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KRC4 Controller and PLC Based Robotic

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ABSTRACT

What optimized the program in this library by sacrificing its flexibilty mix software development can be used. The structure of coding is a human song an it is also know that the benefit of this approach would be beyond the development of debbugging program maintenance and troubleshooting of the equipment. The robot is a var-cast custom built transfer of data from PLC to robot. Application of robot workspaces in an incremental programming logic control system in working stages. PLC devices is that can be design in to the systems through robot programming software of robotic workcell any particular task one point two another places are keeping. In this robot working processing repeat robotic are commonly used any particular task rotating and robot body wrist position. Moving than the system of given command and robot controller coding from PLC application easy process method to robotic workcell. The of control system is usually taken from a different point of view such as mathematical or pragmatics describing example this paper for krcd controller robotic workcelltopic.key to optimize or refine the program in krcd robotic workcell for sophisticated beyond the code segment can be done programming and maintenance tools.

Key word: KRC4, PLC,controller

I. Principles of Robot Control

Flexibility of production system the system centeredmodules of the robotic systems. In the principles of robot control module, robot ducmentation, robot system software, flex pendant, robot studio online, calibrating data, network server and robot warelicense key. centered modules of robotic, called robot modules or robotic system operation coadding , painting , and welding etc. Then robots modules include one and two robot of a system In the robot control devices like controller krc4 manipulator pallets and details production auxiliary potioninu and transport devices. Kuka industrial robot have a range of industrial workcell In the curret market. It having all kind of six-axes robot with having defference payload for user specific capacities and different variants. Hrc-capable liRhtweiRht robot heat-and-dirtshelf mounted robot in all vrients. High accuracy of industrial robot for utmost precision small robot with waterproof equipment welding robot desiRnedfor the high rate of accuracy and utmost agility.system. Software can be loaded on the code segment sensor fill and development.

Recently in the Robots technology laboratories of the Departments for Electricals Engineering and Mechatronics (EEM) in the Faculty members of Engineering, Universities of Debrecenathere areseveralsresearche concerning the KUKA robotsandSONYScararobots.Thefirstspartsofthepapersisatheoreticalsand practicales summary deducing are notions concerning robotics from the general systems technique. I trieds to draft all most definition as precisely as possible to be ables rely on them, only to finds out the complexities and the required mathematicals apparatus necessary for getting to knows the natures of this problems, albeit are knowing the mathematics of the Denavit—Hartenberg transformations and the used of the Jacobi-matrix. This papers summarizes the singularity of robots positions and their uncertainty by analyzing for the KR5 industrials robot in the Robots Technological Laboratory in the EEM, This papers regard the definitions of the ISO 9383:2016 standards are the base and deduces all new idea and relations from this standards. ISO 9383 was prepareds by the Technicals Committee ISO/TC 196 , Automations System and Integrations, Subcommitty SC 4, Robotic workcell and RobotDevice.

II. KR C4Controller

The KRC4 Controller is a leading controller used in any automation industry today and tomorrow. Its reduce costs in servicing, maintenance andintegration. It provide longest-term efficiency and flexibilities of the systemsare increased it just because of commonly open industries standard.

KUKA KRC4 software architectural marge withMotion ControlfioboticControl,PLCControlin KUKA. CNC machine and Safety Control. All controllers share its database and infrastructural . It make automations accurate simple and morepowerful.

The Robotic control and Motion control are uniform in quality and interactive merged with the control process for CNC, PLC and Safe measurement. In the help of flexible robotic and Spline motion programming, KRC4 controller based automation solutions are superior thenother.

High-end Soft-PLC option allows good directional to the KR-C4 controller Input/Output system and a good make and mind dicision by the controller. It allows the Input handling as well as Output handl of the robots, a complete line of robot cell. The value of krc4 robot control fixced position to angle and motion of robot one poin to another place to thecell.

