



Scoring & Timing Solution for Handball



1. Introduction

This is a professional solution for LED scoreboard display in handball stadiums.

Mainly for large-scale handball matches which held in professional sports venues.

The system functions conform to IHF rules.

Match arrangement, real-time scoring & timing display, players' & referees' info display, rank statistics export & print, slow motion video record & playback, and advertising display can be realized through the coordination of Match Scoring System, Meet Management System, Sports Stats System, Video Arbitration System, etc.

It is an ideal choice for most of smart and professional stadiums.

2019, the 27th China-Japan-Korea Junior Sports Exchange Meet



1.1 System Architecture

The whole system is composed of several subsystems, including: Match Scoring System, Meet Management System, Basketball Stats System and Video Arbitration System.

Each subsystem can not only work independently, but also work together to share the data.

It is flexible for customers to configure according to the actual application.

- **Match Scoring System**

Match Scoring System named ULTRA SCORE is composed of Ultra Score Software, Match Scoring & Timing Host, Referee Scoring & Timing Terminal, Shot Clock, Backboard Light, Possession Display, Foul Display, Electronic Buzzer, Electronic Whistle Timing System, etc.

It is mainly operated by the referees to realize the scoring and timing work and real-time scoreboard display.

The system functions conform to FIBA, CBA, FIBA 3V3 and NBA rules.

- **Meet Management System**

It is composed of Meet Management Server, On-Venue Results Workstation, Printer, etc.

Linking with Online Registration System, Match Scoring System and Basketball Stats System, it can realize: participants management, match schedule, result management, technical statistics, court arrangement, rank statistics, etc.

- **Handball Stats System**

Consists of Handball Stats Workstation.

The system can record the goal, warning, and penalties data during the handball game. Linking with Online Registration System and Match Scoring System, the timing and scoring data will be exactly synchronized with them.

It also can generate the professional and detailed statistics report and provide data sharing for website and platform.

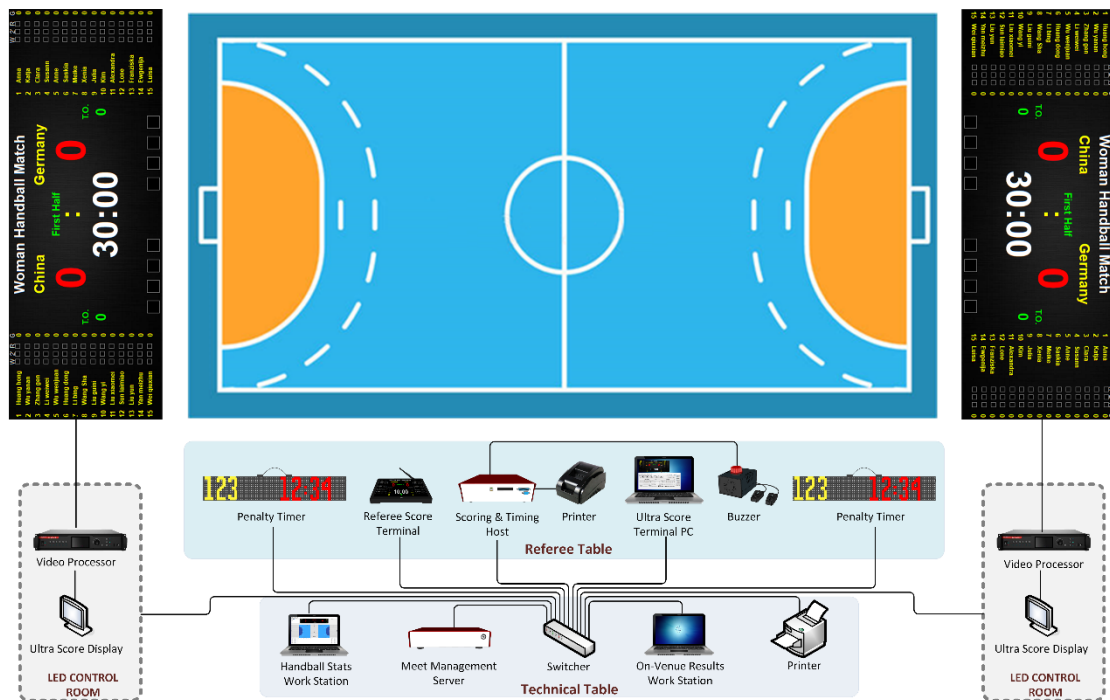
- **Video Arbitration System**

Video Arbitration System named PARROT is composed of video arbitration server, control panel and cameras.

It is operated by the referees during the match. When working with Match Scoring System, referee's score operation will be marked on the frame of video automatically, whilst playback them in slow motion with changes in speed.

It can be used to provide the technical support when dispute happens during the match so as to reduce the misjudging, to ensure fairness and justice of the match.

