2010 International Conference on Indoor Positioning and Indoor Navigation

(IPIN 2010)

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Optical Systems

Ultra Sound Systems

RF RSS (ZigBee, FM, General RF), Fingerprinting

Gpcdnkpi "Nqy /r qy gt'Nqecnk|cvkqp"hqt"O qdkng"Ugpuqtu"P qf gu"379"

Iqti g'Lwcp'Tqdngu."Ugdcuvkcp"Vtqm gt."O qplec'S wktqi c'cpf "Tcrh'Ngj pgtv'

F CNG²'C'Tcpi g/Htgg."Cf cr vkxg'Kpf qqt"Nqecnk|cvkqp"U{uvgo "Gpj cpegf "d{"Nko kygf "Hkpi gtr tkpvkpi "'389"

Qri c'G0'Ugi qw.'Ugrkqu'C0'M kkkrpegqu'cpf "Ugrkqu'E0C0'Vj qo qr qwnqu"

Cf /j qe'P gy qtmu'Ckf kpi "Kpf qqt"Ecrkdtcvkqpu'Qh"J gvgtqi gpgqwu'F gxkegu'hqt"Hkpi gtr tkpvkpi "Cr r rkecvkqpu"397"

Htcpeguecpvqpkq'F gmc'Tquc."J grgc'Ngr r @nqunk'Ughcpq'Dkcpewm."cpf "Lctk'P wto k'

C'O qf gn'Uy kej kpi "Ugs wgpvkcn'O qpvg'Ectnq'Cri qtkj o "hqt'Kpf qqt"Vtcemkpi "y kj "Gzr gtko gpvcn'TUU'F cvc'"3: 3"

Mcvtkp'Cej wgi uk'Lcxkgt'Tqf cu."Ectnqu'L0'Guewf gtq."Lqcs w¶b'O ¶{wg| "

Cp'Gpxktqpo gpV'Cf cr vkxg'\ ki Dgg/dcugf "Kpf qqt"Rqukkqpkpi "Cri qtkj o ""3: ;

Lcpktg'Ncttcpci c.'Ngktg'O wi wktc."Lwcp/O cpwgn'Nqr g| /I ctf g.'Lwcp/K pcekq'Xc| s wg| "

Nqy "Rqy gt'Nqecvkqp'Rtqvqeqn'dcugf "qp'\ ki Dgg"3; 9"

Nw¶{u'Dtª u.'O cteq'Qrkxgktc.'Rgf tq'Rkpj q.'P wpq'Dqti gu'Ectxcrj q'

TUUKnqecnk|cvkqp'y kj "ugpuqtu'r rcegf "qp'vj g'wugt"426"

Rcqnq'Dctuqeej k"Htcpegueq'Hwthctk'Rcqnq'P gr c.'Htcpegueq'Rqvqtv'

TOF, TDOA based Localization

KGGG": 24083'Tcpi kpi "cpf "O wnk/ncvgtcvkqp"hqt"c"Uqhwy ctg/f ghkpgf "Rqukkqpkpi "Tgegkxgt"'432"

H0'Vcr r gtq.'D0O gto kpf .'O 0Ekwtcpc'

Qp"vj g'O kpko k| cvkqp"qh'F kihgtgpv'Uqwtegu'qh'Gttqt"hqt'cp'TVV/Dcugf "Kpf qqt"Nqecnk|cvkqp"U{uvgo "y kj qw'cp{ "Ecrkdtcvkqp'Uvci g"438"

Lcxkgt'Rtkgvq.'Ucpvkci q'O c| wgncu.'Crhqpuq'Dcj knnq.'Rcvtkekc'Hgtpªpf g| .'Twd²p'O 0'Nqtgp| q.'Gxctkuq'L0'Cdtkn'

Eqpuvtckpgf 'O czko wo "Nkngnkj qqf "Rqukkqpkpi "hqt"WY D"Dcugf "J wo cp'O qvkqp'Vtcemkpi "'444"

\ 0'Y 0'O gpqppgp.'G0'Uqyuwue.'E0'Uvgkpgt.'J 0'Nwgemgp.'C0'Y kpgpfgt'

C'O cyj go cvkecn'O qf gn'hqt'c'Rqrctkucvkqp'Dcugf "Qtkgpvcvkqp'O gcuwtgo gpV'Rtkpekr ng'kp'Vko g'qh'Cttkxcn'Tcf kq'Nqecnkucvkqp'U{uvgo u"454"

Cpf tgcu'Gkf rq yj .'13⁄4p'Vj kngngme"

Rgthqto cpeg'uvcbknk{'qh'uqhwy ctg'VqC/bcugf "tcpi kpi "kp'Y NCP "'45: "

O ctc'Ekwtcpc.'F qo gpkeq'I kwukpkcpq.'Crdgtv'P gktc.'Htcpekueq'Dctegq/Cttq{q.'Kutcgn'O ctkp/Gucnqpc'

