ProgramAssessment Plan

Program

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        D (&(     (&(     (&(       HYDO FORVH ORRS
        E (&(     (&(                HYDO FORVH ORRS
6       F (&(     (&(                HYDO FORVH ORRS
        G (&(     (&(                HYDO FORVH ORRS
  )DFXOW\ ³FORVH WKH ORRS´ PHHWLQJ
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D VWXGHQW ZRUN IRU WKH SXUSRVHUR HPDHDSXUHLQJD 62 WSKGHRQ

- (& ((& (Students will demonstrate ability to use mathematics or science/engineering principles to characterize a system as evidenced in the project notebooks, technical reports, or technical presentations

,QGLFDWRU 7KLV LQGLFDWRU V\VWHP RXWFRPH ZKHUH VWXGHQWV DFTXLUH DQG DSSO\ WKH V\VWHP WKDW WHDFKHV FRQFHSWV RI GHVLJQ V\VWHP

- (& (Students will demonstrate ability to find the thevenin equivalent circuit as evidenced by laboratory reports. The Thevenin equivalent circuit is a simplified model that includes only one voltage source and one impedance/resistance. This circuit behaves the same as the one from which it is drawn
- (& (Students will demonstrate the ability to determine/develop the I-V characteristics equation of semiconductor devices such as diodes and transistors as evidenced by the final exam
- (& (Students will demonstrate an ability to find and implement, via a matlab function, the impulse response of a system to remove an echo from an acoustic signal as evidenced by a Matlab computer program
- (& ((& (Students will demonstrate ability to use mathematics or science/engineering principles to create a system model as evidenced in the project notebooks, technical reports, or technical presentations

,QGLFDWRU 7KHLVV LQGLFDWRU VWXGHQWV DEILOLW\ WR FRQVWUXFW D FLUFXLW WKDW VDWLVILHV VSHFLI\ FRPSRQHQW YDOXHV DQG WKHQ WHVW WR FRQILUP WKDW LW GRHV D ODUJHU ZK

- (& (Students will demonstrate ability to design an RLC circuit in order to achieve a specific frequency response as evidenced by laboratory reports
- (& (Students will demonstrate an ability to develop a matlab function that eliminates an echo from an acoustic signal as evidenced by a Matlab computer program 7KLV UHTXLUHV WKDW RXV FRPSRQHQWV EH V\QWKHVL]HG LQJRVWUHPWR FUHDWH D SXWHU SURJUDP
- (& ((& (Students will demonstrate an ability to synthesize, i.e. create or specify or implement, components/subsystems using mathematics or science/engineering principles to create a larger whole as evidenced in the project notebooks, technical reports, or technical presentations

7KH DVVHVVPHQW WHFKQLTXHV IRU WKLV DERYH OLQ WDEOH

7$%/($VVHVVPHQW UXEULFV IRU 6WXGHQW 2XWF

5XEULF

,QG 'RHV QRW PHHW ([SHFWDWLRQV [V FHGV H[SHFWDWLRQV

(& (

7KH IUHTXHQF\ UHVSRQVH IXQFWLRQ (LWKHU WKH IUHTXHQF\ UHVSRQVH IXQFWLRQ DQG WKH ILOWHU W\SH LV IXQFWLRQ LV QRW FRUUHFW RU WKH ILOWHU W\SH LV VWDWHG LQFRUUHFWO\

(/(&75,&$/ (1*,1((5,1* 352*5$0

6 DQG DIWHU)RU WKH LQWHUQDOWHVWDQGWQWU\QHHGLWWRQHWW
WKH FROOHFWHG GDWD LV VXIILFLHQWO IRUXSURYRQLWKHUWDXI
UHVLVWDQFH 7KLV UHTXLUHV VRPFRQSWHQWs will demonstrate KRZ PX
an ability to determine the adequacy of the battery resistance measurements for the purpose of drawing meaningful conclusions with confidence as evidenced by the battery technical report or the experiment report