1.2 System Chart



System Structure Description

- 1) **LAN:** A LAN is set up in the stadium. Connect the LED control PC, Ultra Score Terminal PC, Match Scoring & Timing Host, Referee Scoring & Timing Terminal, Basketball Stats Workstation, Meet Management Server, On-Venue Results Workstation and Printer to the LAN.
- 2) **LED Screen:** One or two LED screens are controlled by separate computers which connect with LED sending cards. Both of the LED screens can show the same contents or different contents as required.
- 3) **Match Scoring & Timing Host:** It is the core scoring & timing equipment which is installed in the Officials Table and has the function of hot backup. Use the special cables to connect the Shot Clock, Foul Display, Possession Display, Electronic Buzzer and Thermal Printer to the host.
- 4) **Referee Scoring & Timing Terminal:** Installed in the Officials Table for referee's operation of score and penalty. It can be connected to the LAN through network cable or WIFI.
- 5) **Meet Management Server:** It is the core data processing equipment which is installed in the Technical Table and connected to the LAN by network cable.
- 6) **Handball Stats Software:** Installed in the Technical Table to work independently or connect to the LAN to obtain the match data from Ultra Score System.

2. Specification for products

2.1 Ultra Score Software

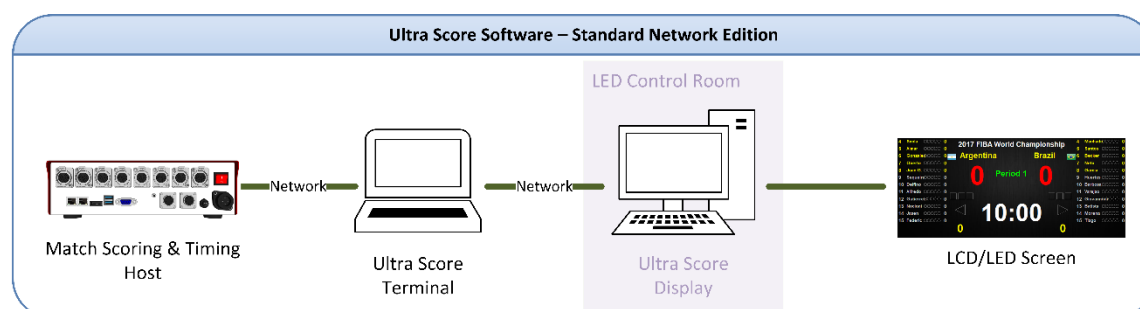
Products	Details
Standard network edition	<ul style="list-style-type: none"> ◆ Terminal + 1 Display ◆ Supports: Handball ◆ English version ◆ Including 1 dongle
Professional network edition	<ul style="list-style-type: none"> ◆ Terminal + Referee + 2 Display ◆ Supports: Handball ◆ English version ◆ Including 1 dongle

Difference:

Standard Network Edition:

Score terminal and media player functions can be installed on 2 PCs respectively. So that one independent PC can be setup on the courtside special for referee's operation, the other PC running as media player to manage the LED display.

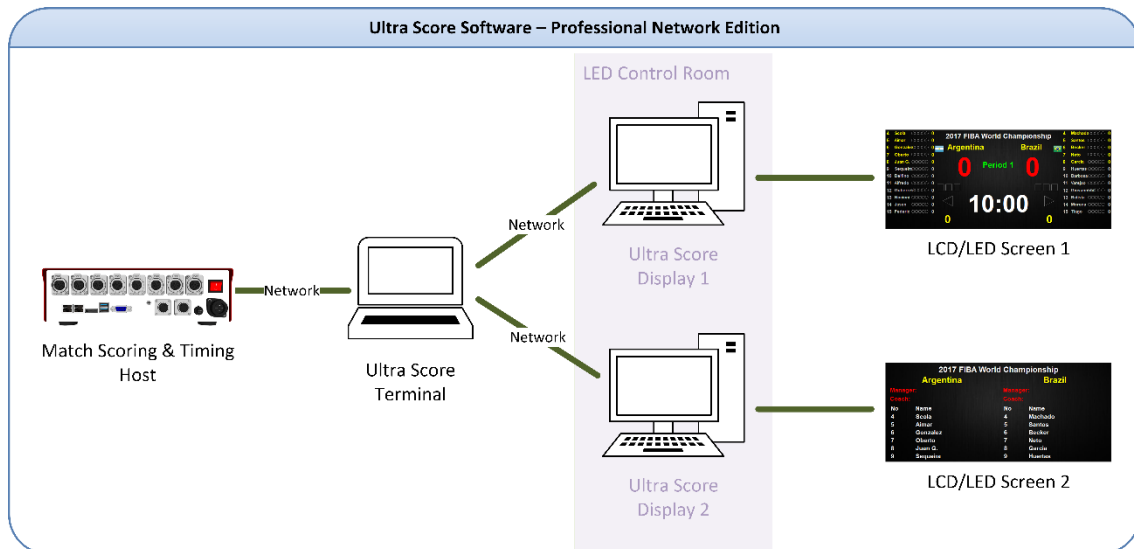
- It is suitable for the stadium where has one screen, needs to do the scoring and timing on the courtside.