J ctf y ctg'Ko r ngo gpvcvkqp'qh'c'Rctvkeng'Hkngt"hqt'Nqecvkqp'Guvko cvkpi "'468"

Fcpkgn'HtqË.'Lcp'Ncpi gt.'Cpfª²'HtqË.'O ctmq'T¾Ëngt.'Wtkej 'J gkpmgn'

Cf "j qe''Kpf qqt"Rggt'vq/r ggt'Vtcemkpi "wukpi "Tgncvkxg'Nqecvkqp'Guvko cvkqp""474

Fqj {wpi "Rctm'Lqqpuwpi "Mcpi .'cpf "Gwpi "Uwp'Mko "

Fktgevkqp'Guvko cvkqp'hqt"Egmwct'Gpj cpegf "Egm/KF"Rqukkqpkpi "Wukpi "O wnkrng'Ugevqt'Qdugtxcvkqpu"482"

Ik{wp'Uj gp.'[cuwj ktq'Qf c"

UWB (Ultra Wide Band)

Nqy "Rqy gt'CUKE"vtcpuokvgt'hqt"WY D/KT "tcf kq'eqo o wpkecvkqp'cpf 'r qukkqpkpi "'488"

Ej 0'Tqdgtv.'R0'Vqo ².'T0O gt| .'E0Dqwvgup.'C0Dncwgt'cpf 'R0'C0Hctkpg'

WY D"Ugs wgpvkcn'O qpvg'Ectnq'Rqukkqpkpi "wukpi "Xktwcn'Cpej qtu"495"

Rcwn'O gkuupgt.'Vj qo cu'I ki n'cpf "Mncwu'Y ktkucri'

Cp'ceewtcvg'WY D'tcf ct'ko ci kpi "o gyj qf "wukpi "kpf qqt"o wnkr cyj "gej qgu'hqt'cti gu'kp'uj cf qy "tgi kqpu"4: 5"

Uj wj gk'Hwkkc."Vcmw{c'Ucmco qvq."Vqtw'Ucq'

Cp'Ko r wng'Tcf kq'WY D'Vtcpuegkxgt'y kj "J ki j /Rtgekukqp'VQC'O gcuwtgo gpv'Wpkv'"4; 2"

I wpvgt'Hkuej gt.'Qngmuk{'Mn{o gpmq.'F gp{u'O ctv'pgpmq.'cpf 'J ko '"Nwgf ki gt'

Gzr gtko gpvcn'Xcnkf cvkqp'qh'c'VQC'WY D'Tcpi kpi "Rncvhqto "y kj "vj g'Gpgti {'F gvgevkqp'Tgegkxgt""4: ;

O kej cn'O 0'Rkgvt| {m'Vj qo cu'xqp'f gt'I tÄp'

WY D'Rqukkqpkpi "Wukpi "Mpqy p'Kpf qqt"Hgcvwtgu'ó'Gpxktqpo gpv'Eqo r ctkuqp"528"

Lcp'Mkewkpumk'\ crgunk'Vcmc{c'[co c| cvq'

Wnvtc/Y kf gdcpf "U{uvgo '/Ngxgn'Uko wncvqt'hqt'Rqukkqpkpi "cpf "Vtcemkpi "'³W/URQV+"537"

Vj qo cu'I ki n'Rcwn'O gkuupgt.'Lqugh'Rtgkuj wdgt/Rhnwi n'cpf "Mncwu'Y ktkucri'

Kpf qqt'P cxki cvkqp'Tgugctej "y kj "vj g'Mj gr gtc'KKKO qdkng'Tqdqv²'Cp'Gzr gtko gpvcn'Dcugnkpg'y kj "c'Ecug/uwf {'qp'Wnvtc/y kf gdcpf "Rqukkqpkpi "'546"

Co cpf c'Rtqtqm'Cf tkcp'Cthktg.'Crgzcpf gt'Dcj t.'Lqj p'T0'hctugtqvu.'cpf 'Cej gtkq'O ctkpqmt'