‡ (&((&(Students will demonstrate an ability to

7KHUH LV HYLGHQFH ZKHUH PHD
VXUHG GDWD KDV EHHQ DVVHVVHG WR
GHWHUPLQH LI LW LV VXLWDEOH IRU GUDZ

(b.2) an ability to analyze and interpret data

7$%/(	6WXGHQW DXWKRUHG WR RSHUDWH RQ VDQG GHVF
,QGLFDWRU	&RXUVH $VVHVVPHQW 'HVFULSWLRQ
	(&($VVHVV WKH SUHFLVLRQ LQ V YRZHOWKHX SXUSRVH RI GHZYHOOLQJ DGHYRLVLRQ W
$ELOLW\ WR UHFRJQL]H WKH SUHVHQFH RI PHDVXUHG RI PHDVXUHG GDWD	(&(WKH LQWHWUDQDFH URHVL EDWWHU\
	(&(([KLELW WKURXWKRXWLQHXQKQLFDWKH3URM
	(&(1RWHERRN WHFRQLWHEKQHLSRWSUHVH
	(&($VVHVV WKH UHOHYDQF\ RI PHDVXUHG SXUSRVH GHYHOZHSLQJ DQGGHFLVLRQ W
$ELOLW\ WR UHFRJQL]H WKH UHOHYDQF\ RI PHDVXUHG YDQF\ RI PHDVXUHG GDWDWKH LQWHWUDQDFH URHVL EDWWHU\	
	(&(([KLELW WKURXWKRXWLQHXQKQLFDWKH3URM
	(&(1RWHERRN WHFRQLWHEKQHLSRWSUHVH
	(&(2EVHUYH GDWDZHHDWXRXHQG RPHWULFV IF
$ELOLW\ WR UHFRJQL]H	(&(SXUSRVH GHYHOZHSLQJ DQGGHFLVLRQ W
GDWD IHDWXUHV IRU WKH PRGHOLQJ SURFHVV	(&(EHHSGRWDWZLQJ
FRQFOXVLRQV	(&(([KLELW WKURXWKRXWLQHXQKQLFDWKH3URM
	(&(1RWHERRN WHFRQLWHEKQHLSRWSUHVH

7KLV RXWFRPH UHWHRUWDQWDRQ\DQ DEHGZOLHQWWHHWSKUHHGDGDWDLDV HLWKHU S
IURP DQ H[SHULPHQWDWRROOQYHFWLRQQ \GZDKWHHZURVGWRDEROLW[DPSOH SC
REVHUYLQJ WUHQGV RU DQDO\]LQJWWHUV SXFWW DWR OPLHQHVXUHRSVHVW
]HUR FURVVLQJV HWF ,W FDQ DPHVDXPHDQGVWRFHUDPWQHGQZLWWKDI
DVVHVV PHDVXUHPHUQWRSGHWLHVLRQRBHQWKROHHWGHGQDFW IRU GUD
FRQFOXVLRQV 7KH ZRUG ³UHOHYDQWDUHRHOVHWWRHZKHWWKXWUWDE
LQWHQGHG FRQFOXVLRQV

,Q VXPPDU\ LW LV DOO WKH QHFHVVDU\ DQDO\WDQDOFWLVWDDUQGWRQWHD
FRQFOXVLRQV

,QGLFDWRU 7KLV VWXGHQWDLDFEDWRUHWWWKHRSUHMRQLQ RI WKH PHDVU

‡ (&((DFK VWXGHQWXHLQGJWRXFRQWHRXQHDWKDYRZHOQ WR D
$V SDUW RI WKH GHFYHOVPLHQWWRRQWHHPFLWULRQV WDUHHSORWWHG
D VHWWLQJ WR TXDSULWEDWLYHRQOYRXQWHRXQWKHFIRU WKH SXUSI
D UHOLDEOHStudentDWdemonstrate an ability to assess theisionof the various met
rics in order to determine which are most suitedor developing a reliable classifier tree as evi
denced by a technica0030008ro9-2.4(e)-0.6pa00300oh

1csu.2(w 21edwill)5.bi3met

‡ (&((&(Students will demonstrate an ability to recognize the precision of the measured data as evidenced in the project notebooks, technical reports, or technical presentations

