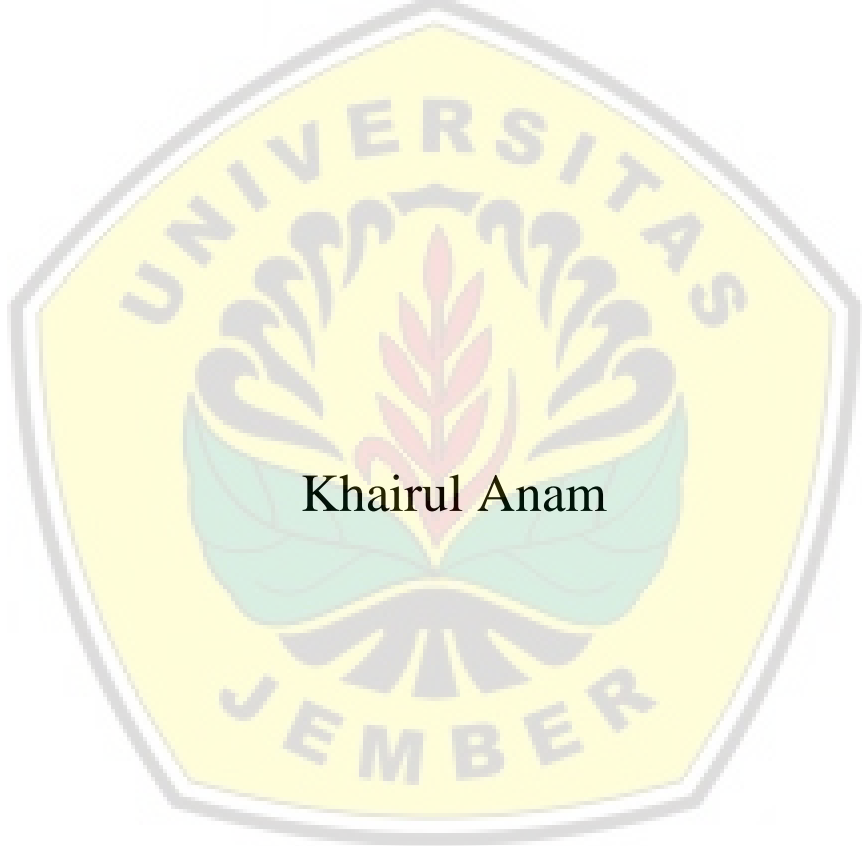


SISTEM KONTROL ROBOT UNTUK REHABILITASI



Khairul Anam

**UPT PERCETAKAN & PENERBITAN
UNIVERSITAS JEMBER**

SISTEM KONTROL ROBOT UNTUK REHABILITASI

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Prakata

Puji syukur Alhamdulillah kami panjatkan kehadirat Allah Yang Maha Esa, akhirnya penulis berhasil menyelesaikan penyusunan Buku yang berjudul Sistem Kontrol Robot untuk Rehabilitasi. Pengembangan teknologi robot yang langsung menyentuh permasalahan masyarakat patut untuk digalakkan. Termasuk teknologi robot untuk membantu proses pemulihan kelumpuhan pasien karena serangan stroke atau lainnya. Namun, pengembangan robot untuk rehabilitasi kadang terbentur dengan ide dan kekhawatiran biaya. Buku ini dapat memberikan solusi permasalahan di atas dengan menyajikan berbagai macam bentuk robot rehabilitasi yang ada di dunia saat ini baik dari sisi mekanik, sistem kontrol, dan aplikasinya.

Buku ini menyajikan berbagai bentuk robot terapi yang secara ide bisa dikembangkan di Indonesia dengan bahan lokal sehingga dapat menekan biaya. Dengan konsep amati, tiru, dan modifikasi, kemandirian anak bangsa akan pengembangan robot terapi dapat diwujudkan dan diterapkan di masa yang akan datang.

Pada akhirnya, kami menyadari bahwa buku ini tidak luput dari kekurangan. Semoga semua kekurangan tersebut dapat diperbaiki di masa yang akan datang. Penulis berharap, dengan segala kekurangannya, buku ini dapat memberi manfaat bagi anak bangsa untuk mengembangkan teknologi robot rehabilitasi sendiri dalam rangka meningkatkan kemandirian bangsa.