Gzr gtko gpvcrl'F go qpuvcvkqp"qh'Ugrh/Nqecnk| gf "Wntc"Y kf gdcpf "Kf qf qqt'O qdkng'TqdqvlP cxki cvkqp"U{ uvgo '"555"
O ctegrq"Ugi wtc."J quugkp"J cuj go k'Etkurkcp'Ukuvgtpc'cpf "Xkegpvg'O w"
Gxcnwcvkqp"qh'tgs wktgo gpu"hqt"WY D"nqecnkucvkqp"u{ uvgo u"kp"j qo e/gpvgtvckpo gpv"cr r nkecvkqpu"564"
T0'\ gvkm"I 0'Uj gp"cpf "T0'Vj qo ®'
WY D/dcugf "Nqecn'Rqukkqpkpi "U{ uvgo <htqo "c"uo cl/uecng"Gzr gtko gpvcrl'Rncvhqto "q"c"ncti e/uecng"F gr nq{ cdng"U{ uvgo '"572"
R0'Vqo ².'E0'Tqdgtv."T0'O gt| ."E0'Dqwgtqp."C0'Dncwgt"cpf "R0'C0'Hctkpg'"
Qp"dgpghku"cpf "ej cmgpi gu"qh'r gtuqp"nqecnk| cvkqp"wukpi "wntc/y kf gdcpf "ugpuqtu"582"
T0'J gtto cpp."L0'Ucej u."H0'Dqpkx| "
Ceewtce{ 'Eqpukf gtcvkqpu"qh'WY D"Nqecnk| cvkqp"U{ uvgo u"F gf kecvgf "hqt"Ncti e/Uecng"Cr r nkecvkqpu"589"
Nwncu| "\ y ktgmq."O cnigt| cvc'Lcpuqp."Ej tkuvkcp'Cuej gt."Witkej "Uej y gukpi gt."I gtv'H0'Vtro o gt"cpf "Vj qo cu'\ y kem'
Kpf qqt'Wntc/Y kf gdcpf "Nqecvkqp'Hkpi gtr tkpvkpi "'594"
J ctcnf "Mt¾m"Ej tkuvqr j "Uvgkpgt"
O wnkngxgn'Eqo r ngo gpvct{ 'Ugwu'qh'Ugs wgpegu'cpf "vj gkt'cr r nkecvkqp'kp"WY D"'599"
Gptkswg'I cte¶c."Lwcp'LguÀu'I cte¶c."LguÀu'Wtgº c.'O 0'Ecrto gp'R²tg| ."F cpkgn'Twk|

Industrial Metrology & Geodetic Systems, iGPS (Nikon)

Rgthqto cpeg'Gxcnwcvkqp"qh'kI RU'hqt"Kpf wuvtkcnl'Cr r nkecvkqpu'"5: 4"
TqdgrvlUej o kw.'Uwwucppg'P kuej ."Crgzcpf gr'Uej ¾pdgti ."Htcpem{ 'F go ggruvg.'Uvgxgp'Tgpf gtu'"
Kpf qqt'pcxki cvkqp"qh'o cej kpgu"cpf "o gcuwtkpi "f gxkegu'y kj "kI RU"'5; 2"
Lwkkc'Uej y gpf go cpp."Vkno cp'O Ãmngt."TqdgrvlMcwuuej pgkf gr"
Rcvj "Vtcemkpi "y kj "kI RU"'5; : "
Encwf kc'F gr gpvj crl'
Nqecvc<'C'pgy 'j ki j "ceewtce{ 'kpf qqt'r qukkqpkpi "u{ uvgo '"626"
Ej tku'Tk| qu.'I gyj kp"Tqdgrvu.'Lqgr'Dctpgu"cpf "P wp| kq'I co dcrg"
Rqukkqpkpi "cpf "U{ pej tqpk| cvkqp"qh'Kpf wuvtkcnl'Tqdqvu"633"
Ej tkurqr j "J gtto cpp.'O ctkc'J gppgu"
Vj g'Wug'qh'Mcmo cp'Hkmgtkpi "kp"Eqo dkpcvkqp'Y kj "cp'Grgevtqpke'Vcej gqo gvgt"'638"
Ugplc'I co ug.'Vj qo cu'C0'Y wpf gtnkej ."Rgvgt'Y cuo gkgt.'F w-cp'Mqi ql"

Radar Systems

Rqy gt'Ngxgn'Uwtxgkmcpeg'hqt'cp'HO EY /dcugf "Nqecnl'Rqukkqpkpi "U{ uvgo ""647
Tgko ct'Rhgkn'O ctmwu'Rkej ngt.'Rj knkr r "Uej gt| ."Cpf tgcu'Uvgn gt."I Ãpvgr'Uvgrj co o gr"

Mapping, SLAM

Uko wncpgqwu'O qdkng'TqdqvlcpflTcf kq'P qf e'Nqecnk| cvkqp'kp'Y ktgnguu'Ugpuqr'P gvy qtmu"657"
Lwgti gp'I tcghgpuvgkp."Co qu'Cndgrv.'Rgvgr'Dkdgr.'Cpf tgcu'Uej knkpi "
O qf grkpi "cpf "Uko wrcvkpi "Cuukuvkxg'Gpxktqpo gpu'kp'5/F "y kj "vj g'[CO CO QVQ"Vqqmkv'"663"
Ej tkurqr j "Uvcj nl'Vko "Ej y ctv'"
Cwqo cvgf "Nqecnk| cvkqp"qh'c'Ncugr'Uecppgt'kp'Kpf qqt'Gpxktqpo gpu'Wukpi "Rncpct'Qdlgevu"669"
Mqwtquj "Mj qui grj co "
WY D"UNCO "y kj "Tcq/Dncemy gm| gf 'O qpvg'Ectnq'F cvc'Cuuqekcvkqp'"676"
Vqdkcu'F gkÉngr.'134p'Vj kengnge"
F gxgrqr kpi "cp"Kpvgi tcvgf "Uqhy ctg'Gpxktqpo gpv'hqt'O qdkng'TqdqvlP cxki cvkqp'cpf 'Eqpvtqn'"67; "
\ qnª p'Vw| c.'Lª pqu'Twf cp.'I ªdqt'U{ gf grnª p{ k'