Professional Network Edition:

Except the function of score terminal, 1-3 media players can be equipped on PCs separately, in order to display different contents on several LED screens.

- It is suitable for the stadium where has more than 2 screens where referee need to do scoring on the courtside and LED screens need to display different contents separately. (For example, one LED screen is for scoreboard and another is for advertising or player info).



Features:

- (1) Professional scoreboard display: Scoring and timing operation, layout of scoreboard can meet international game rules.
- (2) Match management: Information of match, team, team members and coaches can be saved in advance. And referee's scoring operation during the match can be recorded and output.
- (3) Scoring functions: Include operation and display of teams' and players' points, fouls and substitutions.
- (4) Timing functions: Include operation and display of game time, pause, break time, count down time and system time.
- (5) Convenient operation feeling: Referees can do operation on a special score console as well as by using shortcuts on the keyboard.
- (6) Powerful media player: Kinds of media formats are supported. It is easy to switch between scoreboard and video.
- (7) Notification: Rolling to display short notice on the screen which allows to set the speed, colors, fonts freely.
- (8) Customization: All contents on the scoreboard including fonts, color and layout can be modified to meet clients' needs.
- (9) Self-adaptation: With easy configuration, score information can be displayed on kinds of LED and LCD screen by using this system which can adjust the layout to meet any sizes of screen.
- (10) Security: Auto backup function will help you recover the match immediately from the computer fault.

Score interface for handball:

Woman Handball Match

China vs **Germany**

0 : **0**

First Half

30:00

T.O 0

1	Huang hong	□□□	0
2	Wu yanan	□□□	0
3	Zhang gen	□□□	0
4	Li weiwei	□□□	0
5	Wu wenjuan	□□□	0
6	Huang dong	□□□	0
7	Li bing	□□□	0
8	Wang Sha	□□□	0
9	Liu guini	□□□	0
10	Wang yi	□□□	0
11	Liu xiaomei	□□□	0
12	Sun laimiao	□□□	0
13	Liu yun	□□□	0
14	Yan meizhu	□□□	0
15	Wei qjuxian	□□□	0

1	Anna	□□□	0
2	Katja	□□□	0
3	Clara	□□□	0
4	Susann	□□□	0
5	Anne	□□□	0
6	Saskia	□□□	0
7	Meike	□□□	0
8	Xenia	□□□	0
9	Julia	□□□	0
10	Kim	□□□	0
11	Alexandra	□□□	0
12	Lone	□□□	0
13	Franziska	□□□	0
14	Ewgenija	□□□	0
15	Luisa	□□□	0

Woman Handball Match

China vs **Germany**

0 : **0**

First Half

30:00

Player interface for handball:

Woman Handball Match

China vs **Germany**

Manager:
Coach:
Players:

No	Name	Position
1	Huang hong	
2	Wu yanan	
3	Zhang gen	
4	Li weiwei	
5	Wu wenjuan	
6	Huang dong	

Manager:
Coach:
Players:

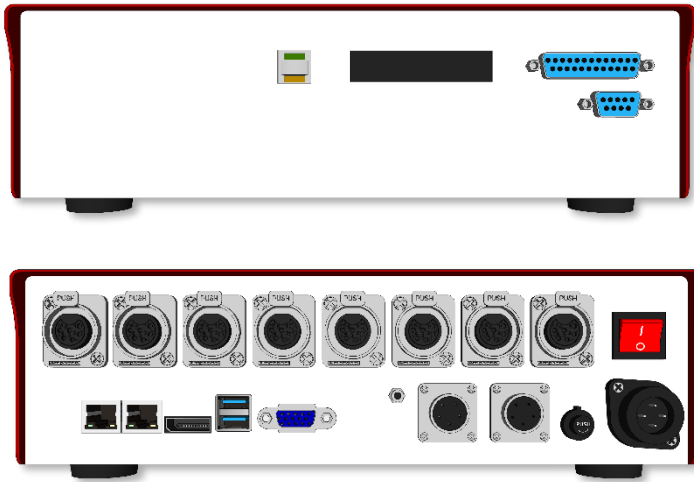
No	Name	Position
1	Anna	
2	Katja	
3	Clara	
4	Susann	
5	Anne	
6	Saskia	

Referee interface for handball:

Woman Handball Match

Name vs **Region**

2.1.2 Match Scoring & Timing Host



Match Scoring & Timing Host

Type	KS-MONSTER
Size	260 x 280 x 80 (mm)
Support	Basketball, Volleyball, Football, Futsal, Handball, Water-polo, Ice-hockey
Other	Supports hot switching between the main and backup system.

