

a Q m K v E m M / m

SQbBiBQ2MBQ`1M;BM22`- _2bBHB2Mi *QMi`QH J2i?Q/b h2 K
S +B}+ LQ`i?r2bi L iBQM H G #Q` iQ`v USLLGV
//`2bb Nyk " ii2HH2 "Hp/X- SXPX "Qt NNN- Ja C8@R8- _B+?H M/- q NNj8
1@J B B QmKv XFmM/m!TSMQHM2RQp8yNV jd8 k9jR

"`B27 S`Q}H2

A K+m``2MiHv a2MBQ`1M;BM22` rBi?BM i?2 _2bBHB2Mi *QMi`QH J2i?Q/b h2
i?2 TTHB+ iBQM M/ /2p2HQTK2Mi Q7 MQMHBM2 `bvbi2Kb i?2Q`2iB+ iQQHb iC
BM+Hm/BM; i?2 /2bB;M Q7 `2bBHB2Mi M/ `2HB #H2 TQR2` ;`B/b- QT2` iBQM C
`2bBHB2M+2 Q7 i` MbTQ`i iBQM M2irQ`FbX A ? p2 H2/ b2p2` H .P1 UP1- 11_1
T`QD2+ibX A K T`2b2MiHv b2`pBM; b i?2 bm#@i?`mbi H2 / 7Q` KmHiB@v2`
i?`Qm;? . i @/`Bp2M BMi2HHB;2MiHv@.2bB;M2/ *QMi`QHb U_.k*VX

1/m+ iBQM

kyRj .Q+iQ` Q7 S?BHQBQT?v IMBp2`bBiv Q7 JB+?B; M- MM `#Q`
kyyN J bi2` Q7 h2+?MQHQ;v AM/B M AMbiBimi2 Q7 h2+?MQHQ;v E?`
kyyN " +?2HQ` Q7 h2+?MQHQ;v U>QAMB M AMbiBimi2 Q7 h2+?MQHQ;v E?`

1KTHQvK2Mi

kyRe@ S +B}+ LQ`i?r2bi L iBQM H G #Q` iQ`v- la
a2MBQ`1M;BM22`
Ç a2`pBM; b i?2 S`BM+BT H AMp2biB; iQ` USAV QM i?`22 T`QD2+ib rQ
#vi?2 .P1 aQH `1M2`;v h2+?MQHQ;B2b P{+2 Ua1hPV- i?2 .P1 P{+2 Q7
/p M+2/ a2MbQ`b M/ . i M HviB+b T`Q;` K- M/ i?2 SLLG G #@.B`;
M/ .2p2HQTK2Mi USLLG@G._.V T`Q;` KX
Ç a2`pBM; b bm#@i?`mbi H2 / rBi?BM i?2 SLLG@G._. .k* BMBiB iBp
Ç a2`p2/ b SA- *Q@SA M/ h bF G2 / QM b2p2` HT bi T`QD2+ib 7mM/2/
T`Q;` K- M/ p `BQmb .P1 Q{+2b M/ T`Q;` Kb- BM+Hm/BM; P{+2 Q7
M/ _2M2r #H2 1M2`;v U11_1V- "mBH/BM; h2+?MQHQ;B2b P{+2 U"hPV
JQ/2HBM; S`Q;` K- P1 :`B/ JQ/2`MBx iBQM AMBiB iBp2- P1 JB+`Q;` B
p M+2/ _2b2 `+? S`QD2+ib ;2M+v @ 1M2`;v U _S @1VX

kyRj@kyBQb H KQb L iBQM H G #Q` iQ`v- la
SQbiQ/Q+ _2b2 `+? bbQ+B i2
Ç .2p2HQT2/ +QKTmi iBQM HHv 2{+B2Mi- b+ H #H2 M/ /2+2Mi` HBx2/
#BHBiv Q7 M BMi2`+QMM2+i2//vM KB+ H bvbi2K mM/2` /Bbim`# M+2
b T`i Q7 G LG@G._. T`QD2+iX

kyyN@kyIMBp2`bBiv Q7 JB+?B; M- MM `#Q`- la
:` /m i2 aim/2Mi _2b2 `+? bbBbi Mi
Ç AMp2biB; i2/ i?2 BKT +i Q7 H `;2@b+ H2 BMi2;` iBQM Q7 THm;@BM
bBHB2M+v U b T`i Q7 L iBQM H a+B2M+2 6QmM/ iBQM BMBiB iBp
_2b2 `+? M/ AMMQp iBQM, _2bBHB2Mi M/ ambi BM #H2 AM7` bi`m
*H2 M 1M2`;v _2b2 `+? *2Mi2` U*1_*V *H2 M o2?B+H2 *QMbQ`iBmKV.
Ç .2p2HQT2/ KQ/2HBM;- M HvbBb M/ +QQ`/BM iBQM bi` i2;B2b 7Q
?vbi2`2bBb@# b2/ 2H2+i`B+ H HQ /b BM +QMM2+iBQM iQ /2K M/ `2b