High Sensitive GNSS

F KP I RQU²'J ki j "Ugpukvkxkv{ 'I P UU'r ncvhqto "hqr'f ggr "kpf qqt'uegpctkqu'"687"
J gtdgrvlP kgf gto gkgt.'Dgrpf 'Gkuuhgmgr.'Lqp'Y kpmgn'Vj qo cu'Rcp{ .'Dgrpj ctf 'Tkgf nl'Vj qo cu'Y ¾| ."TqdgrvlUej y kgrv.'Uvghcpq'
Nci tcrcvc.'I wuvcvq'Nqr g| /Tkuwgpq.'F cxkf 'Lko kpg| /Dcpcu'
F ggr n{ 'Kpvgi tcvgf 'I RU'hqr'Kpf qqt'P cxki cvkqp"697"
Cpf rg{ 'Uqnqxkgv.'V0'Lghhtg{ 'F kemo cp'

F qr r ngt"Tcvg"O gcuwtgo gpvu"kp"Uvcpfctf "cpf "J ki j "Ugpukkxkv{"I RU"Tgegkxgtu<"Vj gqtgvkecn"Cpcn{uku"cpf "Eqo r ctkuqp'"6: 6"
P cf g| f c"Uqmqmqxc."F cpkgng"Dqtkq."D¾4lg"Hqtuugm'I ²tctf "Ncej cr gmg"
Qp"vj g"uvcvg/qh/vj g/ctv"qh"I PUU"uki pcn'ces wkukukqp"õ"c"eqo r ctkuqp"qh"ko g"cpf "htgs wgpe{"fqo ckp"o gyj qfu"6; 5"
Vj qo cu"Rcp{."Gemctv"I ¾j ngt."O ctmwu"Kuki ngt"cpf "L»p"Y kpmgn'
I cringq"'I RU"Kpfqqt"P cxki cvkqp"("Rqukkqpkpi "hqt"UCT"cpf "Vtcemkpi "Cr r nkecvkqpu'"723"
Gty kp"N¾j pgtv."Y qrhi cpi "D®."Gemctv'I ¾j ngt."Lqej gp"O ¾ro gt"
Eqo r qukvg"I PUU'Uki pcn'Ces wkukukqp"kp"Rtgugpeg"qh"Fcvc"Uki p"Vtcpukkqp'"729"
Mgy gp"Uwp"
Gxcnwcvkqp"qh"c"Rggt/vq/Rggt"Mcro cp'Hknvgt"kp"Y gcm/Uki pcn'Ctgcu"wukpi "c"Uqhwy ctg'I PUU/Uki pcn'Uko wncvqt""738"
Kucdgmg"Mtcro gt."Kkc"Dctwwpmqxc."Dgtpf "Gkuufgmgt"
Rwtug"uj cr kpi "kpxguvki cvkqp"hqt"vj g"cr r nkecdknk{"qh"hwwtg"I PUU"uki pcnu"kp"kpfqqt"gpxktqpo gpvu"747"
F cpckl"Uqwuqpgvqw."Grgpc"Uko qpc"Nqj cp"
Kpfqqt"r qukkqpkpi "wukpi "nqy "equv"I PUU"tgegkxgtu<"vguvu"cpf "uvcvkukecn'cpcn{ugu'"754"
O cteq"Rktcu."Cndgtvq"Ekpc

GNSS Indoor, Pseudolites

C"pgy "P cxki cvkqp"U{uvgo "hqt"Kpfqqt"Rqukkqpkpi "*Kpf Nkwg+'"75; "
Cpftgcu"Uej o k|/Rgkhfgt."Cpftg"P wemgnv'O ckm'O kffgpfqth."O kej cgn'Dwtc| cpku"
Kpfqqt"O wnkr cj "O kki cvkqp'"768"
Mquvcu"Ftci pcu"
Kpfqqt"Rqukkqpkpi "Wukpi "I RU'tcpuo kvgtu<"Gzr gtko gpvcn'tguwnu'"775"
Cpec"Hwtgtcuw."Cngzcpftg"Xgtxkuej /Rkeqku."P gn'Uco co c."I kcpecenc"Dqkgtq."I kqti kq"I kj kpao q."Rkgtq"Nqxkuqnq"
4F "Kpfqqt"r qukkqpkpi "u{uvgo "wukpi "I RU'uki pcn'"784"
Mgtgo "Q| uq{."Cj j cp'Dq| mwtv'cpf "Kkdtcj ko "Vgmkp