Item	Details	Item	Details
Product	Match Scoring & Timing Host	Type	KS-MONSTER
Size	260 x 280 x 80 (mm)	Net weight	3 KG
Material	Iron	Power	100W
CPU	Intel J3160	RAM	8GB
Communication	RJ45x2	Hard disk	64GB
Video output	VGAx1, DPx1	Input voltage	AC 100~240V
Working Temp	0-60°C	Relative humidity	5%-95%, non-condensing
Language	English	Timing accuracy	<=10ms
Port	G-Portx8, Shot Clock portx2, Audiox1, USBx2, Serial portx1		
Accessories	Match Timer Handheld *1, Shot Clock Handheld *1		
Supporting games	Basketball, Volleyball, Football, Futsal, Handball, Water-polo, Ice-hockey, etc.		
Supporting rules	FIFA		
Functions	<ol style="list-style-type: none"> 1. Timer functions: Timing in count up and count down, start, pause, reset, correct are available. 2. Scoring functions: Modify the score of the team and player. 3. Penalty functions: Player penalty control, Substitution control, yellow/red card control, etc. 4. Supports match rule setup. 5. Synchronous control of Match Timing Displays. 6. Adjust the brightness of Match Timing Displays. 7. Provides buzzer sound output, which can be connected to the venue's public address system or speakers. 8. Supports hot switching of the main and backup servers. In case of the main server fails, just manually switch to the backup server to ensure the data intact. And in case of power failure, the previous screen will be restored after restarting. 9. Supports the post-match celebration mode. 10. Supports real-time data output, which can be used for live broadcast. 11. Monitoring the status of scoring devices, providing convenient fault diagnosis (with a separate monitor). 12. Anti-loose port ensures the safety of match data. 		

2.1.3 Referee Timing & Scoring Terminal



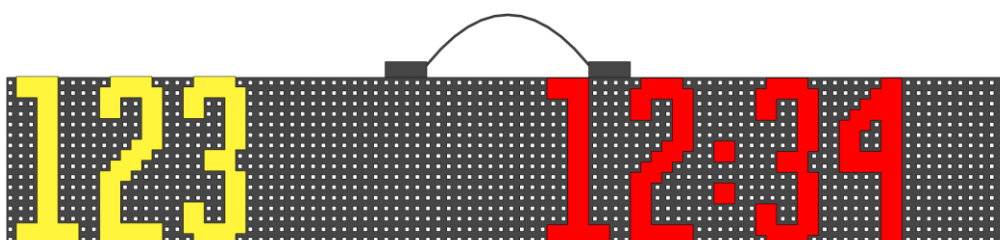
Detailed parameters

Item	Details	Item	Details
Product	Referee Timing & Scoring Terminal	Type	KS-GC18
Size	250 x 175 x 70 (mm)	Material	PVC
Touch LCD	10.8 inch	Resolution	1920*1080
OS	WIN 10	Capacity	10000mAh
Communication	LAN / WLAN	Hard Disk	64GB
Video Output	HDMI*1	RAM	4GB
Functions			

1. Timer: It has positive timing, countdown, start/pause/reset/correct timing functions.
2. Scoring function: Modify the score of the team and player.
3. Penalty function: Team foul control, Player individual foul control, Player Penalty operation, Substitution control, Player yellow/red/blue card control, etc.

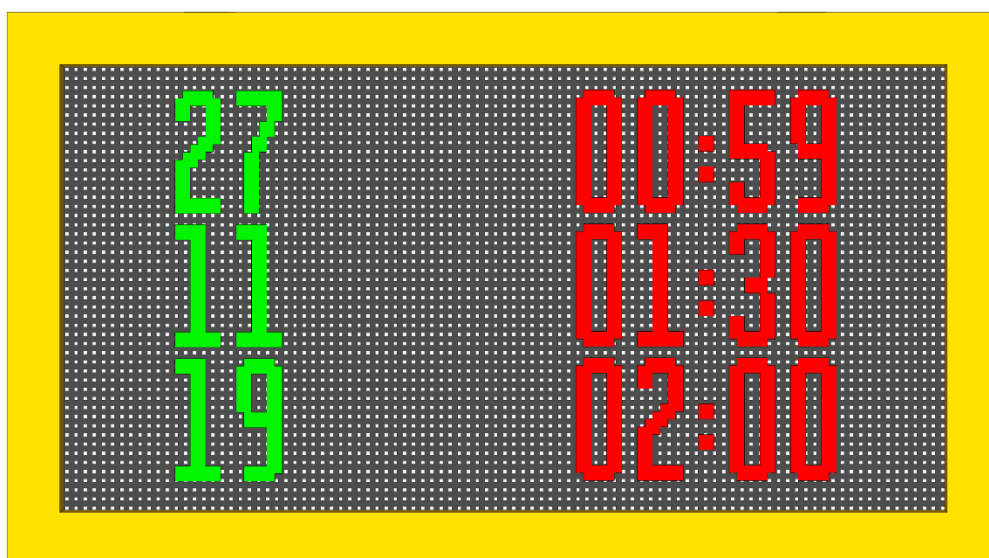
2.1.4 Handball Penalty Screen (Single Line)

Item	Details
Handball Penalty Screen (Single Line)	Type: KS-SCRN-LED960160 Size: 960*160*100(mm) Material: Aluminum Input: 48V DC Function: <ul style="list-style-type: none">◆ Must be used together with Handball Scoring Software.◆ Display athlete's number and penalty time.