Tidak lupa kami ucapkan terima kasih rekan-rekan Jurusan Teknik Elektro Universitas Jember, terutama Prof. Dr. Ir. Bambang Sujanarko, M.M. atas segala dukungan dan bantuannya sehingga buku ini dapat diterbitkan. Demikian juga terima kasih kepada Prof. Achmad Subagio yang memberikan dorongan untuk terus berkarya di tangan kesibukan pekerjaan di LP2M Universitas Jember. Terima kasih kepada Prof. Adel Jumaily yang membantu penulis dalam menyelesaikan studi S3. Buku ini merupakan kelanjutan dari riset S3.

Jember, 5 Januari 2019

Penulis

Kata Pengantar

Di Era Industri 4.0, teknologi robot dengan kecerdasan bukannya menjadi sesuatu yang biasa hadir di tengah-tengah masyarakat. Penerapannya dapat terjadi dalam berbagai bidang kehidupan manusia. Termasuk di bidang kesehatan. Keterlibatan robot dalam dunia medis kini bukanlah hal yang mustahil. Hanya saja, penerapan dan penggunaannya belum begitu terasa di Indonesia karena masih terbatas pada alat-alat medis di rumah sakit khususnya untuk operasi.

Sistem Robot untuk rehabilitasi telah banyak dikembangkan khususnya untuk pemulihan pasien yang mengalami kelumpuhan pasca serangan stroke. Namun, teknologi robot ini masih tergolong mahal bagi mayoritas rakyat Indonesia. Perlu adanya upaya pengembangan robot-robot berbahan lokal dengan teknologi yang sepadan sehingga rakyat Indonesia dapat menikmati manfaatnya.

Dalam rangka mendukung upaya tersebut, buku ini hadir sebagai panduan awal dalam menggali berbagai kemungkinan pengembangan robot lokal untuk rehabilitasi. Buku ini menghadirkan berbagai macam jenis robot rehabilitasi yang telah dikembangkan di dunia ini kira-kira sejak 10 tahunan yang lalu. Buku ini diawali dengan bab yang menyajikan pengenalan teknologi rehabilitasi dan penerapan robot dalam rehabilitasi. Bab ini penting dalam membuka wawasan pembaca akan keberadaan berbagai macam teknologi rehabilitasi yang ada di dunia saat.

Bab dua menekankan pada robot portable yang dikenakan oleh pengguna dalam rangka meningkatkan efektifitas terapi atau mempercepat proses pemulihan. Teknologi robot yang dihadirkan adalah robot eksoskeleton. Berbagai macam jenis eksoskeleton disajikan mulai robot eksoskeleton tubuh bagian atas, bagian bawah dan seluruh tubuh. Bab ini berfokus pada desain mekanik dari robot eksoskeleton yang ada di dunia saat ini. Pembaca dapat mengambil manfaat dari desain mekanik yang ada.

Setelah menyajikan desain mekanik, bab 3 menyajikan rangkuman sistem kontrol dari robot eksoskeleton yang ada. Sistem kontrol yang dihadirkan tidak hanya sistem kontrol untuk pergerakan robot, akan tetapi meliputi sistem kontrol yang terkait dengan proses terapi. Dengan membaca bab ini, pembaca akan mendapatkan gambaran yang lebih

lengkap terkait teknologi robot untuk rehabilitasi. Untuk mendapatkan informasi yang lebih lengkap terkait penerapan pada masing-masing robot, pembaca dipersilakan membaca bab 4 dan 5. Kedua bab ini menjelaskan penerapan teori kontrol pada beberapa jenis robot yang ada saat ini .

Akhirnya di bab terakhir, pembaca dihadirkan dengan teknologi robot eksoskeleton tangan beserta sistem kontrolnya. Robot eksoskeleton tangan tampak lebih sederhana dan lebih murah pengembangannya. Penulis saat ini juga sedang melakukan pengembangan robot eksoskeleton tangan untuk terapi orang stroke. Bagaimana desain dan penerapannya dapat dibaca pada bab ini.