,QGLFDWRU 7KHLU VWXGHQWV LWQRG LWFKDVWRUEHLUZKLWFKWRRHDWHQHUQWV GR QR LQWHQGHG VROXWLRQ RU PHDVXUHPHQW RI LQWHUHVW DQG VKR

‡ (&((DFK VWXGHQW JURXS ZLOO GHPRQVWUDWH DQ DELOLW\ WR UHFRJQL]H ZKLFK PHWULFV DUH UHOHYDQW WR WKH LQWHQGHG VROXWLRQ RU PHDVXUHPHQW RI LQWHUHVW DQG VKRXOG EH GLVFDUGHG DV HYLGHQFHG E\ WKH ODERUDWRU\ UHSRUWV SUHVHQWDWLRQV RU SURMHFW QRWHERRNV

an ability to recognize which metric components are relevant for creating a reliable classifier tree as evidenced by a technical report

‡ (&(

3 U L R U W \ Students will demonstrate an ability to recognize which measurements do not relate to the intended solution or measurement of interest and should be discarded as evidenced by the laboratory reports, presentations, or project notebooks

6 D Q G E D W W H U \ For the internal battery resistance measurement project, students will demonstrate an ability to determine the relevancy of the collected data in order to determine which measurements can lead to meaningful conclusions as evidenced by the battery technical report or the experiment report

‡ (&((&(Students will demonstrate an ability to recognize the relevancy of measured data as evidenced in the project notebooks, technical reports, or technical presentations

,QGLFDWRU 7KLV LQGLFDWRU GHDOV ZLWK WKH DELOLW\ WR REVHUYH GDWD WUHQGV RU GDWD IHDWXUHV IRU WKH SXUSRVH RI PRGHOLQJ SUHGLFWLRQ RU GUDZLQJ FRQFOXVLRQV

‡ (&((DFK VWXGHQW JURXS ZLOO GHPRQVWUDWH WKDW WKH\ DUH DEOH WR REVHUYH WUHQGV LQ HLWKHU WKH VSHFWUDO HQHUJ\ RI WKHLU YRZHO VRXQGV RU WKH PHWULF YHFWRUV IRU WKH SXUSRVH RI GHYHORSLQJ D UHOLDEOH FODVVLILHU WUHH DV HYLGHQFHG E\ D WHFKQLFDO UHSRUW

‡ (&(

3 U L R U W \ Students will demonstrate an ability to observe data trends or data features for the purpose of modeling, prediction, or drawing conclusions as evidenced by the laboratory reports, presentations, or project notebooks

6 D Q G D I W H U) R U W K H L Q W H U Q D O [E D W W H U \ U H V L V W D Q F H G D W D W U H Q G V R U G D W D I H D W X U H V L Q W K H L U P H D V X U H P H Q W V U H V S H F W L Y H O \ J H W V K R W F K D Q J H V W H P S H U D W X U H Q R U H V L V W D Q F H G X U L Q J W K H V D P H Students will demonstrate an ability to observe trends or data features in their internal battery resistance measurement experiment as evidenced by the battery technical report or the experiment report

‡ (&((&(Students will demonstrate an ability to solve data trends as evidenced in the project notebooks, technical reports, or technical presentations