Innovative Systems

Y ktgnguu"Ceqwuvke"Vtcemkpi "hqt"Gzvgpfgf "Tcpi g"Vgngr tgugpeg'"78: "
Hgtfkpcpf "Rcnk"Hgfgtkml'Dgwwrgt."cpf "Wy g"F 0J cpgdgem'
Ugrh/Nqecnk| cvkqp"Cr r nkecvkqp"hqt"KRj qpg"wukpi "qpn{ "Co dkgpv'Uqwpf "Uki pcnu'"799"
Vj qo cu"Lcpuqp."Ej tkukcp"Uej kpfgrj cwgt."cpf "Lqj cppgu"Y gpfgdgti "
C"P qxgr'Vgej pks wg"hqt"O qdkng"Rj qpg"Nqecnk| cvkqp"hqt"Ugctej "cpf "Tguewg"Cr r nkecvkqpu'"7: 9"
Ughcp'\ qtp."Tkej ctf "Tqug."Crgzcpfgt'I ¾| ."Tqdgtv'Y gki gn'
Cf xcpegu"kp"Vj gtoo cr'Kphtctgf "Nqecnk| cvkqp<"Ej cengpi gu"cpf "Uqnwkqpu'"7; 3"
F cpkgr'J cwej knf v'cpf "P keqrcn'Mkej j qh'
Kpfqqt"KT "C| ko wwj "Ugpuqt"wukpi "c'Nkpgct'Rqrctk| gt'"7; ; "
Mgkc"Cuuwo k'cpf "O cpcdw'Ucpq"

Localization, Algorithms for WSN

C"eqo r ctkuqp"qh"O F U'O CR"cpf "pqp/nkpgct'tgi tguukqp'"826"
Ectr'Gmku."O kng"J c| cu"
Eqqr gtcvkxg'Kpfqqt"Rqukkqp"Nqecvkqp"wukpi "vj g"Rctcrng'Rtqlgevkqp"O gyj qf'"832"
T0O kej cgn'Dwej tgt."Dgpvqp"Vj qo r uqp."cpf "Vcq"Lkc"
J {dtkf "TUU/TVV"Nqecnk| cvkqp"Uej go g"hqt"Y ktgnguu'P gwy qtmu'"842"
Crhqpuq"Dcj knq."Cpvci q"q"c| wgcu."Lcxkgt"Rtkgvq."Rcvtkekc"Hgtpªpf g| ."Twd²p"O 0O qtqp| q"cpf "Gxctkuvq"L0Cdtkr'
Nqecnk| cvkqp"Ugtxkegu"kp"J {dtkf "Ugrh/qti cpk| kpi "P gwy qtmu'"849"
Cppc"O ctkc"Xgi pk"O cteq"Ectrk'Crguucpftq"P gtk'
Qp"F kuvcpeg"Guvko cvkqp"dcugf "qp"Tcfkq"Rtqr ci cvkqp"O qf gnu'cpf "Qwwkgt"F gvgevkqp"hqt"Kpfqqt"Nqecnk| cvkqp"kp"Y ktgnguu"I gqugpuqt"P gwy qtmu'"856"
Crgzcpfgt'Dqtp."O ctkq."Uej y gdg'cpf "Tcrh'Dkmr'
Vj gqtgvkecn'Cpcn{uku'cpf "Xcrkfcvgf "Gzr gtko gpvu"qh"vj g"Nqecnk| cvkqp"d{ "Uwr gtr qukpi "Dgcvu'"862"
O cwj kcu"Uej pgkfgt."Tcrh'Ucro qp"
Ko r cev'qh"Nqecvkqp"Gttqtu"qp"I gqi tcr j ke"Tqwkpi "kp"Tgcnkukke"Y UP u'"869"
Dq"Rgpi "cpf "Cpftgy "J 0Mgo r "

J{dtkf"cevkxg"cpf"rcuukxg"nqecnk|cvkqp"hqt"uoctl\cti gwu'"876"
Nwec"Tgi i kcpk"Tqdgtvq"O qtej gwk"
Nkpgct"Cpvgppc"Cttc{."Tcpi kpi "cpf"Ceegngtcvkqp gvgt"hqt"5F"I RU/Nguu"Nqecnk|cvkqp"qh"Y ktgnguu"Ugpuqtu'"87; "
Rcvt{m'O c|wtmkgy ke| ."Cyj cpcukqu'I ngnkcu."cpf "Mkp'M0'Ngwpi

