





Applied Sciences Building 986J  
Simon Fraser University  
8888 University Drive  
Burnaby, BC, Canada V5A 1J6

! °, ĺ' i

+ \[ QR\_3bY. ( UN[ X f \ b. ( UN[ X f \ b ` \ Z bPU S\_ W[ V[ T b ` . ° [ Q' UNF YR[ R, d \ bYQ f \ b YXR a\ T \ [ Rea?

' fl ° - ži " i ~ i ž #, ž - ž &) fili &

fIVZ f [ NZ RV ' UNF YR[ R ~ Rž \ PX-ž \_ bTR\_ . ĺNZ N x Ú f RN\_ \ YQRYRPa\_VPNYR[ TV[ RR\_Pb\_\_R[ aif ] \_NP aPV[ T V[

\* N[ P \ bcR\_ . ĺd \ \_X S\_ NY&



Applied Sciences Building 986J  
Simon Fraser University  
8888 University Drive  
Burnaby, BC, Canada V5A 1J6

] \_\VRPaV\_ [ [ QVTR[ \b` \_R` R\_cR` PU\\Yd UR\_RaJRR[ aVR` PU\\YO\_Rd Z RN` PVR[ aV aN[ Qd R'cR] baVb  
a\TRaUR\_ d R'cRQRcRY] RQ Pb\_\_VpYn\_d VdU aUR aRNPUR` N[ QaUR] \_V\_ PM NY. ' \, V\_ QVcR` Rd NF` Z f  
\_R` RN\_PU, t\_a\_VRQa\ Q\_V T ONPX V\_ a\ aUR PMN` \_\Z ORPNb` R V\_ PR\_aNM\_ P[ aRea` d RQ\['aUNcRaUR  
\_VPU[ R` a\ U\ R V\_ \[ d UR[ d R` RaRNPUM\_ T, R` ] RPMNYf aRNPUR\_PN[ QVONaR` d U\ UNQ\_NPR\_aNM\_ Z V\_ Q Ra  
° [ QVd` Nd NF` PUNYR[ TV\_ T ORPNb` R NSaR\_ t\_NYbQR a\ aURZ aUNaVsf\b Q\ N` RN\_PU\ S[ QVTR[ \b` \\_  
° O\ \_TV\_ NYV\_ aUR Pb\_\_VpYbZ , Vd\ PPb\_` `Ve aZ R` V\_ \b\_ Pb\_\_VpYbZ , # [ aN\_V` Pb\_\_VpYbZ , `Ve aZ R` V%o



~ | ' & i |  
- RNU. & i` \_RMYf P\ \Y.

' fl° - ži " |  
( UNaQ\ R` \ `b[ Q` \ V[ aR\_ R' a[ T.

! ° , & " |  
\* R\_f ReP\ a[ T` abSS & UN\ ` UNFYR[ R, Q\ f\ b UNcR N[ f aJ V[ T a\ NQQ a\ aJ Na?

& fl°  
+ UNa& d \ bYQ YXR a\ ` RR, V[ aJ R ] \ \_ T\_ NZ aJ Na& Z V[ , d R UNcR Z N[ QNa\ \_ f P\ b\_ ` R` aJ Na\ b\_ ° O\ \_ TV[ NY  
` PU\ \ N[ ` aRNP U \ [ , d UNa& Q YXR a\ ` RR Z \ \_ R \ S & Q YXR a\ ` RR aJ Na d \ \_ X V[ aR T\_ NaR Q d V aJ aJ R \ aJ R\_  
QV P[ Y[ R' . / \ \_ ReNZ ] YR, & aRNP U' ( | ! , Oba& aRNP U & [ QV R[ \ b` ] R\_ ] RP a& R' V[ Z f P\ b\_ ` R, Oba& Q YXR a\  
` RR V a NY \ RZ ORCQR Q V[ \ aJ R\_ P\ b\_ ` R' . ' \ & aJ V[ X V S V i` , aJ R\_ R` \ ` Z R P\ [ a[ b V f , aJ R[ d UR[ Z f ` abQR[ a  
YR NcR Z f PYN` , & Q[ ' a\_ RMYf d N[ a aJ RZ ` a\ S\_ TRaNO\ ba V a