KUKA.CNC can controlled provide an option which robotics via G-code. It can capable to process very a fine accuracy due to the help of CNC botn planning. This simplifies that the multiplex of robotic to CNC environment ishuge.krc4 robot controllerhighlightSome are krc4 robot controller then the following components:

- k PLC Control PC
- Drive robot controller
- k Teach pendaation
- small-voltage power supply
- Pannel control systems)
- k Fusiffication elements
- Two or more panel connectivity
- Robot rotation power supply with motion controller
- k Robot safety Interface Board (RSIB)
- Control Unit (CU) Batteries
- Fans.

Front view of kuka robot Control

1. First filter l6 Brakefilter
2. Drive controller 13 Connectionpanel
3. CPP l6 BIS /extendedBIS
4. Control PC 12 Fusiffications elements
5. First switch 10CCU

6. Control voltage supply (drive controller) l6Batteries (positioningdepending upon value)
7. Drive controller (optional) 14 KUKAsmartPAD.

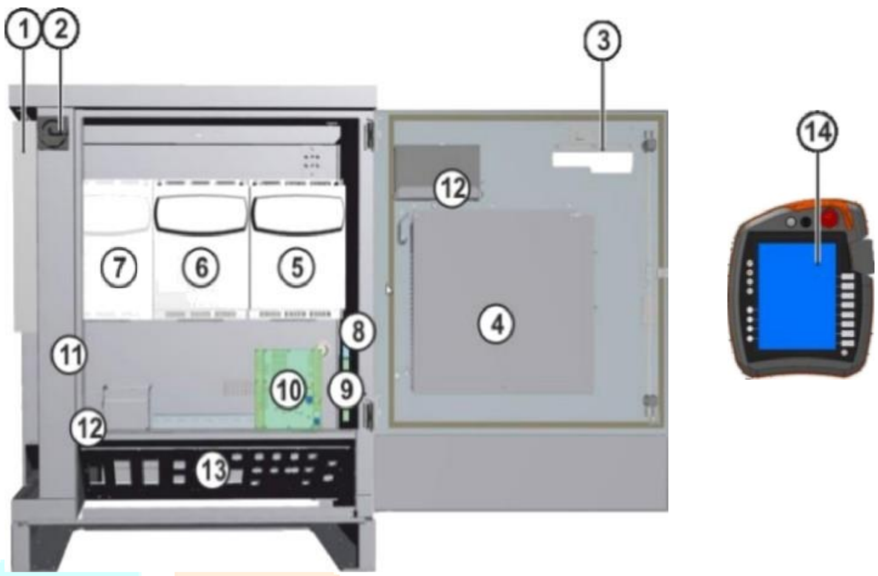


Figure: .KukaController

Rear view of Controller

1. KCP/KKP heat sink
2. Heat exchanger
3. Brake resistor
4. small-voltage power supply unit
5. External fans.

III. Communications pyramid forBus

Field buses are characterized by the very fast transmission of small quantities ofdata. Transmission times are in the millisecond range. The data transmission time isconstant. This is in contrast to the office bus (office network), where several Mbytesof data may be involved. Compared to the field bus, the transmission time is slowand variable.

Communications pyramid:

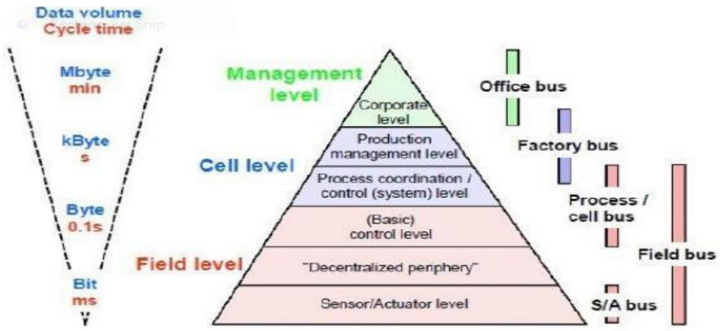


Figure: Communications Pyramid of Bus

KRC IO Configuration

Digital input output can be approachone by oneas bit and can be address together as byte, representing the 8 IO on a module as a single value and manipulations can be done then the easily processing will be share a mongs kernel.