Frameworks for Hybrid Positioning

Vtcemkpi "Htco gy qtm'hqt"J gvgtqi gpgqwu'Ugpuqt'Uqwtegu"886"
O ctgkmg'Mtkv| ngt."Cpvqpkq'MtÃi gt"
Kpfqqt'P cxki cvkqp'Kpvgi tcvkqp'Rncvhqtm "hqt'Hktghki j vkpi "Rwtr qugu"896"
Wÿ g'TÃr r gn'Mck'O ctewu'UvÃddg."cpf "Wÿ g'\ y kpi gt"
C'Nqecnk|cvkqp'Htco gy qtm'hqt'Y ktgnguu'O guj 'P gvy qtmu'ó'Cpch qt/Htgg'F kuvtkdwvkqp'Nqecnk|cvkqp'kp'vj g'FGU/Vguvdgf'"8: 2"
Dcuvkcp'Dn{y ku.'O guuw'I Ãpg .'Hgnkz'Lwtcuej gm'Ughhgn'I rkgej

Applications of Location Awareness

EEF "Eco gtc"cpf "KI RU"Vtcemkpi "qh'I gqr j{ulecn'Ugpuqtu'hqt"Xkuwcnk|cvkqp"qh'Dwtkgf "Gzr nqukxg'F gxkegu"8; 2"
O qvq{wnk'Ucvq."Cj o gf "I cdgt."[w{c'[qmqvc."O ctm'I tuo wgem"cpf "Rkgtr cqrq'O ctej gukpk"
C "Tgcnk\ kpi "qh'cp'Go gti gpe{'Ecrn'U{uvgo "qp'c'Tgcn\vkm g'Nqecvkqp'Cr r nkecvkqp'Rncvhqtm '"8; 6"
Y qrhi cpi "Tqd.'O cphtgf 'I tkguugt.'Cpftgcu'I gtgmg

Passive RFID

Ceewtcvg"Kpfqqt'Rqukvkqp'Guvko cvkqp'd{ "vj g"Uy khv/Eqo o wpkecvkqp'Tcpi g'Tgeqi pkvkqp"*U/ETT+'O gyj qf "kp'Rcuukxg"
THKF "u{uvgo u'"8; ; "
P qtkg'Wej kqm k'Cuuwmk'Kpcfc .'O cpcvq'Hwiko qvq .'Vqo qvcm'Y cfc .'Mqwlej k'O wuwwtc .'J ktqo k'Qmcfc"
Eqpetgvg"Go dgff gf "THKF "hqt"Y c{/Rqkpv'Rqukvkqpkpi "928"
F qppcej c'F cn{.'Vj qo cu'O gnkc'cpf 'I gtctf 'Dcnfy kp"

Active & General RFID

Ko r tqxkpi "THKF /Dcugf "Kpfqqt'Rqukvkqpkpi 'Ceewtce{'Wukpi 'I cwuukcp'Rtqeguugu"938"
Hgtpcpfq'Ugeq.'Ej tkuvkcp'Rrci go cpp.'Cpvqpkq'T0'Lko ²pg| ."Y qrhtco "Dwti ctf "

Context Detection & Awareness

Cp'Gpgti {/Cy ctg'Kpfqqt'Rqukvkqpkpi "U{uvgo "hqt'CCN'Gpxktqpo gpvu'"946"
Htcpm'Mÿj rgt."O ctewu'Vj quu.'Cngzcpfgt'Ctkpi "
Ukwcvkqp/Cy ctg'Kpfqqt'Vtcemkpi "y kj 'J ki j /F gpukv{.'Nctig/Ucerg'Y ktgnguu'Ugpuqt'P gvy qtmu"953"
F cxkf g'O gtkeq."Tqdgtvq'Dkukcpk'Cnguucpftc'O kngq"
Kpfqqt'P cxki cvkqp'Cr r tqcej "Dcugf "qp'Cr r tqzko cvg'Rqukvkqpu""95:
Qt{'Ej qy cy /Nkgdo cp."Wac'Ej kuropr j ."Mctn'J gkp| "Mtgo r gnu.'Ej kuropr j "Vgty gn "
P cxki cvkqp'Dcugf "qp'U{o dqnke'Urceg'O qfgn'"967"
Mctqrkpc'Dctcu.'Cftkcpq'O ctgkc.'Hkrkr g'O gpguku"
Kpfqqt'Nqecvkqp'Ugtxkegu'cpf 'Eqpvgzv/ugpukkkxg'Cr r nkecvkqpu'kp'Y ktgnguu'P gvy qtmu'"972"
T»dgtv'Uej wre| ."I ªdqt'Xcti c.'cpf 'Nª u| n»'V»yj "
I gqmqecvkqp'Ugtxgt'ó'Eqqtfkpcvgu'dgeqo g'eqpvgzv/cy ctg"982"
Vj qtg'Hgej pgt.'O ctgkmg'Mtkv| ngt.'Cpvqpkq'MtÃi gt"

User Requirements

Wugt'Tgswktgo gpvu'hqt'Nqecnk|cvkqp'cpf "Vtcemkpi "Vgej pqnqi {<'C'Uwtxg{'qh'O kuukqp/ur gekhke'P ggfu'cpf 'Eqpuvtckpu'"989"
Lqwpk'Tcpvcmqmmq."Rgvgt'J ®pfgl'O kej cgn'Htgfj qo ".'cpf 'H0'O ctuvgp/Gmn²h'