Meskipun terdapat banyak kelebihan, buku ini tidak luput dari kekurangan. Buku ini terlalu banyak menghadirkan berbagai macam jenis robot dan kontrolnya. Namun pembahasan masing-masing robot tidak terlalu mendalam. Pembaca disarankan untuk merujuk pada referensi yang telah dirujuk oleh penulis.

Pada akhirnya, semoga buku ini dapat berkontribusi bagi kemunculan teknologi – teknologi baru di bidang robotika khususnya dalam pemanfaatannya dalam meningkatkan efektifitas proses pemulihan pasien difabel di Indonesia.

Jember, 11 Januari 2019

Prof. Dr. Ir. Bambang Sujanarko, M.M
Teknik Elektro Universitas Jember

Daftar Isi

Prakata	iii
Kata Pengantar	iv
Daftar Isi	vi
Daftar Gambar	ix
Daftar Tabel	xv
BAB 1. PENGENALAN REHABILITASI	1
1.1. Pendahuluan	1
1.2. Rehabilitasi	2
1.3. Teknologi Rehabilitasi	4
1.4. Robot Rehabilitasi	7
1.5. Robot Rehabilitasi Bergerak	8
1.5.1. Robot Rehabilitasi Berbasis <i>End-effector/fixed</i>	11
1.5.2. Robot Rehabilitasi Yang Bisa Dikenakan	12
1.6. Referensi	15
BAB 2. ROBOT EKSOSKELETON MASA KINI	23
2.1. Sejarah Robot Eksoskeleton	23
2.2. Penerapan Robot Eksoskeleton	23
2.3. Eksoskeleton Ekstremitas Atas	24
2.3.1. Eksoskeleton IntelliArmis	25
2.3.2. Eksoskeleton SUEFUL-7	26
2.3.3. Eksoskeleton CADEN-7/EXO-UL7	27
2.3.4. Eksoskeleton ARMin III	28
2.3.5. Eksoskeleton MGA	29
2.3.6. L-Exos (Light Exoskeleton)	30
2.3.7. Eksoskeleton RUPERT IV	30
2.3.8. BONES	31
2.3.9. WOTAS	32
2.3.10. Eksoskeleton UTS	33
2.3.11. Eksoskeleton SUE	33
2.3.12. Eksoskeleton UNEJ	34
2.4. Eksoskeleton Ekstremitas Bawah	35
2.4.1. Eksoskeleton Badan Bagian Bawah untuk Treadmill Pelatihan Gaya Berjalan	36
2.4.2. Robot Eksoskeleton Tungkai Bawah untuk Latihan Berjalan	38

2.4.3. Robot Eksoskeleton Seluruh Tubuh	41
2.4.4. Soft Wearable Robot.....	41
2.5. Referensi	43
BAB 3. SISTEM KONTROL PADA ROBOT EKSOSKELETON.....	49
3.1. Pendahuluan	49
3.2. Sistem Kontrol Berbasis Model	50
3.2.1. Model Dinamis.....	50
3.2.2. Model Otot	52
3.3. Sistem Kontrol Berdasarkan Hirarkinya.....	54
3.4. Sistem Kontrol Berdasarkan Paramater Terkontrol	54
3.4.1. Kontroler Posisi.....	54
3.4.2. Kontroler Torsi/Gaya.....	55
3.4.3. Kontroler Interaksi antar Gaya.....	56
3.5. SISTEM KONTROL BERDASARKAN TUGAS	57
3.6. Referensi	60
BAB 4. SISTEM KONTROL PADA EKSOSKELETON TUBUH BAGIAN ATAS 65	65
4.1. Sistem Kontrol INTELLIARM	65
4.2. Sistem Kontrol SUEFUL-7	65
4.3. Sistem Kontrol EXO-UL7	68
4.4. Sistem Kontrol ARMIN III.....	69
4.5. Sistem Kontrol MARYLAND-GEORGETOWN-ARMY (MGA). 71	
4.6. Sistem Kontrol RUPERT	75
4.7. Sistem Kontrol L-EXOS.....	79
4.8. Sistem Kontrol PNEU-WREX	81
4.9. Sistem Kontrol WOTAS.....	83
4.10. Sistem Kontrol ROBOT EKSOSKELETON UTS.....	85
4.11. Referensi	87
BAB 5. SISTEM KONTROL PADA EKSOSKELETON TUBUH BAGIAN BAWAH	91
.....	91
5.1. Sistem Kontrol LOKOMAT	91
5.2. Sistem Kontrol LOPES.....	92
5.3. Sistem Kontrol ALEX.....	94
5.4. Sistem Kontrol EXPOS	95
5.5. Sistem Kontrol HAL	98
5.6. Sistem Kontrol BLEEX	100
5.7. Adaptasi Pola Gaya Berjalan Pada Eksoskeleton Ekstremitas Bawah	102
5.8. Sistem Kontrol REHAB-ROBOT	105