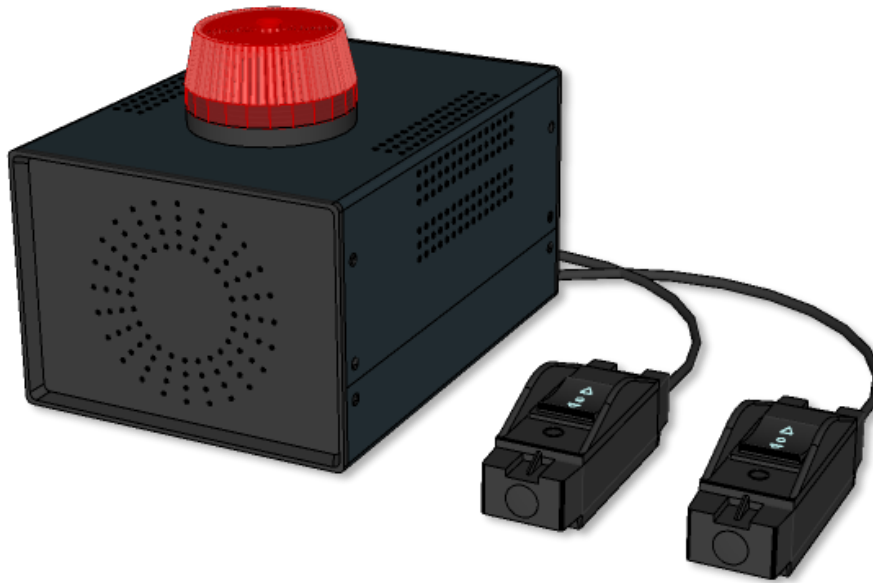


2.1.5 Handball Penalty Screen (Triple Line)

Item	Details
Handball Penalty Screen (Triple Line)	Type: KS-SCRN-LED960480 Size: 1080*600*145(mm) Material: Aluminum Function: <ul style="list-style-type: none">◆ Must be used together with Handball Scoring Software.◆ Display athlete's number and penalty time.



2.1.6 Electronic Buzzer



Detailed parameters

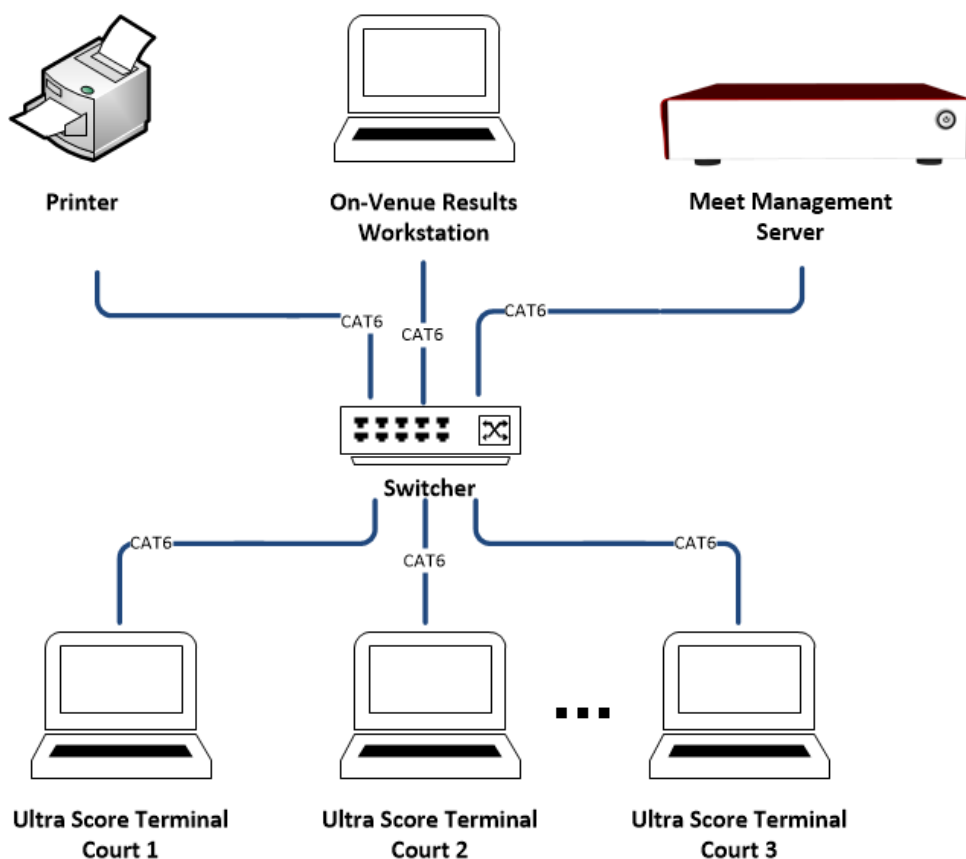
Item	Details	Item	Details
Product	Electronic Buzzer	Input Voltage	12V DC
Type	KS-BUZR	Power	35W
Size	200x150x150 (mm)	Color	Black
Volume	110dB	Weight	1KG
Implementation of Standards	International Sports Competition Rules		
Packing List	Host*1, Handheld*2, Power Adapter*1, Power Cable*1, User Manual*1		
Functions	<ol style="list-style-type: none"> 1. Generate a siren sound for match timer timeout or substitution. 2. Not only support independently use, but also access to the Match Scoring Host for linkage use. 3. Controlled by Match Scoring Host without separate power supply under linkage mode. 4. Anti-loose ports ensure the safety of match data. 		