(c) an ability to design a system, comp

(e) an ability to identify, formulate, and solve engineering problems

7$%/(6WXGHQWDVVHVVPHQW HQGLFDWLRQV DQG GHVFU		
,QGLFDWRU	&RXUVH	$VVHVVPHQW 'HVFULSWLRQ
$ELOLW\ WR UHFRJQL]H DQG VHOHFW HQJLQHHULQJ SUREOHP (&([KLELW WKURXJKRXW WKH FXUULFXOXP 3UR REVHUYDWLRQV (&(1RWHERRN WHFKQLTXH FKHFNOLVW SRUWIROLR (&(&DOLEUDWH D 3,' FRQWUROOHU IRU WK		
$ELOLW\ WR GHYHORS DQG FRQGXFW DSSURSULDWH H VRIWZDUHGHVLJQHGPHDVXUHPHQWV (&([KLELW WKURXJKRXW WKH FXUULFXOXP 3UR QHHULQJ SUREOHP (&(1RWHERRN WHFKQLTXH FKHFNOLVW SRUWIROLR (&(&DOLEUDWH D 3,' FRQWUROOHU IRU WK		
$ELOLW\ WR DQDO\]H GDWD WR LGHQWLI\ DQG VROYH SUREOHP XVLQJ HQJLQHHULQJ SULQFLSOHV (&([KLELW WKURXJKRXW WKH FXUULFXOXP 3UR (&(1RWHERRN WHFKQLTXH FKHFNOLVW SRUWIROLR (&(&DOLEUDWH D 3,' FRQWUROOHU IRU WK		
$ELOLW\ WR DVVHVV WKH SHUIRUPDQFH RI DQ HQJLQHHULQJ VROXWLRQ (&(([KLELW WKURXJKRXW WKH FXUULFXOXP 3UR (&(1RWHERRN WHFKQLTXH FKHFNOLVW SRUWIROLR		

7KLV RXWFRPH UHTXLUHV FRQVLGHUDEOH GHYHORSPHQW DQG PDVWHU\ RI EHKDYLRUDO SURFHGXUHV FDUU\ RXW WKH VROXWLRQ DQG PHDVXUH WKH GLVWDQFH LQLWLDWLYH IRU HQFRXUDJHV SURFHHGXUHV WKDW DQ LQVWUXFWRU

,QGLFDWRU 7KLV LQGLFDWRU WKUHDWHQV WR JLYH HDFK VWXGHQW RQH FKDQFH LQ RUGHU WR IXOILOO WKH 7(&+12/2*< GXULQJ WKH SURFROXWF yX@ ðRX€00P F•ROPQD VWVSVLFD„•tQ" `(`

VHWXS RU D SURFHGXUH

- (&(6WXGHQW JURXSV DUH UHTXLUHG WR GHYHORS D SURFHGXUH IRU WKH SXUSRVH RI FRQWURONLQJ WKH EH FDOLEUDWHG E\ PRGLI\LQJ WKH SURJUDPPLQJ RI D SURFHGXUH HIIHFWLYHQHVV LQ FDOLEUDWLQJ D SURFHGXUH WLYH PHWULFV Students will demonstrate an ability to develop a procedure with an appropriate feedback in order to calibrate a PID controller as evidenced by a technical report
- (&(3URFHGXUH 6WXGHQWV will demonstrate an ability to develop a structure through which an engineering problem can be solved as evidenced by the laboratory reports, presentations, or project notebooks
- 6DQG DIWHU 7KHRHWLFDO DQDO\VLV DQG VLPXODWLRQ RI D EDWWHU\ 6WXGHQWV will demonstrate an ability to solve problems related to the battery experiment as evidenced in the project notebooks, technical reports, or technical presentations
- (&((&(Students will demonstrate an ability to develop a structure through which an engineering problem can be solved as evidenced in the project notebooks, technical reports, or technical presentations

,QGLFDWRU 7KLV LQGLFDWRU WR DHSHUHYDOXDWHG RQ DDXWKRUDQDWLYH EDVLV HQJLQHHULQJ SULQFLSOHV 7KLV FRXOG KHTXLUH VXFFHVVIXO FRPSOHWLRQ RI DQ LQWHUQDWLRQDO KDUGZDUH VHWXS SURFHGXUH EDVHG RQ WKH PRGXOH