5.9. Sistem Kontrol pada EKSOSKELETON UNIVERSITAS SHANGHAI JIAO TONG	106
5.10. Sistem Kontrol VANDERBILT.....	109
5.11. Sistem Kontrol ANDDROS.....	113
5.12. Referensi	114
BAB 6. Sistem Kontrol Robot Tangan berbasis EMG	117
6.1. Pendahuluan	117
6.2. Sistem kontrol EMG pada berbagai robot tangan	117
6.2.1. Robot eksoskeleton tangan Mulas	117
6.2.2. Robot eksoskeleton tangan Wege.....	118
6.2.3. Robot eksoskeleton tangan Tong	120
6.2.4. Robot eksoskeleton tangan UNEJ	122
6.3. Penutup	128
6.4. Referensi	128
Daftar Pustaka.....	129



Daftar Gambar

Gambar 1.1 Ringkasan Terapi Rehabilitasi	4
Gambar 1.2 Ringkasan Teknologi Rehabilitasi	5
Gambar 1.3 Klasifikasi Robot Rehabilitasi	8
Gambar 1.4 Purwarupa Kursi HLPR (Bostelman & Albus, 2007).....	9
Gambar 1.5 Rehabilitasi Stroke Menggunakan HLPR	9
Gambar 1.6 WHERE-II (Kap-Ho & Ju-Jang, 2009).....	10
Gambar 1.7 Robot ArmAssist (Zabaleta dkk, 2011)	10
Gambar 1.8 Latihan Pasca Stroke Menggunakan ArmAssist	11
Gambar 1.9 MIT Manus untuk Pemulihan Syaraf pada Bahu dan Siku (kiri) dan seorang anak dengan cerebral palsy (kanan) (Krebs & Hogan, 2006)	11
Gambar 1.10 Pasien sedang menggerakkan sebuah cincin pada sebuah bentuk geometris menggunakan JHUAPLarm (Kuiken dkk, 2009)	12
Gambar 1.11 Pasien mencoba mengambil kotak tisu menggunakan lengan DEKA(Kuiken dkk, 2009)	13
Gambar 1.12 The Smartleg, robot prostetik ekstremitas bawah(Dedic & Dindo, 2011)	13
Gambar 1.13 Klasifikasi Eksoskeleton Berdasarkan Sudut Pandang Desain Mekanis	15
Gambar 2.1 Model Kinematis Badan Manusia Bagian Atas (Tondou, 2007).....	25
Gambar 2.2 Desain Mekanis dari IntelliArm (Yupeng dkk, 2009)	26
Gambar 2.3 Desain Robot Eksoskeleton SUEFUL- 7 (Gopura dkk, 2009).....	27
Gambar 2.4 CADEN-7 (Cable-Actuated Dextrous Eksoskeleton for Neurorehabilitation) (J. C. Perry dkk, 2007)	28
Gambar 2.5 ARMin III (T. Nef dkk, 2009)	28
Gambar 2.6 Eksoskeleton Maryland-Georgetown-Army (MGA) (Carignan dkk, 2009; Liszka, 2006)	29
Gambar 2.7 L-Exos dan sebuah proyektor untuk melakukan latihan rehabilitasi (Frisoli dkk, 2009)	30
Gambar 2.8 The RUPERT IV design and implementation(Balasubramanian dkk, 2008).....	31
Gambar 2.9 Desain Mekanis BONES (Klein dkk, 2008)	31
Gambar 2.10 Purwarupa BONES (Klein dkk, 2008).....	32

