# Development of a Low—Cost Experimental Quadcopter Testbed Using an Arduino Controller for Video urveillance

A project present to The Faculty of the Department of Aerospace Engineering San Jose State University

in partial fulfillment of the requirements for the degree

By

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approved %y

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c 2015

Ankyd Ji

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# Development of Lo!"#o\$t E%pe&iment I '( dcopte& Te\$t)ed (\$in\* n A&d(ino cont&olle& fo& Video S(&veill nce

Ankyd Ji nd + m& n T(&ko\*I( <sup>y</sup> S n Jo\$e St te , nive&\$ity- S n Jo\$e- #A .5112- , SA

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T )le ;3 Initi I 4ID v I(e\$ to \$t )ili1e &oll nd pitc/3



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#### A3 D t #ollection

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5i\* (&e 53 Roll #o/e&ence in #I5 ER<sup>&</sup> of \$et of \$!eep d t 3

#### G3 SISD Identi c tion An Iy\$i\$

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$$T 5_{pitc/} H = \frac{102A\$ \ I \ 102;}{\$^2 \ I \ 10.\$ \ I \ .01C} e^{001B2A\$}$$
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5i\* (&e A3 Roll #o/e&ence in #I5 ER<sup>&</sup> fo& t/e \$et of \$!eep d t 3

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mod(l & nd /i\*/ly e%i)le \$t&(ct(&e3 50& me \$(&ement\$- t/e I2, nd G4S / ve )een c li)& ted !it/ complement & lte& A clo\$ed loop 4ID i\$ de\$i\*ned in Sim(link (\$in\* t/e \$t te \$p ce model to \$t )ili1e non"line & pl nt dyn mic\$3 T/e clo\$ed loop cont&olle& / \$ I\$o )een coded into t/e A&d(ino 2e\* 3 F it/ t/i\$ de\$i\*n-i\*/t d t co(ld)e \$ent) ck to I ptop t/&o(\*/t/e 7)ee & ceive&3 T& n\$fe& f(nction\$ fo& & oll nd pitc/ !e&e identi ed nd ve&i ed (\$in\* do()let d t f&om & li\*/t3

In f(t(&e \$t(die\$-)ec (\$e t/e \$!eep d t ! \$ I ckin\* co/e&ence in t/e /i\*/e& f&e0(encie\$- n (tom ted c/i&p \$i\*n I i\$ imed to )e (\$ed in\$te d of m n( I pilot inp(t\$- fo& \$y\$tem identic tion3

#### Refe&ence\$

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; Lee-G3-Jeon\*-D3 8-+/oi-63 D3- nd + n\*-T; IAttit (de #ont&ol System foi ' ( diotol 5lyin\* Ro)ot-T Ct/ Inte&n "tion I #onfetence on , )i0(ito(\$ Ro)ot\$ nd Am)ient Intelli \*ence-, RAI-Inc/eon-+ote - 2011-pp3 B; BC3

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<sup>A</sup>Di#e\$ te-A3-G(\$t f\$on-+3- nd Lindenfelet-43-TDe\$i\*n Dptimi1 tion of '(d"Rotot # p) le of A(tonomo(\$5li\*/tTGS Repot-Aeto\$p ce nd 2ec/ nic I Dept3- Fotc/e\$tet 40lytec/nic In\$tit (te-Fotc/e\$tet-2A3

<sup>B</sup>Andle \$-R3-TDyn mic\$ Identic tion U V lid tion- nd 40\$ition #ontlol fol ' ( dlotol-T 2 S T/e\$i\$-A(tonomo(\$ Sy\$tem\$ L)-S! i\$\$ 5edel I In\$tit(te of Tec/nolo\*y-9(lic/-S! it1ell nd-2010) <sup>C</sup>V loti F2 # Idol P3 L i S3 nd G(ic/ id IB T + P #ontlol fol ' ( dlotol (\$in\* nit ' ( iterinion\$) 2 odelin\* nd

<sup>C</sup>V le&i - E3- # Ide& - R3- L & - S3- nd G(ic/ &d- J3- TL ' R #ont&ol fo& ' ( d&oto& (\$in\* , nit ' ( &te&nion\$0 2 odelin\* nd Sim (I tion-T IEEE- 4(e)I - 2 e%ico- 201:3

2 \*n(\$\$en-D3- nd S-on/ (\*-+3 E3-12 odelin\*- De\$i\*n nd E%pe&iment I St(dy fo& '( dcopte& Sy\$tem #on\$t&(ction-T 2 S T/e\$i\$- En\*inee&in\* Dept3- A\*de&, niv3- +&i\$ti n\$ nd- 6o&! y-20113 <sup>10</sup>Domin\*(e\$-J3 23 G3-T'( d&oto& p&ototype-T 2 S T/e\$i\$- 2 ec/ nic I En\*inee&in\* Dept3- Tec/nic I, nive&\$ity of Li\$)on-Li\$)on- 4o&t(\* I-200.3

11A) \$-63-Le\*o!o-A3- nd Akmeli ! ti-R3-T4 & mete& Identic tion of nA(tonomo(\$ ' ( d&oto&-T ;t/ Inte&n tion I #onfe&ence on 2ec/ t&onic\$-IEEE-+( I L(mp(& 2 I )y\$) - 20113

<sup>12</sup>Sie)e&t-S3- nd Tei1e&-J3-T2o)ile : D m ppin\* fo& \$(&veyin\* e &t/!o&k p&o=ect\$ (\$in\* n , nm nned Ae&i I Ve/icle?, AV& omo(\$ e :