~ | ' & i |  
# [ R \ S aJ R aJ V[ T` aJ Na d R O\ UR\_ R Na) " , # V d R NP ab NYf Y \ X Na V[ QV R[ R V f N' Na aJ RZ R, N[ Q` \ aJ R f  
Q\ [ ' a UNcR N` ] RP V S P P\ b\_ ` R aJ Na V W` a \ [ & [ QV R[ \ b` V` b R' \ \_ & V[ QV R[ \ b` aJ RZ R' . & i` V[ ] YNPR V[  
RcR\_f \ [ R \ S \ b\_ P\ b\_ ` R' . & i` ORR[ \_ RMYf d RYY d \ cR[ aJ \_ b TU aJ R P b\_ \_ V P b Y b Z . ° [ Q R cR\_f ` V[ TYR P\ b\_ ` R  
` b ] \ \_ a' aJ RZ N[ QNaR \ S UNcV[ T N[ & [ QV R[ \ b` ] R\_ ] RP a& R, N[ Q\_ RMYf Y \ X` Na aJ R S \ a ] R \ YR '  
] \_ V[ P[ YR ` \ SYRN ] V[ T N[ Q U \ d aJ \ R aJ V[ T` PN[ OR ] R\_ \ [ NY g R Q N[ Q O \ b TU a a\ aJ R S \ RS \ [ a ' \ & Z  
\_ RMYf , & Z \_ RMYf V Z ] R` RO d V aJ U \ d aJ R ] R \ YR d U ] ba aJ R ] \ \_ T\_ NZ a\ TR aJ R\_ c V b NY g R aJ V , N[ Q  
aJ R f ` cR ORR[ O\_ V[ TV[ T V a\ aJ R S \ RS \ [ a

! ° , & " |  
° cR\_f V Z ] \ \_ a[ aJ V[ T aJ Na f \ b UNcR O \ b TU ab ] aJ R\_ R V , N[ Q S \ \_ b\_ ` RYcR' , d R Y V a` W` a V[ P\ \_ ] \ \_ Na V[ T  
aJ R P\ [ a[ b V f \ S V a N[ Q Z NX V[ T aJ Na N ] \ \_ V f aJ Na V[ QV R[ V g V[ T R Q b P Na V [ V ] N\_ a \ SR cR\_f P\ b\_ ` R & i`  
[ \ a W` a NP \ b\_ ` R \ [ V a \ d [ . & i` RMYf N ] ] YR ` a\ RcR\_f aJ V[ T.

& fl°  
- R' , & YXR aJ Na Z \ QRY, f \ b\_ Z \ QRY ^ b V a R NO V a OR a a R\_ , Oba aJ R[ aJ R\_ R` \ ` Z R PUNYR[ TR' f \ b R[ P\ b[ aR\_  
ORPN b` R \ S aJ V[ T` YXR NP NORZ V P S\_ RRO \ Z , N[ Q d UNa f \ b PN[ aRNP U V[ f \ b\_ P\ b\_ ` R \ \_ d UNa f \ b ` U \ b YQ  
aRNP U V[ f \ b\_ P\ b\_ ` R \ \_ d UNa f \ b PU \ \ R a\ aRNP U V[ f \ b\_ P\ b\_ ` R' . ' \ V a` \_ RMYf NPUNYR[ TR \ [ QV SR\_ R[ a  
YRcRY . ' \ f \ b Z Nf Q\ V a V[ f \ b\_ P\ b\_ ` R' . " ba V a` [ \ a[ RPR` ` N\_ V f aJ Na NP \ YRNT b R d WY d N[ a a\ Q\ V a V[  
aJ R V\_ P\ b\_ ` R.