_2b2 `+? AMi2`2bib

- LQMHB2M`avbi2Kb M HvbBb
- G `;2@a+ H2 L2irQ`Fb
- *QQ`/BM iBQM Q7 6H2tB#H2 GQ /b
- "mBH/BM;b@iQ@:`B/ AMi2;` iBQM
- _2bBHB2M+2 Q7 h` MbTQ`i iBQM L2irQ`Fb

_2b2 `+? :` Mib Ua2H2+i2/V

kykR@kyk2H7@ r`2 GQ+ H miQMqKqmb M/ a2KB@*QQT2` iBp2 *QMi`QH 7
 _QH2I. "m/;2i _2bTQMbB\$#B000ivaTQMbQNL-LDRD
 *Q@H2 /BM; i?Bb T`QD2+i r?B+? BKb iQ /2p2HQT M/ /2KQMbi` i2
 `Bi?Kb i? i2M #H2 i?2 ;2Mib BM H `;2+v#2`@T?vbB+ H M2irQ`F i
 M/ BM +QHH #Q` iBp2 ? `KQMv iQ 2M7Q`+2 bmb`2/ `2bBHB2M+2
 h?2 2tT2+i2/ Qmi+QK2 Q7 i?Bb 2zQ`i Bb bmbi2 Q7 T`QiQivT2- QT
 `Bi?Kb 7Q` b 72iv@ r`2 HQ+ H miQMqKqmb M/ b2KB@+QQT2` iB
 +v#2`@T?vbB+ H M2irQ`Fb- bmb+? b M2irQ`F2/ KB+`Q;`B/b M/ bK`i

kykR@kykjLjS, o`B iBQM H_2+m``2Mi L2m` H L2irQ`F@# b2/ L2i@HQ / S`2
 _QH2I. "m/;2i _2bTQMbB\$#B000ivaTQMbQOE SETO
 a2`pBM; b i?2 SA 7Q` i?Bb T`QD2+i r?B+? BKb iQ mb2 /p M+2/ `K
 +?BM2 H2 `MBM; i2+?MB[m2b iQ +`2 i2 M QT2M@bQm`+2 iQQH i
 2H2+i`B+ HQ / BM `2 b rBi? H `;2 KQmMib Q7 #2?BM/@i?2@K2i2`
 i?2 QT2` iBQM Q7 i?2 2H2+i`B+ M2irQ`FX Pmi+QK2b 7`QK i?Bb T`Q
 bB;MB}+ Mi 2+QMqKB+ #2M2}ib- BM //BiBQM iQ TH vBM; +`BiB+
 amMa?Qi kyjy ;Q H Q7 8yW `2/m+iBQM BM H2p2HBx2/ +Qbi Q7 UbQH

kykR@kykG1_h, PMHBM2 PTiBKBx iBQM@" b2/ / TiBp2 G2 `MBM;@1M #H2/
 _QH2I. "m/;2i _2bTQMbB\$#B000ivaTQMbQNL-LDRD
 a2`pBM; b i?2 SA 7Q` i?Bb T`QD2+i r?B+? BKb iQ /2bB;M QMHBM2 M
 Q7 2tBbiBM; QTibK H +QMi`QH bQHmiBQM b BM `2bTQMb2 iQ +v#2`
 bmb`2 U[m MiB} #HvV bm{+B2Mi K `;BMb Q7 `2bBHB2M+2X 1tT2+i
 /2bB;M Q7 / TiBp2 G2 `MBM;@1M #H2/ _2bBHB2Mi hmMBM; +QMi`Q
 QM H v2` M/ `2TH +2b i?2 M22/ 7Q` +Qbi@T`Q?B#BiBp2 `2/2bB;M Q7
 i2+?MQHQ;v rBHH #2 p HB/ i2/ QM UbBM;H2 M/ M2irQ`F2/V KB+`Q;