- (&(6WXGHQW JURXSV DUH UHTXLUHG WR GHYHORS D SURFHGXUH IRU WKH SXUSRVH RI FRQWURONLQJ WKH EH FDOLEUDWHG E\ PRGLI\LQJ WKH SURJUDPPLQJ RI D SURFHGXUH HIIHFWLYHQHVV LQ FDOLEUDWLQJ D SURFHGXUH WLYH PHWULFV Students will demonstrate an ability to carry out the calibration procedure in order to modify the robot movement dynamics as evidenced by a technical report
- (&(3URFHGXUH 6WXGHQWV will demonstrate an ability to carry out a problem solution using mathematics and/or engineering principles as evidenced by laboratory reports, presentations, or project notebooks
- 6DQG DIWHU 7KHRHWLFDO DQDO\VLV DQG VLPXODWLRQ RI D EDWWHU\ 'HYHORS D SURFHGXUH WR VROYH SUREOHPV UHODWHG WR WKH EDWWHU\ Students will demonstrate an ability to carry out a problem solution related to the battery experiment as evidenced in the project notebooks, technical reports, or technical presentations
- (&((&(Students will demonstrate an ability to carry out a problem solution as evidenced in the project notebooks, technical reports, or technical presentations

,QGLFDWRU FKHFNLQJ WR VHH LI WKH URERW PRYHV DFFXUDWHO\ DQG SUHFLVHO\ DFFRUGLQJ WR WKH SURJUDPPHG LQSXW SDUDPHWHUV

- (&(6WXGHQW JURXSV DUH UHTXLUHG WR GHYHORS D SURFHGXUH IRU WKH SXUSRVH RI FRQWURONLQJ WKH EH FDOLEUDWHG E\ PRGLI\LQJ WKH SURJUDPPLQJ RI D SURFHGXUH HIIHFWLYHQHVV LQ FDOLEUDWLQJ D SURFHGXUH WLYH PHWULFV Students will demonstrate an ability to assess their calibrated PID controller as it relates to the optimal robot movement as evidenced by a technical report
- (&(3URFHGXUH 6WXGHQWV will demonstrate an ability to assess the final result of a problem solution as evidenced by the laboratory reports, presentations, or project notebooks

6 DQG DIWHU 7KHHEDWWHU\ [SHULPHQW VWXGHQWV LQWHU
RI D EDWWHU\ Students will demonstrate ability to assess a problem solution related to the battery
experiment as evidenced in the project notebooks, technical reports, or technical presentations

‡ (&((&(Students will demonstrate an ability to assess a problem solution as evidenced
in the project notebooks, technical reports, or technical presentations

7KH DVVHVVPHQW WHFKQLTXH IRU WKLV DFWLYLW\ LV

7$%/($VVHVVPHQW 6WUXFWXUH 2XWFRPH H

5XEULF

,QG 'RHV QRW PHHW ([SHFWDWLRQV 0HHWV VRPH [SHFWDWLRQV 0HHWV DOO [SHFWDWLRQV

(&(

7KHUH LV HYLGHQFH WKDW D FOHDU\
7KHUH LV OLWWOH RU QR HYLGHQFH WKDW
DQ\ SURFHGXUH KDV EHHQ GHYHORSHG
OLVKHG WR WXQH D 3,' FRQWUROOHU WKDW
QHFHVVDULO\ UHSHDWDEOH

7KHUH LV OLWWOH RU QR HYLGHQFH WKDW
DQ\ SURFHGXUH IRU WXQLQJ D 3,'
FRQWUROOHU KDV EHHQ FDUULHG RXW

(f) an understanding of professional and ethical responsibility

7KLV RXWFRPH UHIHUV WR WKH NQRZOHGJH DQG DZDUHQHVV RI SURIHVVLRQDO DQG
UHODWH WR WKH ILHOG RI (OHFWULFDO (QJLQHHULQJ (QJLQHHUV DUH H[SHFWHG WR 7KH
VRXUFHV IRU WKLV SHUIRUPDQFH LQGLFDWRU LQFOXGH WKH VH

- 7KH 1DWLRQDO 6RFLHW\ RI 3URIHVVLRQDO (QJLQHHUV 163(KWWSV ZZZ QVSH RUJ UHVRXUFHV HWKLFV FRGH HWKLFV
- 7KH ,QVWLWXWH RI (OHFWULFDO DQG (OHFWURQLFV (QJLQHHUV ,(((KWWSV ZZZ LHHH RUJ DERXW JHQHUDO HWKLFV S KWPO