Gambar 2.11 Purwarupa WOTAS (Rocon dkk, 2007).....	32
Gambar 2.12 Eksoskeleton UTS (Chetcuti, 2011; UTS:NEWSROOM, 2011).....	33
Gambar 2.13 <i>Supinator Extender</i> (SUE): desain (kiri) dan purwarupa (kanan) (Allington dkk, 2011).....	34
Gambar 2.14 Robot eksoskeleton UNEJ (Anam, Rosyadi, & Sujanarko, 2018).....	34
Gambar 2.15 Lokomat: Desain dan Purwarupa (Colombo dkk, 2000)...	36
Gambar 2.16 LOPES (van Asseldonk & van der Kooij, 2012; Veneman dkk, 2007).....	37
Gambar 2.17 ALEX: Desain dan Percobaannya (S.K. Banala dkk, 2009).....	38
Gambar 2.18 Purwarupa GAIT-ESBIRRO (Pons, 2008).....	39
Gambar 2.19 KonGambar urasi Sistem HAL-5 untuk Rehabilitasi (Sakurai & Sankai, 2009).....	40
Gambar 2.20 Konsep HAL-5 untuk Latihan Ambulasi (Sakurai & Sankai, 2009).....	40
Gambar 2.21 <i>Body Extender</i> : Skema Kinematis dan Purwarupa (Marcheschi dkk, 2011).....	41
Gambar 2.22 Desain Robot TREMOR (Gallego dkk, 2011).....	42
Gambar 2.23 Percobaan pertama dari penggunaan The TREMOR neuro-robot (Gallego dkk, 2011).....	43
Gambar 3.1 Klasifikasi sistem kontrol dari robot eksoskeleton.....	49
Gambar 3.2 Sistem Kontrol Berdasarkan Model Dinamis.....	50
Gambar 3.3 Sistem Kontrol berdasarkan Muscle Model.....	52
Gambar 3.4 Sistem Kontrol berdasarkan parameter terkontrol.....	55
Gambar 3.5 Ringkasan sistem kontrol berbagi tugas.....	58
Gambar 4.1 <i>Zero Resistance Regulation Control</i> (ZRRC) untuk IntelliArm (Hyung-Soon, Yupeng, & Li-Qun, 2008).....	65
Gambar 4.2 Enam belas Lokasi Elektroda dalam Mendapatkan Sinyal EMG (Kiguchi & Hayashi, 2012).....	66
Gambar 4.3 <i>Neuro-fuzzy modifier</i> untuk Perkiraan Nilai Bobot (Kiguchi & Hayashi, 2012).....	67
Gambar 4.4. Sistem Kontrol dari SUEFUL-7 (Kiguchi & Hayashi, 2012).....	68
Gambar 4.5 Sistem Kontrol dari EXo-UL7 (Rosen & Perry, 2007).....	69
Gambar 4.6 Diagram Blok dari suatu Myoprocessor (Cavallaro dkk, 2006).....	69