kyky@kykK GJ, *QMiBMm H > `KQMB+b@1M? M+2/ GQ / JQ/2H .Bb+Qp2`v hQ
 _QH2I. "m/;2i _2bTQMbB\$#B000ivaTQMbQOE OE (Sensors)
 a2`pBM; b i?2 SA 7Q` i?Bb T`QD2+i r?B+? BKb iQ /2p2HQT MQp2H
 H2p2` ;2/ i 7`QK /p M+2/ ;`B/ b2MbQ`b iQ +QMiBMmQmbHv KQMBi
 +? `+i2`BbiB+b- BM+Hm/BM; i?2 2z2+i Q7 ? `KQMB+b M/ Qi?2` 7+
 #2? pBQ` H M/ 2M;BM22`BM; U;`B/ QT2` iBM; +QM/BiBQM bVX h?2
 i?2 BKT +i Q7 i?2 2M? M+2/ ? `KQMB+ HQ / KQ/2Hb QM ;`B/ `2HB
 QT2` iBQM H mb2@+ b2 b+2M `BQbc b r2HH b [m MiB7v b2MbBiBp
 M/ BM ++m` +B2b BM i?2 b2MbQ` K2 bmb`2K2MibX

kyR3@kykjSP, *QKT`2?2MbBp2 SHB Mi S2`KBbbBp2 S`BQ`Biv PTiBKBx iBQM
 _QH2I. "m/;2i _2bTQMbB\$#B000ivaTQMbQOE BTO
 *Q@/2p2HQT2/ i?2;` Mi T`QTQb H- M/ b2`p2/ b i?2 h bF G2/- 7Q` i
 /vM KB+-`2 H@iBK2 / TiBp2 #mBH/BM; HQ / T`BQ`BiBx iBQM 7` K2
 ~m2MiB H T `K2i2`b- BM+Hm/BM; #mBH/BM; 7mM+iBQM M/ +? `+i2
 +QMbi` BMib 7`QK mb2`b- iBK2 Q7 / vfv2 ` - r2 i?2` - M/ 2[mBTK2Mi
 M/ QT2` iBQM H +QMbi` BMibX h?2 Qmi+QK2b 7`QK i?Bb T`QD2+i
 miBHBiB2b iQ 2{+B2MiHv b+?2/mH2 +`BiB+ H #mBH/BM; HQ /b BM /
 BKT`Qp2 7`2[m2M+v M/ pQHi ;2`2;mH iBQM b2`pB+2b 7Q` KB+`Q;

kyRd@kykQ#mbi _2bBHB2Mi *QQ`/BM iBQM Q7 622/2`b rBi? IM+2`i BM .Bbi
_QH2I. "m/;2i _2bTQMbB\$B000i vaTQM.bDOE EERE
J M ;2/ i?Bb T`QD2+i b SA- r?B+? /2p2HQT2/ T`2/B+iBp2 QTIB
iBQM 7` K2rQ`F iQ K M ;2 ~2tB#H2 ;`B/`2bQm`+2b M/ H2; +v +QMi
HQR@pQHi ;2 /Bbi`B#miBQM bvb2K iQ 2 b2 i?2 ~m+im iBQMb M/ p
h?2 T`QD2+i/2KQMbi` i2/i` Mb7Q`K iBp2 M/ ?B;?Hv b+ H #H2 i2+?
/p M+2/ ;`B/ BM7` bi`m+im`2 iQ 2M #H2 bQH ` i RyyW Q7 i?2 T2 F/

kyRe@kyR3A RXd *QMi`QH 6` K2rQ`F 7Q` G `;2@a+ H2 *QKTH2t avbi2Kb
_QH2o-PI. "m/;2i _2bTQMbB\$B500i vaTQM.bQVNL-LDRD
a2`p2/ b i?2 *Q@SA Q7 i?Bb T`QD2+i r?B+? /2p2HQT2/ M HvbBb
bvb2K iB+ HHv `+?Bi2+i M/ /2bB;M+QMi`QH ?B2` `+?B2b 7Q` H `;
Qmi+QK2b r2`2 b2i Q7 `2[mB`2K2Mib iQ BM7Q`K +QMi`QH- +QKKn
`+?Bi2+im`2 /2}MBiBQM M/ H;Q`Bi?K b2H2+iBQM 7Q` ;Bp2M bvb