6WXGHQWV DUH PDGH DZDUH RI WKLV SHUIRUPDQFH LQGLFDWRU LQ &(&(

$Q H[DPSOH RI GDWD WKDW PD\ EH XVHG WR GHPRQVWUDWH DQ XQGHUVWDQGLQJ RI /RJLVWLFV /RJ
VPDOO FRPSDQ\ WKDW VROG LQYHQWRU\ WR UHWDLO VWRUHV DURXQG WKH FRXQWU\ UHFHLYHV D
EHFDPH YHU\ UHOLDQW XSRQ LW E\ WKH \HDU 7KH\ DOVR EHJDQ WR KHDU YDULRXV F
VRIWZDUH FODLPHQWV WKDW VRPH RI WKH FRPSHWLWRUV ZHUH XVLQJ ZKLFK RQ¶V F
QLJKW DQG ³UHSRVVHVVHG´ WKH VRIWZDUH IURP UXQQLQJ EXW WKH\ FUD
WKDW VWRSSHG WKH VRIWZDUH IURP UXQQLQJ 7KH\ DOVR DVNHG WKDW WKH\ FUD
VKLSPHQWV LQYROYLQJ 7KH\ DOVR DVNHG WKDW 3
(GLVRQ 1- DQG IRUFHG WKHP WR VHQG \V 5HYROXWLRQDU\ 6NHYUOR QZP
WR VKLS SURGXFWV)/ DQG 2[FRQVROH 1[DQG 2QH &RQVROH 6HW WR
(DVW 86 DQG :HVWHUQ (XURSH &OLHQW VXSSRUW HQJLQHHUV DFFHVV LQWHUQHW
DFWLRQV FRPSXWHU ZKLFK WXUQHG RXW

- :HUH /RJLVWLFR¶V DFWLRQV WKDW KHOSHG VROYH WKH SUREOHP DQG UHVWRUH 163(FRGH RI HWKLFV
- :HUH /RJLVWLFR¶V DFWLRQV WR DVVLVW 'DQLHO 6PLWK DQG RWKHUV DQG XVLQJ WKH 163(FRGH RI HWKLFV
- :HUH 5HYROR¶V DFWLRQ QRW WR [LHWWKH 16((SRRV LFV

7KHVH TXHVWLRQV WKHUHIRUH FRQWULEXWH WR WKH 6(I HWKLFV

- (&((&(Student will demonstrate an underst

(g) an ability to communicate effectively

,QGLFDWRU 7KLV UHIHUV WR DQQHDEHLFOWLWY\H WSRU HZVHLQWHDDWQLR Q
SUHVHQWDWLRQ LV HYDOXDWHGWLQRQWKULHXDPDLQWDUHDV WK WKH

7KHUH LV HYLGHQFH WKDW WKH SRVWHU SUHVHQWDWLRQ LVSURYLGHV DQ DSSURSULDWH IRUP RI FRPPXQLFDWLQJ ZLWKRXW UHTXLULQJ FDOO SHRSOH E\ H[KLELWLQJ RU RI WKDQ RQH RI WKH PRGDOLWLHV

D 7KH SUHVHQWDWLRQ FRQWDLQV VWDWLVWLFDO LQIRUPDWLRQ PRVWO\ EURDG GHVFULSWLRQV VXFK DV FRQVWUDLQWV DVVRFLDWLRQV SHUFHQWDJHV DQG FRQFOXVLRQV

E 1RQ WHFKQLFDO ZRUGV DUH FKRVHQ DV PXFK DV SRVVLEOH RU KLJKO\ WHFKQLFDO ZRUGV DUH H[SODLQHG

F KLJKO\ WHFKQLFDO FRQFHSWV DUH SUHVHQWHG LQ QRQ WHFKQLFDO DQG VLPSOLILHG WHUPV

G &RQFOXVLRQV DUH HDVLO\ XQGHUVWRRG E\ QRQ WHFKQLFDO SHRSOH

‡ (&(6WXGHQWV DUH UHTXLUHG WR GHPRQVWUDWH DQ DELOLW\ WR LGHQWLI\ DQG HYDOXDWH UHVRXUFHV IRU WKH SXUSRVH RI FDOLEUDWLQJ D 3,' FRQWUROOHU DV HYLGHQFHG E\ D WHFKQLFDO UHSRUW