2.2 Meet Management System

It is composed of Meet Management Server, On-Venue Results Workstation, Printer, etc. Linking with Online Registration System, Match Scoring System and Basketball Stats System, it can realize:

- 1) **Participants Management:** Information management of players, teams and referees. Both import and input registration form are available. And auto generate the order form.
- 2) **Match Schedule:** Auto draw the players' lots. Multi-project arrangement make the schedule more smoothly. Auto generate the bracket, order form and round form.
- 3) **Result Management:** Receive or record the results. Determine the players' rank, admission or elimination at each stage. Print the results announcement and send to the LED display system, TV broadcasting system and comprehensive meet manage system.
- 4) **Technical Statistics Arrangement:** Combine with the basketball stats software, it can summarize the info of teams' score, teams' timeout, teams' foul, players' substitution, players' foul, players' comprehensive results, and generate the integrated report.

2.2.1 System Diagram



2.2.2 Meet Management Server

Products	Details
Meet Management Server	Type: KS-MMS-MINI Size: 170x150x35 (mm) Weight: 1.0 KG Features: <ul style="list-style-type: none">● Multi-court arrangement, auto generate the order form.● Multi-project arrangement, make the schedule more smoothly.● Monitor the status of each court in real time, including the current field, rotation and player info.● Court adjustment, can manually modify the match court and session info.● Summary and print integrated report.



2.3 Video Arbitration Server

Video Arbitration System named PARROT is composed of video arbitration server, control panel and cameras.

It is operated by the referee during the match. When working with Match Scoring System, referee's score operation will be marked on the frame of video automatically, whilst playback them in slow motion with changes in speed.

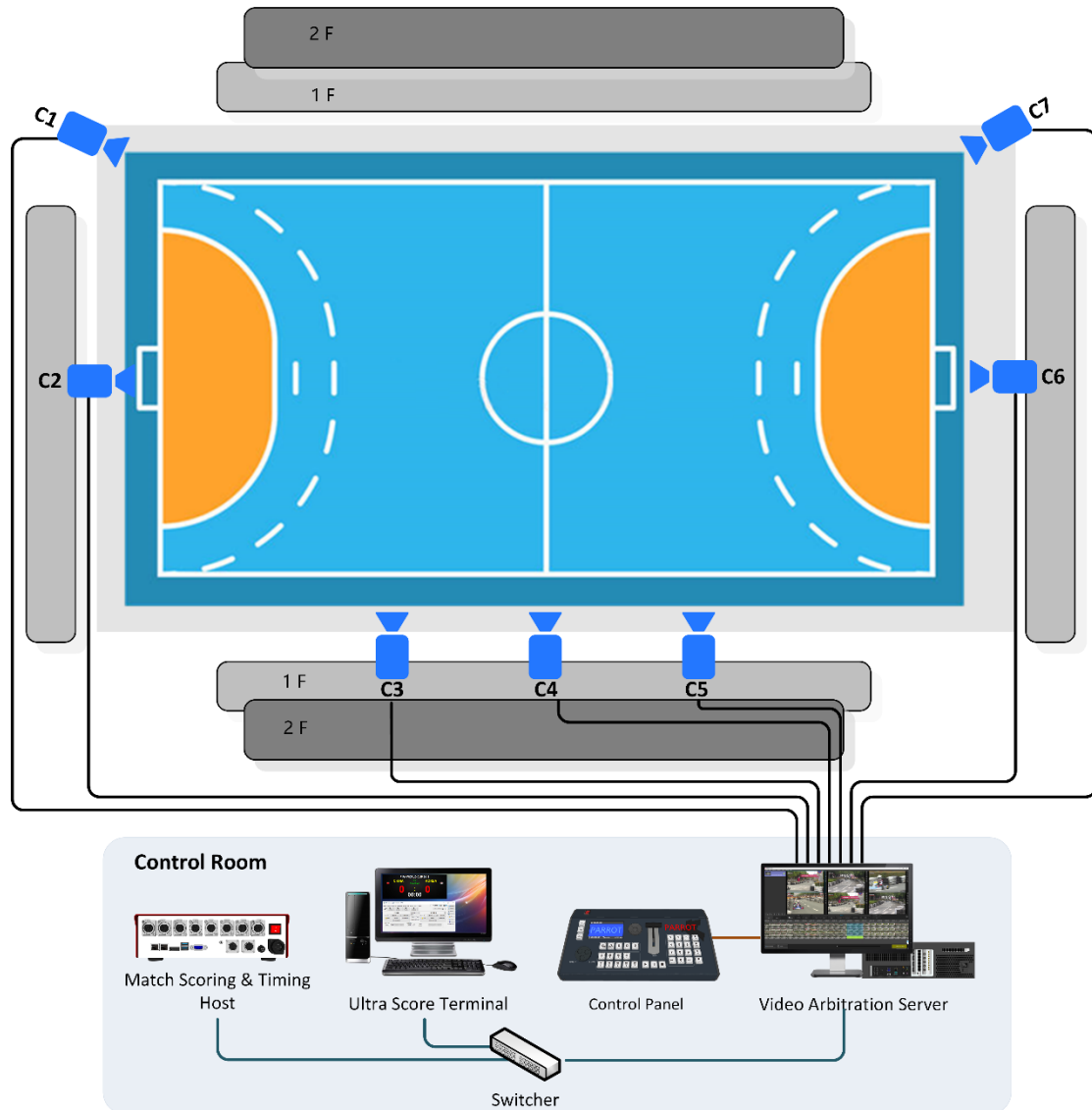
It can be used to provide the technical support when dispute happens during the match so as to reduce the misjudging, to ensure fairness and justice of the match.

