SISTEM KONTROL ROBOT UNTUK REHABILITASI

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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 rehabiltiasi 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 diperbaki 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 tengan 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 Januri 2019
Penulis

Kata Pengantar

Di Era Industri 4.0, teknologi robot dengan kecerdasan buatannya 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 penggunaanya 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 akhrinya, 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 Elekro Universitas Jember

Daftar Isi

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Daftar Tabel

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.

6.4. Referensi

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