.Bbb2`i iBQMb M/ h?2b2b

S?. a2 KH2bb AMi2;` iBQM Q7 _2M2r #H2 :2M2` iBQM M/ SHm;@BM 1H
i`B+ H :A B i s r S`Q72bbQ` A M X >BbF2Mb- lMBp2`bBiv Q7 JB+?B; M
J bi2`b AMp2biB; iBM; i?2 bBM;mH `BiB2b BM i?2 MQ`K H 7Q`K K T M2 ` ;`
Advisor S`Q72bbQ` aQmKBi`Q " M2`D22- AAh E? ` ;Tm`
" +?2HQ`2p2HQTK2Mi Q7 +QMi`QHH2` +?BT iQ pQB/ #B7m`+ iBQM BM pQH
p2`i2Advisor S`Q72bbQ` aQmKBi`Q " M2`D22- AAh E? ` ;Tm`

S i2Mi

CX GB M- EX E Hb a X. X no M #Bi22HH2 J2KQ`B H AMbiBimi2 AM+- ó1ti` +iBM; K
`2bTQMb2 TQi2MiB H BM +QMi`SaidH #H210BQ 706Xó kykyX

"QQF *? Ti2`

AX *? F` #Q`iv- aX LaX/ ENMQ iB / EX E HbB- ó. i @/`Bp2M S`2/B+iBp2 6H2tB#
Q7 .Bbi`B#mi2/ 1M2`;v _2bQm`+2b-ô SLLG h2+?MB+ H _2TQ`ib
Advanced Methods, Digital Technologies, Decision Support Tools, and Applications- aT`BM;2` - kykyX

h2+?MB+ H _2TQ`ib

(_j)EX SX a+?M2B/2`- >X L ;` D M- X S` ii- JX CX _2MQ- "X PHHb- 6X hmx
EmM/mqX .m- >X >BD xB- _X C BM- 6X 6HQ`2b@1bTBMQ- CX > K#`B+F M/
S`Q+2bb 7Q` L2irQ`F2/ JB+`Q;`B/b-ô SLLG h2+?MB+ H _2TQ`i- SLLG@jyy
(_k)uX GBm- SX oXaXBMn Q p m l- óPT2M@aQm`+2 >B;?@6B/2HBiv ;;`2; i2 *QK
JQ/2Hb Q7 1K2`;BM; GQ / "2? pBQ`b 7Q` G `;2@a H2 M HvbBb-ô SLLG
kN8Nk- kykyX
(_R)X "? ii +? `v - aX LX :Qm`Bb2iiB- CX > M b2ME m K h n Q 7 2 A E X M i B p B @ " b2/
*QMi`QH M/ *QQ`/BM iBQM Q7 .Bbi`B#mi2/ 1M2`;v _2bQm`+2b-ô SLLG
k3dk9- kyRNX

a2H2+i2/ CQm`M H Sm#HB+ iBQMb

(a22@a+?Q7Q` +QKTH2i2 HBbi)

(CRgXL M/ M@QEM-M/CX GB M- IX o B/v - .X o` #B2 M/ EXE HbB- óaT `b2 *QM
IM+2`i BM _2bTQMbBp2 GQ /b rBi? aiQ+? bIBE TransAction: Smart Mi22bô-
Grid- CmH kykRX

(CN)X EmM/mX "? ii +? `v - oX *? M/ M- LX _ /? F`Bb?M M- oX /2iQH M/
aiQ+? biB+ JmHiB@*`Bi2`B .2+BbBQM J FBM; H;Q`Bi?K 7Q` .vM KB+ C
AMi2` +iBp2 1{+B2MiASMB LettM Dynamic Systems and Control- pQHXR- MQX j-
kykRX

(C3)