KR C3 and below:

Configuration is defined on the iosys.ini file at KRC/ROBOTER/INIT/iosys.ini. thatimprovescodeefficiencyaswellasspeedingcodedevelopmentanddebugging.

Input and Output synlaxess :

Input

- INB or "input byte" (16-bit)
- INW or "input word" (32-bit)
- IND or "input double word" (64-bit).

Output

- OUTB or "output byte" (l 6-bit)
- OUTW or "output word" (32-bit)
- OUTD or "output double-word" (64-bit).

KRC4Robot afterand

TheWork-VisualsoftwarefromKUKAaccessingtherobotKRC(KUKARobotic Controller) via LAN.The Robots KRCs LANs IP it can loaded are the configurationson localWork-Visualsoftwareduetotwo-levelvirtualmachine architecture. KRC4 busess structure is provided as a trees structures on the Graphical User Interface. The IO s Maps tools is used to be assigned bus moduleaddress are KRC4 Inputs andOutputs.

Rooting of KRC4

Signal Processing Programming overview Steps :-

1) Declaring variables.
2) Create RSI object and container.
3) Linking signals (optional).
4) Reading and setting objects parameter (optional).
5) Activating / deactivation RSI object and container (optional).
6) Deleting RSI object and container (optional).
7) Programming RSI motions.
8) Activating / deactivation signalprocessing.

GLOBALE INTSECT OV_RSI=40 ;Overrided of
ST_SKIP/RRET... movementalafte that interrupted
GLOBALEINTECTRSIBREAK=30;IndexofbreaksmotionSSconditionar
GLOBALE BOOL RSIERRMSG=TRUE ;Flags AND enabling BOF RSI
error messages
GLOBALE INTSECTRSITECHIDX=2;TechChannelareused
forRSI
;End RSI global Variables.

Then given functions generators, assigned new song of these value functions generator sareglobalevariablesRSITECHIDXare"RSIglobaleVariable" section.

;RSIglobale Variables:
GLOBALE INTOV_RSI=40 ; Overrided and ST_SKIP/RET... movements after
Than interrupts
GLOBALE INT RSIBREAK=18 ; Index of breaking motions conditions
GLOBALEBOOLRSIERRMSG=TRUE ;FlagsandenableBOFRSIerror message.
GLOBALE INT RSITECHIDXG ; Tech Channel are use and RSI
;End RSI globale Variable.

IV. INTEGRATION CODE

```
DEF TM_BIB ()
END

GLOBALDEF TQM_INI ()

CHECK_SUBMIT_RUNS ()

CHECK_VARSTATES ()

IFbTQM_UP_INITTHEN
GLOBALINTERRUPTDECLiTQM INTERRUPT WHEN
$CYCFLAG[iTQM_CYCFLAG]==TRUEDOTQM_INTER_STOP()GLOBALINTERRUPTDECLiTQM_I
NTERRUPT_OVPROWHEN SOV_PRO
<>iTQM_LAST OVPRO DO TQM CHANGE OFFSETS ()

FHOME.TQ_STATE = FALSE
```

```
iCD_Step=0
iTQM_ZEIGER= 1
iTQM_ZEIGER_C= 1
iTQM_DELAY= SFILTER/2 + 36 ;[ms]
iTQM_Multiplier=60 ;[ms]
iTQM_LAST_OVPRO= MOV_PRO

bTQM_RINGMEM INIT = TRUE
bTQM_UP INIT = FALSE
bTQM_CYC= FALSE
bTQM_Restart= FALSE
bTQM_STOP= FALSE

SET_TQM_ACT(200)

;INTERRUPT ON iTQM_INTERRUPT

INTERRUPTONiTQM_INTERRUPT_OVPRO

$CYCFLAG[iTQM CYCFLAG] =FALSE
$CYCFLAG[iTQM CYCFLAG]=(((STORQ DIFF[1]>TQM_ ACT.T11)OR
 ($TORQ_DIFF[2]>TQM_ACT.T12)OR
($TORQ_DIFF[3]>TQM_ACT.T13) OR
($TORQ_DIFF[4]>TQM_ACT.T14) OR
($TORQ_DIFF[5]>TQM_ACT.T15) OR
($TORQ_DIFF[6]>TQM_ACT.T16) OR
($TORQ_DIFF2[1]>TQM_ACT.T21) OR
($TORQ_DIFF2[2]>TQM_ACT.T22) OR
($torq_diff2[3]>TQM_ACT.T23)OR
```