Application:

Basketball, Volleyball, Football, Handball, Boxing, Wrestling, Wushu, Judo, Jujitsu, Karate, Taekwondo, Gymnastics, Swimming, Diving, Ice-hockey, Weightlifting, etc.



2.3.1 System Diagram



2.3.2 System Description

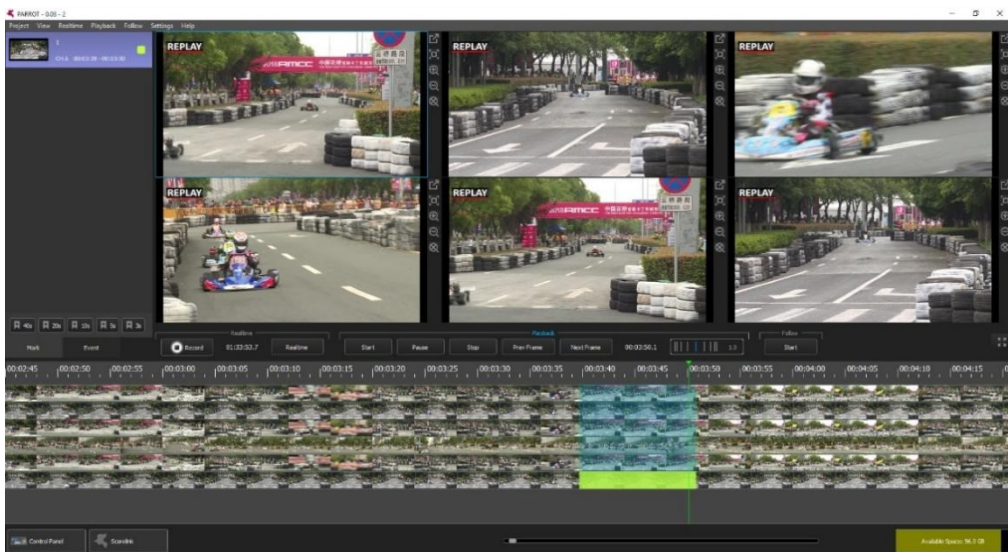
- 1) Ultra Score software is installed on the control computer. Connect the control computer and the video arbitration server to the local network.
- 2) 1-8 sets of HD cameras are installed around the count which connects to video arbitration server via SDI cable.
- 3) Control panel is connected to video arbitration server via a USB cable which makes referee easy to check the playback process and control the speed of slow motion.
- 4) Video arbitration server provides an output video signal which can be connected to LED/LCD display for live slow motion replay.

2.3.3 Functions

- 1) **Nonstop video recording in the background:** 1-8 channels of HD video are recorded simultaneously in the background, nonstop for 10 hours. Video retrieval and playback is unaffected.
- 2) **Synch-playback of multi-channel video:** Supports playback mode of single channel video in full screen and multi-angle video in 6 windows.
- 3) **Speed change in slow motion:** supports 20 frame/s video playback and capturing motion in a grid of 0.05s. The function of frame freeze, fast playback, 1/2 slow playback, 1/4 slow playback and dragging progress bar is available.
- 4) **Video event query:** video stream can be divided into several video events, storing in the event list, which can be renamed for retrieve easily.
- 5) **Video segment marker:** Important or controversial moments can be marked in video stream which will be replayed quickly when clicking the marked records.
- 6) **Professional playback control panel:** configuring T-bar, slow moving wheel, speed preset function keys to make the process more convenient.
- 7) **Video signal output:** provides 2 video output signals, one of which is for preview, the other of which can be connected to LED/LCD display for live slow motion replay.