- (*kk)X SX L M/ MQQ`B- aX S X H- E m M/ a B M ?; `r H- M/ aX *?Qm/?m`v- ó. i @/`E .Bbi`B#mi2/ G2 `MBM; Q7 JmHiB@ ;2Mi avbi2Kb, EQQTK M PT2` iQ` T M/ .2+BbBQM *QM7U2+M-2T-i2/ykRX
- (*kR)X C B M-EmM/mX "? ii +? `v - aX >m M;- oX *? M/ M- LX _ /? F`Bb?M M- o .X o` #B2- óP++mT M+v@.`Bp2M aiQ+? biB+ .2+BbBQM 6` K2rQ`F 7Q` _ GQ /Vh6 American Control Conference- TTX 9RdR@9Rdd- kykRX
- (*ky)X L M/ M Q Q E m M/ a n X S H- EX ; `r H M/ aX *?Qm/?m`v- óJQ/2H@ ;MQbiF `2 H@iBK2 ii +F B/2MiB}+ iBQM BM TQr2` ;IEEE Smart Grid Conference- TTX KyMykQ/2b-ó
- (*RN)X _X E M/ F i H - oX *a?X M E m M/ A n X *? F` #Q`iv- EX *QQF M/ X . b;mTi r`/b h`mbi@ m;K2Mi2/ oBbm H M HviB+b 7Q` . i @EEBVi2MizatiM2` ;v JQ/2H Conference (VIS 2020) - kykyX
- (*R3)X E m M/ m/ EX E H b B- óh` MbB2Mi a 72iv 6BH2` .2bB;M7hQ Amer- B/ @6Q`KB I ican Control Conference- TTX RkNN@Rjy9- .2Mp2`- la - kykyX
- (*Rd)X *? F` #Q`iv- aX L a X/ E m M/ M B- EX E H b B- óaiQ+? biB+ oB`im H " ii2`v Q7 IM+2`i BM 1H2+i`B+ H GQ /b lbBM; o T h A B Q M h C o n t r o l C o n f e r e n c e - 2`ó- TTX Rjy8@RjRy- .2Mp2`- la - kykyX
- (*Re)X E m M/ m X *?m- uX GBm- uX h M;- ZX >m M;- .X C K2b- uX w? M;- SX 1iB ó LQMhBM2 ` _2;`2bbBQM J2i?Q/ 7Q` *QKTQbBi2 S`Qi2+iBQM JQ/2HBM IEEE PES Innovative Smart Grid Technologies Conference- q b?BM;iQM- .*- kykyX
- (*R8)X "B M+?BM- 6X S b [a n X H E z i M B/ o m 2 b B H B 2 M + 2 Q 7 h` {+ L2irQ`Fb rBi? S `iE i`QHH2/ _2 H@hB IEEE Ameri Can Control Conference- TTX kedy@ked8- kyRNX
- (*R9)X u2m a X -EmM/m/ LX >Q/ b- óG2 `MBM; /22T M2m` H M2irQ`F `2T`2b2Mi Q T 2` iQ`b Q7 MQMHBM2 ` /V h K o n + C o n t r o l C o n f e r e n c e TTX 93jk@93jN- kyRNX
- (*Rj)X E m M/ m X .m- aX SX L M/ MQQ`B- 6X hmz M2` M/ EX a+?M2B/2`- óA/2Mi 7Q` _Q#mbi ai #BHBiv BM LQMhBM2 ` L2irQ`F IEEE American Control TTHB+ iBQ Conference- TTX jRRR@jRRe- kyRNX
- (*Rk)X E m M/ a n X :2M;- aX SX L M/ MQQ`B- A X X >BbF2Mb M/ EX E H b B- ó. Bbi`M 7Q` a 72 PT2` iBQM Q7 A m p 2` i 2 T h A B Q M h C o n t r o l C o n f e r e n c e - TTX Ry9k@Ry9d- S?BH /2HT?B - la - kyRNX
- (*Rr)X E m M/ m X *? M/ M- M/ EX E H b B- óa+ H #H2 *QKTmi iBQM Q7 k.@JBM i` `v LQM@*QMp2t .QK B M b, JQ/2HBM; 6H2tB #B H B i v i B M t e c h n o l o g y _ 2 b Q m` + Conference on System Sciences- J m B- la - kyRNX
- (*Ry)X *? F` #Q`iv- aX SX L M X E m M/ o B M i m H " ii2`v S ` K2i2` A/2MiB}+ iBQ h` Mb72` G2 `MBM; " b2/ ai +F 2I/thn IEEE International Conference on Machine Learning and Applications- TTX RkeN@Rkd9- P`H M/Q- la - kyR3X
- (*N)X SX L M/ M Q Q E m M/ m X o` #B2- EX E H b B M/ CX GB M- óS`BQ`BiBx2/ h?` 7Q` .Bbi`B#mi2/ 6` 2[m2M IEEE Control Technology and Applications- TTX kjd@k99- *QT2M? ;2M- .2MK `F- kyR3X
- (*3)X J `m a X E m M/ m X u2mM; M/ JX M;?2H- ó.2+QKTQbBiBQM Q7 LQMhBM2 ` oB *QKT `BbQM E u r o p e a n C o n t r o l C o n f e r e n c e - TTX R Ny @ R Ne- GBK bbQH- *vT`mb

(* 9) X E m M / m