KUKA KR C4 COMMUNICATOR RTOS CODE

```
GLOBALDEFMsgNotify(sText[]:IN,sModul[]:IN,
nNumPar:IN,sTextPar[] :IN,nMsgNr:IN)

;*********************************************

;Function: Executes a Message send of the notify Message
;**************************************************

Dec1CHARsText[],sModul[],sTextPar[]
DeclKrlMsg_TMsg
DeclEKrlMsgTypeMsgType
DeclKr1MsgParType_TMsgParType
Dec1Kr1MsgPar_TMsgPar[3]
DeclKr1MsgOpt_TMsgOpt
DeclState_TState
Dec1Intcount,len, offset,nNumPar,nHandle,nMsgNr

MsgType=#Notify
Msg.Nr=l
Err Clear($Err)
```

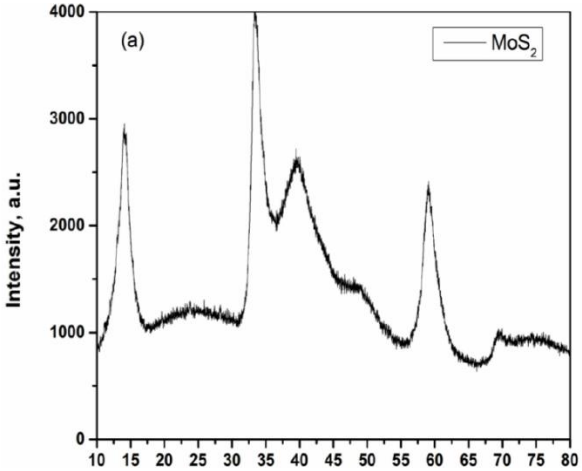
```
On Error Proceed
Msg.Nr=nMsgNr
len=Strlen(sText[])
iflen>0 then
if 1en>80 then
1en=80
endif
for count=1 tolen
Msg.Msg_txt[count]=sText[count]
endfor
else
Msg.Msg_txt[]="parameter sText[] is missing"
endif
len=Strlen(sModul[])
iflen>0 then
if 1en>24 then
1en=24
endif
for count=1 tolen
Msg.Modul[count]=sModu1[count]
endfor
else
Msg.Modul[]=”Appl”
endif
Err Clear($Err)
On Error Proceed
offset=nNumPar
```