O cuu/o ctmgv'tgs wktgo gpwu'hqt''kpf qqt''r qukvkqpkpi "cpf "pcxki cvkqp"''998''
Ncwtk''Y ktqm."Vqo o k'Nckpg''cpf "Lctk'U{ tl@kppg''
Tgs wktgo gpwu'hqt''r qukvkqpkpi "cpf "pcxki cvkqp'kp''wpf gti rqwpf "eqpuvtwevkqpu'''9: 5''
Qnkxgt''Uej pgkf gt

Magnetic Localization

Rqukvkqp''Guvko cvkqp''Wukpi "Ctvkhkekcn'I gpgtcvgf "O ci pgvke''Hkgnf u''9: 9''
I¾i "Dncpmgpdcej ."'Cdf gm qwo gp'P qttf kpg

Hybrid IMU Pedestrian Navigation 1

C''O qf wrct''cpf "O qdkng''U{ uvgo "hqt''Kpf qqt''Nqecnk cvkqp''9; 4''
Ncuug''Mrkkpi dgkn'O kej ckncu''Tqo cpqxuc. ''Rctvkem'Uej pgkf gt. ''O ctvkp''Vtcegej vgt.''{ kcppqu'O cpqrk''
Ugrh/Eqpvckpgf "Kpf qqt''Rqukvkqpkpi "qp'qhh/yj e/uj grh'o qdkng''F gxkegu'': 24''
F qo kpkm'I wugpdcwgt. 'Ectuvgp''Kguvt''cpf "Lgpu'Mt¾uej g''
Rgf guvtkcp''Uo ctr j qpg/Dcugf "Kpf qqt''P cxki cvkqp''Wukpi "Wntc''Rqtvcdrg''Ugpuqt{ 'Gs wkrm gpv''33''
Ej tkvkcp'Nwnkcpvq. ''Ej tkvkcp'J ¾ppki gt. 'J ctcrf "Ugtrdgrgt ''
C''nqy ''equv'pcxki cvkqp'wpkv'hqt''r qukvkqp'qh'r gtuqppgn'chvgt''nquu'qh'I RU'r qukvkqp'''': 38''
Mko ''O cvj kcuug. ''Nglh'J cpuugp. ''Qf f xctr'J cmki uvcf ''
C''I RU'KP U/dcugf 'Ctej kgevurg'hqt''Tguewc''Vcvo ''o qpkqtkpi ''''': 48''
Crdgtvq''Etqek''O cwkc'F g'Ci qutkpq. ''Co dtqi kq''O cpj kpq''
J {dtkf''r qukvkqpkpi ''u{ uvgo ''eqo dkpkpi ''cpi ng/dcugf ''nqecnk cvkqp.''r gf guvtkcp''f gcf ''tgemqpkpi .''cpf ''o cr /hknvgtkpi ''''55''
Rcwn'Mgo r r k''Lwwuq''Rclwpgp. ''Xkng''Tcpnk ''Hcdkq ''Dgmqpk ''Vgtj k'Tcwkkckpgp''
Kpf qqt''Nqecnk cvkqp''cpf ''Xkuwcnk cvkqp''Wukpi "c''I wo cp/Qr gtcvgf "Dcemr cem'U{ uvgo ''''62''
Vko qyj {'Nkw.'O cwj gy ''Ectndtgi k .''I gqti g''Ej gp.''Lcem{ 'Ej gp.''Lqj p'Mwc.''Cxkf gj \ cnj qt''
Ko r tqxgf "Xgj keng''Rqukvkqpkpi "hqt''Kpf qqt''P cxki cvkqp'kp''Rctmkpi "I ctci gu''Vj tqwi j 'Eqo o gtekcn{'Cxckncdrg''O cr u''''72''
Lqj cppgu''Y ci pgt. ''Ectuvgp''Kguvt. ''Ctpg ''Rwtuej y ky{ .''Ctpqrf "Mkuvpgt''
UgvWr ''qh''c''Eqo dkpgf "Kpf qqt''cpf ''Qwf qqt''Rqukvkqpkpi "Uqnwvkqp''cpf "Gzr gtko gpvcn'Tguwnvu''7: ''
Nctu'Lqj cppgu. ''Lqpcu'F gi gpgt. ''Y qrhi cpi "P kgo gkgt''