~ | ' & i |  
" \ , V a` [ \ a[ RPR` ` N\_ V f aJ Na N[ \ aJ R\_ P\ YRNT b R d \ b YQ d N[ a a\ , Oba d R' cR\_ RMYf Z NOR V a NS\_ P b` N[ Q N  
T \ NY d UR[ d R Y \ X & &





Applied Sciences Building 986J  
Simon Fraser University  
8888 University Drive  
Burnaby, BC, Canada V5A 1J6

a



Applied Sciences Building 986  
Simon Fraser University  
8888 University Drive  
Burnaby, BC, Canada V5A 1J6

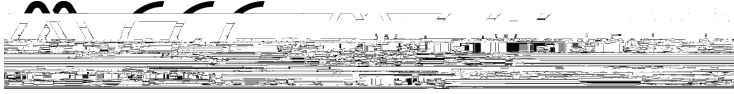
£ fl°  
i eNPaif.

! °, £" i

- V PibQR £[ QMTR[ \b` ] R\_ \[ ` N[ Q] R\_ \[ ` \SNcVVOYRZ V[ \\_Vaf V[ P\_RNaV[ T aUNaP\ [ aR[ a' \ W aT\ V[ T  
ONPX a\ d UNa' UNfYR[ R UNQZ R[ aX[ RO, V[ aR\_Z ` \SO\_VOTV[ T aJRTN] ORad RR[ £[ QMTR[ \b` d NF` \S  
X[ \d YROTRN[ Q+ R` aR\_ [ ` PVR[ PR, ` URZ R[ aX[ RO` b] ] \\_a[ T ] R\ ] YRd U\ Q\ UNcRaJRX[ \d YROTRa\  
P\Z RONPX N[ Q` UN\_R V\ d V\ U aJRV\_ P\Z Z b[ Vaf N[ QaJR[ NY \ ` b] ] \\_a[ T V[ Q\c\ObNY V[ \\_RObPNa\ ` V[  
O\_VOTV[ T aJRTN] ORad RR[ £[ QMTR[ \b` d NF` \SX[ \d V[ T N[ Q+ R` aR\_ [ ` PVR[ PR. ° \_R aJRV\_RN[ f Q a \[ RO] R













Applied Sciences Building 986  
Simon Fraser University  
8888 University Drive  
Burnaby, BC, Canada V5A 1J6

N[ QaUR`abOR[ a` a\ NPac\AR, `abOfV[ T aUNaR[ TNTR` aURZ V[ ORP\Z V[ T V[ aR\_R` aQN[ Q] R\_UN] ` , f\b  
X[\d, ] V`bV[ T aURV\_V[ aR\_R` aV[ aUV[ XV[ T NO\baaUR` ROVPV[ Y[ R` N[ QPN\_RR\_` Q\d [ aUR\_\NO ` \ Vád \\_X`  
d VU ad \ aUV[ T`, ad \ PNaX[ ` aUNaE`Q` Nf. ! NXV[ T `b\_RaUNaURT\NY` b`aN[ ` \ba\_RNPU] \_\T\_NZ ` N\_R  
NYT[ RQd VU Pb\_\_VPbYbZ [ bZ OR\_\[ R, N[ QPbYb\_NYP\ aRea[ bZ OR\_ad \.

' fl° - žI



Applied Sciences Building 986J  
Simon Fraser University  
8888 University Drive  
Burnaby, BC, Canada V5A 1J6