‡ (&(

3URMHFW 6WXGHQWV ZLOO GHPRQVWUDWH DQ DELOLW\ WR LGHQWLI\ DQG HYDOXDWH UHVRXUFHV IRU WKH SXUSRVH RI DFTXLULQJ DSSURSULDWH NQRZOHGJH WR IXUWKHU D GHVLJQ VROXWLRQ DV HYLGHQFHG E\ SURMHFW QRWHERRNV WHFKQLFDO UHSRUWV RU WHFKQLFDO SUHVHQWDWLRQV

6 DQG DIWHU 6WXGHQWV ZLOO GHPRQVWUDWH DQ DELOLW\ WR LGHQWLI\ DQG HYDOXDWH UHVRXUFHV IRU WKH SXUSRVH RI GHYHORSLQJ D EDWWHU\ PHDVXUHPHQW H[SHULPHQW DV HYLGHQFHG LQ WKH SURMHFW QRWHERRNV WHFKQLFDO UHSRUWV RU WHFKQLFDO-SUHVHQWDWLRQV

‡ (&((&(Students will demonstrate an ability to identify and evaluate resources for the purpose of acquiring appropriate knowledge to further a design solution as evidenced in the project notebooks, technical reports, or technical presentations

,QGLFDWRU 7KLV LQGLFDWRU UHTXLUHV VWXGHQWV WR GHPRQVWUDWH WKHLU DELOLW\ WR UHDG DQG XQGHUVWDQG PDWHULDO IRXQG LQ DSSURSULDWH UHVRXUFHV WR IXUWKHU D GHVLJQ VROXWLRQ

‡ (&(Students will demonstrate an ability to read and understand material found in appropriate resources to calibrate a PID controller as evidenced by a technical report

‡ (&(

3URMHFW 6WXGHQWV ZLOO GHPRQVWUDWH DQ DELOLW\ WR UHDG DQG XQGHUVWDQG PDWHULDO IRXQG LQ DSSURSR

(j) a knowledge of contemporary issues

- (& (Students will demonstrate an ability to use the matlab development environment to write a computer program as evidenced in laboratory reports.
- (& (Students will demonstrate an ability to use the SDK500 development tool to program an ATMEGA 32A AVR chip as evidenced in laboratory reports

7KH DVVHVVPHQW UXEULFV DUH JLYHQ LQ IROORZLQJ WDEOH

7$%/($VVHVVPHQW 6WUXFWXUH 2XWFRPH N

5XEULF

,QG 'RHV QRW PHHW ([SHFWDWLRQV [SHFWDWLRQV H[SHFWDWLRQ

7KHUH LV OLWWOH 7RKHQR HLY LHGYHLQGFHQ F7KRIRQLV HH[YDLPSHQFH RI P
ZKHUH'00 KDV EHHQZKHUH'00 KDV EHH[QPXSOHHGVHZDKH00 KDV EHHC
FRUUHFWO\ PHDVXUHRUYRHOFWDQ\HPLQDWHUQHDWLRQHDWFL\PHD
FXLW DV SDUW RI DFXOWDWRUVDSWRUW HR[SHLQDEORUDFWRQVHYRWRDEORUDWR
PHQW PHQW H[SHULPHQW

7KHUH LV OLWWOH 7RKHQRH HLYLHGYHQFHQ F7KRIRQLV HH[YDLPSHQFH RI P
ZKHUH'00 KDV EHHQZKHUH'00 KDV EHH[QPXSOHHGVHZDKH00 KDV EHHC
FRUUHFWO\ PHDVXUHRUYRHOFWDQ\HPLQDWHUQHDWLRQHDWFL\PHD
GLJLW FLUFXLW DVGSLDJUW RIUDFXOWDWRUVDSWRUWGLRJDDW GFDEHRVWRUWR\D
H[SHULPHQW H[SHULPHQW UDWRU\ H[SHULPHQW

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Å&¬Òuì5F Å À P a0 € p 0#rÐ p ° € P € 0 0 € • À ä ‰