functions

- `fopen` (s)
- `get` (s,{ 'STATUS','Type' })
- `fprintf` (s,'\*IDN?')
- s BytesAvailable `while` (s.BytesAvailable==0) end out=0
- `while` (out~=08) out
- `set` (vid,'ReturnedColorSpace','rgb')
- `preview` (vid)
- `imshow` (img)
- `if` ((img(k, 1, 1)>40 &&img(k, 1, 1)< 110)&&...(img(k, 1, 2)>=0 &&img(k, 1, 2)< 30)&&...(img(k, 1, 3)>=0 &&img(k, 1, 3)< 10)) img\_bin(k
- `elseif` ((img(k, 1, 1)~=0 &&img(k, 1, 1)~=0)&&...(img(k, 1, 2)~=0 &&img(k, 1, 2)~=0)&&...(img(k, 1, 3)~=0 &&img(k, 1, 3)~=0))%img\_bin(k
- `else` img\_bin (k, 1)=0
- `end end end` `imshow` (img\_bin)
- `imagesc` (label)
- `end end end` Sending back to the bot `fprintf` (s, send) `fclose`(s) `delete`(s) `clear` s
- `stop`(vid)
- `delete` (vid)

### Variables

- s = serial('COM26')
- s `ReadAsyncMode` = 'continuous'
- img = getsnapshot(vid)
- figure
- j = size(img)
- for k
- l = 1
- STATS = regionprops(label, 'Area')
- send data accoorfing to area and color if STATS< "nothinng to be picked"send=28;else if STATS > nothing &&STATS< " max"send=38;else if STATS > max send = 48
- clear vid

## 2.5.1 Function Documentation

2.5.1.1 delete (vid)

2.5.1.2 elseif ((img(k, 1, 1)~=0 &&img(k, 1, 1)~=0)&&...%(img(k, 1, 2)~=0  
&&img(k, 1, 2)~=0)&&...%(img(k, 1, 3)~=0 &&img(k, 1, 3)~=0))

2.5.1.3 fopen (s)

2.5.1.4 end end end Sending back to the bot fprintf (s, send)

2.5.1.5 fprintf (s, '\*IDN?')

2.5.1.6 get (s)

2.5.1.7 if ((img(k, 1, 1)>40 &&img(k, 1, 1)< 110)&&...(img(k, 1, 2)>=0  
&&img(k, 1, 2)< 30)&&...(img(k, 1, 3)>=0 &&img(k, 1, 3)< 10))

2.5.1.8 imagesc (label)

2.5.1.9 else img\_bin (k, l) [pure virtual]

2.5.1.10 end end end imshow (img\_bin)

2.5.1.11 imshow (img)

2.5.1.12 preview (vid)

2.5.1.13 set (vid, 'ReturnedColorSpace', 'rgb')

2.5.1.14 while (out~= 08)

2.5.1.15 s BytesAvailable while (s. BytesAvailable ==0) [pure virtual]

## 2.5.2 Variable Documentation

2.5.2.1 figure

2.5.2.2 img = getsnapshot(vid)

2.5.2.3 j = size(img)

2.5.2.4 for k

Initial value:

```
1:j(1)
for l=1:j(2)
```

```
%           if ( (img(k,1,1)>160) &&...  
%           (img(k,1,2)>160) )  
%  
%           img_bin(k,1)=1
```

#### 2.5.2.5 l = 1

#### 2.5.2.6 s ReadAsyncMode = 'continuous'

#### 2.5.2.7 s = serial('COM26')

#### 2.5.2.8 else send = 48

#### 2.5.2.9 STATS = regionprops(label, 'Area')

#### 2.5.2.10 clear vid

## 2.6 Desktop/final\_grp4/grp4/Group\_4/servo.c File Reference

```
#include <avr/io.h>
#include <avr/interrupt.h>
#include <util/delay.h>
```

### Functions

- void [servo1\\_pin\\_config](#) (void)
- void [servo2\\_pin\\_config](#) (void)
- void [servo3\\_pin\\_config](#) (void)
- void [port\\_init\\_servo](#) (void)
- void [timer1\\_init](#) (void)
- void [init\\_devices\\_servo](#) (void)
- void [servo\\_1](#) (unsigned char degrees)
- void [servo\\_2](#) (unsigned char degrees)
- void [servo\\_3](#) (unsigned char degrees)
- void [servo\\_1\\_free](#) (void)
- void [servo\\_2\\_free](#) (void)
- void [servo\\_3\\_free](#) (void)

## 2.6.1 Function Documentation

2.6.1.1 void init\_devices\_servo (void)

2.6.1.2 void port\_init\_servo (void)

2.6.1.3 void servo1\_pin\_config (void)

2.6.1.4 void servo2\_pin\_config (void)

2.6.1.5 void servo3\_pin\_config (void)

2.6.1.6 void servo\_1 (unsigned char *degrees*)

2.6.1.7 void servo\_1\_free (void)

2.6.1.8 void servo\_2 (unsigned char *degrees*)

2.6.1.9 void servo\_2\_free (void)

2.6.1.10 void servo\_3 (unsigned char *degrees*)

2.6.1.11 void servo\_3\_free (void)

2.6.1.12 void timer1\_init (void)

## 2.7 Desktop/final\_grp4/grp4/Group\_4/zigbee.c      File Reference

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#include <avr/io.h>
#include <avr/interrupt.h>
#include <util/delay.h>
```

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