Gambar 4.7 Skenario latihan dengan menggunakan ARMIN III (Tobias Nef, Mihelj, & Riener, 2007)	70
Gambar 4.8 Blok dari Sistem Kontrol untuk terapi permainan <i>Labyrinth</i> (T. Nef dkk, 2007)	71
Gambar 4.9 Arsitektur sebuah kontroler dari robot eksoskeleton MGA (Carignan, Liszka, & Roderick, 2005; Carignan dkk, 2009)	72
Gambar 4.10 Kontroler Komposit untuk melakukan tugas bagi suatu lengan (Carignan dkk, 2009).....	73
Gambar 4.11 Grafik Antarmuka Pengguna (kiri) untuk pasien dan Grafik untuk petugas kesehatan (kanan) (Carignan dkk, 2009).....	74
Gambar 4.12 Kontroler admittance untuk modul XW (Carignan dkk, 2009).....	75
Gambar 4.13 Arsitektur Kontrol yang ada di Rupert IV (Hang dkk, 2010).....	75
Gambar 4.14 Kontroler PID yang ada di dalam <i>inner-loop controller</i> (Hang dkk, 2010).....	76
Gambar 4.15 Mode <i>Adaptive Active-Assistive</i> untuk RUPERT (Balasubramanian & He, 2012)	77
Gambar 4.16 Mode <i>Adaptive Co-operative</i> untuk RUPERT (Balasubramanian & He, 2012)	78
Gambar 4.17 <i>Open loop controller</i> untuk Otot Pneumatik (Sugar dkk, 2007)	78
Gambar 4.18 Layout dari Virtual environment (Frisoli dkk, 2007).....	79
Gambar 4.19 Skenario tugas “menggapai” (Frisoli dkk, 2009).....	80
Gambar 4.20 Arsitektur Kontrol Impedansi untuk L-Exos (Frisoli dkk, 2007).....	80
Gambar 4.21 Pneu-Wrex: Implementasi dan Desain (Sanchez dkk, 2005).....	81
Gambar 4.22 Arsitektur dari kontrol Pneu-Wrex (Wolbrecht dkk, 2010).....	82
Gambar 4.23 Pengendali posisi adaptative (Wolbrecht dkk, 2010)	82
Gambar 4.24 Pengendali tingkat rendah dari Pneu-Wrex (Wolbrecht dkk, 2010)	83
Gambar 4.25 Tahap perkiraan getaran (Rocon dkk, 2007).....	83
Gambar 4.26 Strategi kontrol WOTAS (Rocon dkk, 2007)	84

Gambar 4.27 Kontrol WOTAS untuk frekwensi getaran yang lebih luas (Ruiz dkk, 2008)	85
Gambar 4.28 <i>Control admittance Cartesian</i> untuk robot UTS (Chetcuti, 2011)	86
Gambar 4.29 Antarmuka <i>GUI</i> untuk robot penyangga UTS (Chetcuti, 2011).....	86
Gambar 5.1 Arsitektur Sistem Kontrol Lokomat (Jezernik dkk, 2003) ...	91
Gambar 5.2 Sistem Kontrol LOPES (Atsushi Tsukahara dkk, 2011)	92
Gambar 5.3 Implementasi dari sub tugas yang berbeda dalam proses penyembuhan dengan melakukan latihan berjalan (van Asseldonk & van der Kooij, 2012).....	93
Gambar 5.4 <i>Force-Field Controller</i> (FFC) untuk ALEX (S. K. Banala dkk, 2010)	94
Gambar 5.5 Prosedur latihan dengan menggunakan ALEX (S.K. Banala dkk, 2009).....	95
Gambar 5.6 EXPOS dari Universitas Sogang (Kyoungchul & Doyoung, 2006).....	96
Gambar 5.7 Mekanisme maju mundur dari alat bantu jalan (Kyoungchul & Doyoung, 2006)	96
Gambar 5.8 Sistem kontrol dalam EXPOS (Kyoungchul & Doyoung, 2006).....	97
Gambar 5.9 Perangkat Keras HAL (A. Tsukahara dkk, 2010)	98
Gambar 5.10 Skema Kontrol pada Sistem <i>Walking Support</i> (Suzuki dkk, 2007)	99
Gambar 5.11 Desain BLEEX (Zoss dkk, 2006).....	100
Gambar 5.12 Model Dinamis BLEEX(Ghan dkk, 2006).....	101
Gambar 5.13 Pengontrol amplifikasi sensitivitas BLEEX (Ghan dkk, 2006).....	101
Gambar 5.14 Algoritma adaptasi gaya berjalan (Gomes dkk, 2011).....	103
Gambar 5.15 Struktur NN1(a), NN2(b) and NN3(c) (Gomes dkk, 2011).....	104
Gambar 5.16 Eksoskeleton untuk Uji Simulasi	104
Gambar 5.17 Eksoskeleton pergelangan kaki aktif untuk uji eksperimental	105
Gambar 5.18 Rehab-Robot: Desain (kiri) dan Implementasi (kanan) (B.C. Tsai dkk, 2010)	105
Gambar 5.19 Sistem Kontrol pada Rehab-Robot (B.C. Tsai dkk, 2010)..	106