Working with Ultra Score System to realize:

- **Auto generate video event:** Video events will be generated automatically for quick query according to the match data that has been preset in Ultra Score.
- Real-time match timer will be superimposed on the video.
- **Referee's operation record:** Referee's every scoring and timing operation can be recorded into the video, showed below the frame when that moment happened.
- **Player's point record:** Player's point can be recorded into the video, showed below the frame when that moment happened.
- **Open developer API:** Just connect your own scoring system onto this Video Arbitration System, so you may record all kinds of events together with the videos.



2.3.4 Video Arbitration Server (up to 8 channels record and replay)



Detailed parameter

Item	Details	Item	Details
Product	Video Arbitration Server	Type	KS-PARROT-2C/4C/6C/8C
Input Voltage	AC 100~240V	Power	35W
Size	483x430x90mm (2U)	CPU	Intel I7
RAM	2 channels: 8GB 4/6/8 channels: 16GB	Hard Disk	2/4 channels: 800GB 6/8 channels: 2T
Input	SDI×2/4/6/8	Communication Port	LAN×2
Output	DP×2	Other Port	USB×4
Packing List	Host*1, Power cable*1, User manual*1		
Functions	<ol style="list-style-type: none"> 1. Nonstop video recording in the background for 10 hours. Video retrieval and playback is unaffected. 2. Support 50 frame/s video playback and capturing motion in a grid of 0.02s. 3. Support playback the video of the specified channel frame by frame, or at a set speed continuously. 4. Important or controversial moments can be marked: manually or auto create video marks by linkage with Ultra Score System. 5. Zoom the playback screen of any channel to accurately observe the details. 6. Provide 2 video output signals, one of which is for preview, the other of which can be connected to LED/LCD display for live slow motion replay. 7. Working with Ultra Score System can realize real-time match data displaying on the video. 8. Automatically synchronize with the match and tag the video, so as to provide convenience to find the match sessions or sets. 9. Each single operation of the referees will be recorded together with the videos. 10. Unique "Follow" mode, automatically replay the most recent screen with a 5-second delay to help the referee make decisions quickly. 		

11. Open external control interface which can be controlled by 3rd-part system.

2.3.5 Control Panel



Detailed parameters

Item	Details	Item	Details
Product	Control Panel	Type	KS-PARROT-CP
Input Voltage	AC 100~240V	Net weight	1KG
Size	365 x 200 x 98 (mm)	Power	15W
Communication Port	USB×1, RS232×1	Display	Color LCD (4.3Inch)
Packing List	Host* 1, Power Cable*1, USB Cable*1, User Manual*1		
Functions	<ol style="list-style-type: none"> 1. Support one touch replay, deferred replay, in/out replay. 2. Preset speed button. 3. T-Bar for dynamic slow motion. 4. Professional dynamic jog wheel. 5. Key to mark the last 10s/20s of the video content. 6. Flexible select the marked video and playback. 		

2.3.6 HD Camera



Detailed parameters

Product Type	KS-PARROT-CAMERA
Video output	3G-SDI
Effective pixels	3.0 million
Max Resolution	1920*1080
Max Frame rate	60FPS
Sensor	CMOS
Focal length	4.2MM
Size	62.5*50*50MM

2.4 Handball Stats System

Consists of Handball Stats Workstation.

The system can record the goal, warning, and penalties data during the handball game. Linking with Online Registration System and Match Scoring System, the timing and scoring data will be exactly synchronized with them.

It also can generate the professional and detailed statistics report and provide data sharing for website and platform.

The screenshot displays the Handball Stats software interface. At the top, the window title is "Handball Stats - 0.01 - Sample Season". The menu bar includes "System", "Match Control", "Score Link", "Live Data", and "Help". The scoreboard shows Team A with 12 goals and Team B with 0 goals, with a time of 30:00.0 in the First Half. Below the scoreboard are two handball court diagrams for Team A and Team B. A central control panel contains buttons for "Goal", "Shootout", "Warning", "Suspension", "Direct Disqualification", and "Qualification With Rejection". At the bottom, there are two player statistics tables for Team A and Team B, each with columns for Player Name, Goals (G), Warnings (W), 2-minute suspensions (2'), Disqualifications (D), and Disqualifications with Rejection (DR).

#	Player Name	G	W	2'	D	DR	Period	Time	Team	Player	#	Player Name	G	W	2'	D	DR
1	Player 1	0	0	0	0	0	1	30:00	Team A	1	Player 1	0	0	0	0	0	
2	Player 2	0	0	0	0	0	1	30:00	Team A	2	Player 2	0	0	0	0	0	
3	Player 3	0	0	0	0	0	1	30:00	Team A	3	Player 3	0	0	0	0	0	
4	Player 4	0	0	0	0	0	1	30:00	Team A	4	Player 4	0	0	0	0	0	
5	Player 5	0	0	0	0	0	1	30:00	Team A	5	Player 5	0	0	0	0	0	