NOV 20 11 14 AM '11



! °, Ł" I

" \, [ \, ] YRN RT\ NURNQ

Ł fl°

' \ ěb` RQNCVOR\ N[ QĚUNQT\æR[ VădJ\\_bTU` \Z R\ăJR\_d \\_XăJNaĚcROV[ R. ěa` [ \ \X[ TR\\_NcMNYOR.  
ěa` PNYRO/V` a' PVR[ aV` a'. ěd WYS[ QNd NF a\ TRaVăa RcR\_f\ [ RNSR\\_b\\_` R` W[ , N[ Q\ [ RReNZ ] YRěb` R  
V,ăJR\_R` \SPăb\\_R,ăJR R[ TV RR\_V[ T \SaJR[ Rd , N[ QăJRQVSSR\_R[ a] \_V[ P] YR` V[ Y\XV[ T Na+ R` aR\_  
X[ \d YROTR N[ QU\ d a\ V[ P\\_] \\_NaR VăV[ ě[ QVTR[ \b` d NF` \SP\ [ ` a\_bPaV[ T,ăJR \ [ RaJNaĚ\_RNYf YXROăJNa  
ĚUNcRY\XRONa] \_\ONOyf ŐŪŐăZ R` , Vă` QR` VT[ V[ TăJR b[ X[ \d [ , Y\XV[ T NaăJR R[ TV RR\_V[ T ] \_V[ P] YR`  
ăJNaN\_RRZ OROORO V[ VY\ QR` VT[ N[ QY\XV[ T NaN[ RYQR\_ObVOV[ TăJR VY\ N[ QăJR[ UNcV[ T` abQR[ a` , ě  
UNcRNaVfăJNaĚUNcRZ f` abQR[ a` N[ QVă` W` a` aPX` N[ Qd NY , N[ QăJR[ăJRf UNcRa\ b` RaJR  
] \_V[ P] YR`ăJNaăJRf d Vă[ R` ROV[ăJR RYOR\_OR` VT[ V[ T N[ QObVOV[ T N[ VY\ . ° [ QăJRf UNcRa\ ObVO\ [ R,  
ObăăJR\_] RR` PN[ SăV[ăVă ( URf Q\ VăNY\cR\_ăJR S\ \\_V[ăJR PN` \\_ \Z , N[ QăJRf UNcRT\_RNaăZ R.  
" bad UR[ăJRf` a\ ] , N[ QăJRfăJN[ XNO\baVăăJR\_RV NZ RPUN[ VZ` dăJăJR N\_PUR` N[ QăJR[ ] Uf` VP  
ORUV[ QăJR N[ TYR` \SaJROYPX` \SVPR\\_U\ d Vă` ] R\_PURO . ° [ QăJR[ăJR` ] V\_NY,ăJRf`\_ROYd [ Nd NF Of,  
` \ăJRf PN[ UNcRNSNObYb` ReNZ ] YR \SĚ[ QVTR[ \b` X[ \d YROTR , a\_NOăV\ [ NYX[ \d YROTR, N[ Q+ R` aR\_  
X[ \d YROTR PăReVăV[ T, N[ QV[ S\\_Z V[ T RNPU \ăJR\_

' fl° - žI " I

~ RS[ VăRYf .

! °, Ł" I

~ R` V\_RR, f\ b d R\_R` aWYV[ăJR] \_\PR` \S` NFV[ T` \Z RaUV[ T, Q\ f\ b d N[ aă P\ [ aV[ bRf\ b\_ăJ\ bTUa?  
[žNbTU` ]

~ I' Ł&I I

+ RY, VăNPăbNYf O\_N[ PUR` \SS\_RNYf [ VPRYf dăJăJNa ěaVăJNaV[ ě[ QVTR[ \b` X[ \d YROTR,ăJNaV` U\ d [ V[  
QVSSR\_R[ ad NF` , \_VTUa? ° [ Q` \ d UR[ d RY\X NaU\ d ° O\ \_TV[ NY` PVR[ PR\_RNYf d \\_X` . + UNăd R`\_RăNYV[ T  
NO\baVăăJV V[ UR\_R[ ad NF \SX[ \d V[ T, N[ QU\ dăJNaV TVcR[ a\ăJR [ ReaTR[ R\_NăX[ N` NS\\_Z \S  
X[ \d YROTRăJ\\_bTU QVSSR\_R[ aZ RN[ ` N[ QZ RaU`O . ' \ Vsd R`\_R, Vsd Rd R\_RăVă aNXRb] Z \\_R\ SaJ` R  
XV[ Q` \SRe] R\_VR[ PR` V[ \b\_PN` \\_ \Z ` , ěăJN[ XăJNa` abQR[ a` \S` O\ \_TV[ NYOR` PR[ ad \bYO NPăbNYf OR  
NOYRăVăăJR[ăNXRăJR` Rb]ăJRZ` RYcR` V[ Nd NFăJNaăJRf` RRăJRZ` RYcR` ORPNb` RăVă ONPXăV`\_RSRPăX[  
N[ QP.VZ Z b[ Văf .