Proposed Model Based Integration Code

```
DEFDATE     $BIOS.R0OTS.SYSTEMS.INIS
CHART $v_0PTIONAL[35]
$V_OPTIONAL[]="V2.l.1/KUKA8.2";VERSIONSKENNUNG
BOOLR $TECH_OPT=TRUE ;FUNKTIONSGENERATORS
BOOLR $TCPP_IPO=TRUE ;GREIFERBEZOGENING
INTERPOLATIONALS
BOOLR $SEPP_ASYNC_OV=FALSE ;Schaltersfuers
Asynchrones Hand-Overrides
BOOLR$LOOP_CONT=FALSE
CHART $LOOP_MSG[142]
BOOLR $IDENT_OPT=TRUE
INTS $SINGULAR_STRATEGY=1 ;1=NONE, 2=APPROX
BOOLR $MOT_STOP_OPT=FALSE ;AKTIVIERUNG “BLOCKING
EXTERNALS STARTS”
BOOLR $CHCK_MOVENA=TRUE ;AB-UND EINSCHALTEN DER
UEBERPRUEFUNG DER EINGANGSNUMMER VON $MOVES_ENABLES
BOOLR $COLLISAVOID=FALSE ;
BOOLR $MOTIONCOOP=FALSE ;
BOOLR $PROGCOOP=TRUE ;
BOOLR $TOV_REDUCE=TRUE ;TRUE = Overridereduzierung
auf 30% in mode R3
BOOLR $VARS_TCPP_IPO=FALSE
```

```
BOOLR $SPL_VELT_MODE_OPT=TRUE ;Defaulteinstellung
Fuer $SPL_VELT_MODE
BOOL $IMPROVEDMIXEDBLENDING=TRUE ;verbesserte
GemischteUeberschleifening
CHAR $WORKSPACE_NAME1[46]
 $WORKSPACE_NAME1[]="WORKSPACE 1"
CHAR $WORKSPACE_NAME2[46]
 $WORKSPACE_NAME2[]="WORKSPACE 2"
CHAR $WORKSPACE_NAME3[24]
 $WORKSPACE_NAME3[]="WORKSPACE 3"
CHAR $WORKSPACE_NAME4[24]
 $WORKSPACE_NAME4[]="WORKSPACE 4"
CHAR $WORKSPACE_NAME5[24]
 $WORKSPACE_NAME5[]="WORKSPACE 5"
CHAR $WORKSPACE_NAME6[24]
 $WORKSPACE_NAME6[]="WORKSPACE 6"
CHAR $WORKSPACE_NAME7[24]
 $WORKSPACE_NAME7[]="WORKSPACE 7"
CHAR $WORKSPACE_NAME8[24]
 $WORKSPACE_NAME8[]="WORKSPACE 8"
 DECL COOP_KRC $COOP_KRC[16] ;POTENTIAL REMOTE ROBOTS
 $COOP_KRC[1]={IP_ADDR[] "172.16.0.1",NAME[] "" }
 $COOP_KRC[2]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[3]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[4]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[5]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[6]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[7]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[8]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[9]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[10]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[11]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[12]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[13]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[14]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[15]={IP_ADDR[] "",NAME[] "" }
 $COOP_KRC[16]={IP_ADDR[] "",NAME[] "" }
CHAR $KCP_HOSTIPADDR[15] ;IP-Adresse des Shared Pendant Masters
```

V. RESULT ANDDISCUSSION



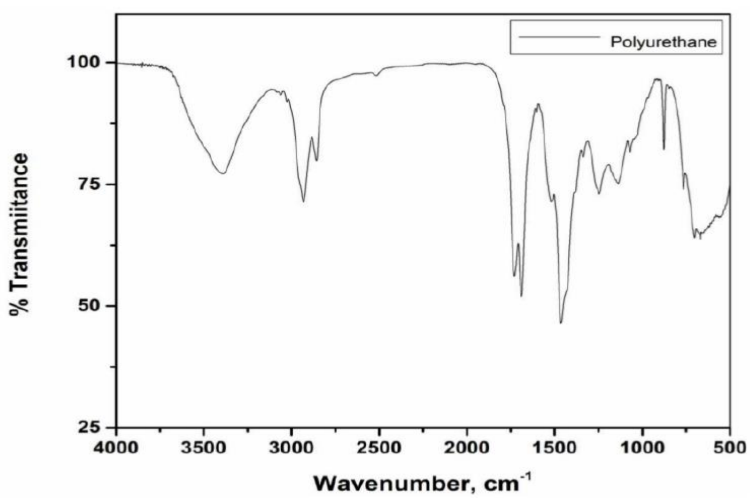


Table - Reveals the breath and bottom for wears tracks measurments krc4

VI. CONCLUSION

It's very clear that RTOS based root integration in artificial intelligence is very effective for the communication of industrial and service robots with their users. By the used of this any user can customized either robots or computers, and it is based on human-oriented manner root to do task. These machine can learning algorithms (set of rules) which can emerged. RTOS are very powerful for a large scale of applications and it depends on logical knowledge to choose the proper outcome for industrial system. So the system should be very familiar with the characteristics of the robotic machine with the help of KR-C4controller.

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