Hybrid IMU Pedestrian Navigation 2

Cp'Cr r tqcej "q''Kphtcuvwewtg/Kpf gr gpf gpv''Rgtuqp''Nqecnk cvkqp''y kj "cp''KGGG'': 2403706''Y UP '''': 86''
Lqj cppgu''Uej o kf ."O ctmwu'X¾mgt."Vqdkcu''I @f gmg."Rcuecn'Y gdgt."Y kj gm ''Uvqtm''Mrcwu''F 0O ñmgt/I ncugt''
TUUKdcugf "Kpf qqt''Rqukvkqpkpi "wukpi "F kxgtukv{ 'cpf "Kpgtvkcn'P cxki cvkqp''''95''
Cpf tgcu''Hkpm.'J gro wv''Dgkmkrej .''O cwj kcu''XqË.''Ej tkvkcp''Uej t¾f gt''
Ecnkdtcvkqp''qh''vj g''Ceegngtqo gvgt''Vtkcf ''qh'cp''Kpgtvkcn'O gcuvo gpv''Wpkv.''O czko wo ''Nkmgnkj qqf "Guvko cvkqp''cpf ''
Etco ²t/Tcq 'Dqwpf '''': : 2''
I 0'Rcpcj cpf gj ."'KO'Urqi .''O 0'Lcpuqp''
Lqkpv'ecnkdtcvkqp''qh'cp''kpgtvkcn'o gcuvtgo gpv''wpkv'cpf "eqqtf kpcvg''tcpuhqto cvkqp'r ctco gvgtu''wukpi "c'o qpqewnct''eco gtc'''': : 8''
F cxg'\ cej ctkcj ''cpf "O ci pwu'Lcpuqp''

Foot Mounted Pedestrian Navigation

C''J ki j "Rtgekukqp''Tghgtgpeg''F cvc''Ugv'hqt''Rgf guvtkcp''P cxki cvkqp''wukpi "Hqqv∨O qwpvgf "Kpgtvkcn'Ugpuqtu'''; ; 5''
O kej cgn'Cpi gto cpp. ''Rctvkem'Tqdgtvuqp. ''Vj qo cu''Mgo r vgt. ''O qj co o gf "Mj kf gt''
Gxcnwcvkqp''qh''\ tq∨Xgnqekv{ 'F gvgevqtu'hqt''Hqq∨O qwpvgf "Kpgtvkcn'P cxki cvkqp'U{ uvgo u'''': ; ;
Kccce''Umqi ."'Lqj p'Qmqh'P knuuqp. ''cpf "Rgvgt''J @pf gn''
Eqo r ctkqp''cpf "Gxcnwcvkqp''qh''Ceegngtcvkqp''Dcugf "Uvgr "Ngpi vj "Guvko cvqtu'hqt''J cpf j gnf "F gxkegu''; 27''
Lcur gt''Lcj p. ''Lqej gp''Ugk{ .''Nweknc'Rcvkpq/Uwf gpmc.''Wrtkej "Dc\ gt.''Lcxkgt''I wk²ttg\ 'Dqtqpcv''
Cp''ko r tqxgf "uj qg/o qwpvgf "kpgtvkcn'pcxki cvkqp'u{ uvgo '''; 33''
P cf kt''Ecuvcpgf c. ''U{ rxkg''Nco {'/Rgtdcn''
Eqpvgzv∨Cf cr vkxg''Cni qtkyj o u''q''Ko r tqxg''Kpf qqt''Rqukvkqpkpi "y kj "Kpgtvkcn'Ugpuqtu'''39''
Wtkej "Y cr f gt. ''Vj qo cu''Dgtpqwnk''

Fwcn"KOW"Kofqqt"Pcxkicvkqp"ykj "Rctvleng"Hknvgt"dcugf "Ocr/Ocvejkpi "qp"c"Uoctrjqpg"; 45"
E0Cuejgt."E0Mguunrgt."O0Y cpmgtn"I 0H0Vtqo o gt"

Rgthqto cpeg"ej ctcevgtkucvkqp"qh'hqqvo qwpvgf "\ WRV/ckfgf "KP Uu'cpf "qyjgt"tgncvgf "u{uvgo u"; 4: "
Lqj p/Qrqh'P knuuqp."Kucce"Umqi ."cpf "Rgvgt"J @pfgn'

Rgfguvtkcp"Kofqqt"Pcxkicvkqp"d{"ckffkpi "c"Hqqvo qwpvgf "KOWy kj "THKF "Uki pcn'Uvtgpi vj "O gcuwtgo gpvu"; 57"
Cpvqpkq"T0Lko ²pg| "Twk| ."Hgtpcpfq"Ugeq"I tcplc."L0Ectnqu"Rtkgvq"J qpqtcvq"cpf "Lqti g"KOI wgxctc"Tqucu

"""C"O qfgn'Dcugf "Crr tqcej "hqt"Y NCP "Nqecnk{cvkqp"kp"Kofqqt"Rctmkpi "Ctgcu"; 64"
"""R0Cff guuq."N0Dtwpq."T0I ctwhk'O 0Nqpi q."T0Tguvkpq."C0Tqdwvgmk'
"""Cp"Kofqqt"Nqecvkqp/Dcugf "Ugtxkeg"Wukpi "Ceeguu'Rqkpvu'cu'Uki pcn'Uvtgpi vj "Fcvc"Eqmgevqtu"; 74
"""MH0Mcq."KG0Nkcq."L0U0N{w'