Ł fl°

( UR\_RN\_RT\ \QReNZ ] YR` \baăJR\_R ěZ [ \a` b\_RVsf\ b'\_RSNZ WNW\_dăJ\ \Yf` d \\_X, d UR\_R` URăNX`  
NO\baad RNXV[ TăJR ON` XRaN[ QăJRăZ RaJNa N[ QăJR NăVăN[ QăJR` ] VăbONYăRNPUR\_ăJNa` P\ [ [ RPăRO  
N[ Q\_RNOV[ T NO\baăJR` PVR[ PRORUV[ QăJNaăRPU[ V` bR . ° [ QăJR \ăJR` a\ \_YR` N\_LOf fiYR[ ° VXR[ URNO,  
d UR\_RV[ ` N` XNăPURd N[ , d UR\_RUR Y\XRONaVOR[ăSPNaV[ dăJăVă\ ONY\\_ \ă` d UR\_RăJRf b` RaJR PăYăb\_NY  
X[ \d YROTR \SZ N[ bSNPăb\_V[ T` [ \d` U` R` a\ O\_V[ T V[ P\\_` PăYăb\_NY[b V[ăRYWTVOR]ăRNPUV[ T N[ QOb\\_ V[ T  
N[ QY\XV[ T NaăJR QVSSR\_R[ PR` . ěSf\ b d R[ aă [ b[ V[ăRYWTVOR] , d UNăd \bYO UN[ ] R[ ? ( UR\_R` \\_Z R\_RNYf ,  
\_RNYf T\ \QReNZ ] YR` \baăJR\_R

! °, Ł" I





Applied Sciences Building 986J  
Simon Fraser University  
8888 University Drive  
Burnaby, BC, Canada, V5A 1J6

i cR\_f aU [ T P \ Z R ` d V \ U ] \_ N P a P R , \_ V T U a ? f i \ a a \ ` a N \_ a ` \ Z R d U R \_ R . + U N a N Q c V P R d \ b Y Q f \ b U N c R a \  
E [ Q M T R [ \ b ` ` a b O R [ a ` d U \ N \_ R d N [ a [ T a \ R [ a R \_ ' ( i ! ? \* [ Q U \ d d \ b Y Q f \ b N Q c V R R O b P N a \ \_ ` a \ O R a U R \_ R  
a \ ` b ] ] \ \_ a d U \ ` R ` a b O R [ a ?

~ i ' t & i i

t d \ b Y Q W ` a R [ P \ b \_ N T R a U R ` a b O R [ a ` a \ T \ d V \ U a U R V \_ ] N ` \ [ ` . \* [ Q Y X R E ` M Q , N a a U R O R T V [ [ V [ T , d U R [   
d R d R \_ R a N X V [ T a \ ' U N f , ` U R d N ` a N X V [ T N O \ b a \_ R ` W R [ P f , N [ Q U \ d Q \ f \ b Z N X R ` b \_ R a U N a f \ b N \_ R N O Y R  
a \ T R a a U R \_ R N [ Q a \ R [ P \ b \_ N T R a U R Z ` a \ \_ R N P U \ b a S \_ U R Y ] d U R [ a U R f [ R R O U R Y ] N [ Q Y \ X S \_ a U \ ` R  
] R \ ] Y R a U N a P N [ U R Y ] a U R Z ` a U \ b T U a U R W b \_ [ R a U