Gambar 5.20 Tampilan Eksoskeleton Universitas Shanghai Jiao Tong (Yin dkk, 2012)	107
Gambar 5.21 Pengontrol neuro-fuzzy dari eksoskeleton (Yin dkk, 2012).....	107
Gambar 5.22 Jaringan Neuro-Fuzzy dan fungsi keanggotaannya (Yin dkk, 2012)	108
Gambar 5.23 Purwarupa Vanderbilt (Farris dkk, 2011).....	109
Gambar 5.24 DES: Diagram (kiri) and Papan Sirkuit (kanan)(Farris dkk, 2011)	110
Gambar 5.25 Mesin Pola terbatas untuk pengontrol tingkat tinggi (Quintero, Farris, & Goldfarb, 2011)	111
Gambar 5.26 Lokasi Pusat Tekanan (Quintero dkk, 2011).....	112
Gambar 5.27 EksoskeletonANDROS (Unluhisarcikli dkk, 2011)	113
Gambar 5.28 Arsitektur Perangkat Keras dan Perangkat Lunak (Unluhisarcikli dkk, 2011).....	114
Gambar 5.29 Pengontrol Impedansi untuk ANDDROS(Unluhisarcikli dkk, 2011)	114
Gambar 6.1 Robot tangan dari Mulas(Mulas, Folgheraiter, & Gini, 2005).....	118
Gambar 6.2 Penempatan elektrode	118
Gambar 6.3 Robot eksoskeleton tangan Wege (Wege & Zimmermann, 2007).....	119
Gambar 6.4 Penempatan elektrode pada tangan	119
Gambar 6.5 Desain mekanik dari robot eksoskeleton tangan Tong (Ho dkk, 2011).....	120
Gambar 6.6 Robot eksoskeleton tangan Tong	120
Gambar 6.7 Penempatan elektrode robot eksoskeleton tangan Tong..	121
Gambar 6.8 Robot "Hand of hope" yang ada telah dikomersialisasi	122
Gambar 6.9 Robot tangan beserta motor penggeraknya dan rangkain elektroniknya.....	122
Gambar 6.10 Sistem kontrol robot tangan UNEJ	123
Gambar 6.11 Posisi sensor pada <i>otot extensor digitorum</i> (a)dan pada <i>otot flexor carpi urnalis</i> (b)	123
Gambar 6.12 Sinyal EMG kekuatan penuh untuk channel 1 (atas) dan channel 2 (bawah) dari 6 kali pengambilan data.....	124
Gambar 6.13 Sinyal EMG kekuatan sedang channel 1 (atas) dan channel 2 (bawah) dari 6 kali pengambilan data.....	124

Gambar 6.14 Sinyal EMG kekuatan lemah untuk channel 1 (atas) dan channel 2 (bawah) dari 6 kali pengambilan data.....	125
Gambar 6.15 Sinyal EMG (atas) and sinyal RMS dari EMG (bawah) dari suatu subyek	125
Gambar 6.16 Robot dikendalikan dengan sinyal EMG.....	126
Gambar 6.17 Sistem Kontrol Robot menggunakan simulink Matlab.....	127
Gambar 6.18 Penggunaan Robot untuk Terapi	127



Daftar Tabel

Tabel 5.1 Deskripsi Posisi (Quintero dkk, 2011).....	111
Tabel 5.2 Transisi Posisi untuk Tujuan Rehabilitasi (Quintero dkk, 2011).....	112





6.3. Penutup

Demikian berbagai sistem kontrol yang terdapat pada berbagai jenis robot terapi rehabilitasi yang ada saat ini. Banyak pilihan dan banyak kemungkinan yang dapat dipilih jika ingin mengembangkan robot terapi sendiri. Semoga bermanfaat bagi masyarakat akademis di Indonesia.

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