# DAFTAR ISI

LEMBAR PENGESAHAN ..... ii
LEMBAR PERNYATAAN ORISINALITAS ..... iii
ABSTRAK ..... iv
KATA PENGANTAR ..... vi
UCAPAN TERIMA KASIH ..... vii
DAFTAR ISI ..... x
DAFTAR GAMBAR ..... xii
DAFTAR TABEL ..... xiv
DAFTAR ISTILAH ..... xv
DAFTAR SINGKATAN ..... xvi
**BAB I** ..... 1
1.1 Latar Belakang ..... 1
1.2 Tujuan Penelitian ..... 2
1.3 Perumusan Masalah ..... 2
1.4 Batasan Masalah ..... 2
1.5 Manfaat ..... 3
1.6 Metodologi penelitian ..... 3
1.7 Sistematika penulisan ..... 4
**BAB 2** ..... 6
2.1 Mobil Listrik[1] ..... 6
2.2 Sistem Steer – By – Wire[17] ..... 7
2.2.1 Ackermann Steering[2] ..... 8
2.2.2 Rack and Pinion[2] ..... 9
2.2.3 Steering Linkage[2] ..... 10
2.3 Sensor ..... 11
2.3.1 Potensiometer ..... 11
2.3.2 Sensor Optocoupler (bentuk “U”) ..... 11
2.4 Motor DC[3] ..... 13
2.5 Driver Motor ..... 14
2.5.1 EMS 30A Dual H - Bridge[4] ..... 14
2.6 Arduino ..... 15
2.6.1 Arduino Mega 2560[5] ..... 15
2.6.2 USB Host Shield ADK for Arduino[6] ..... 17
2.7 Converter DC to DC[7] ..... 18

2.7.1 UBEC[8] ..... 18
2.7.2 Step Up Converter XL6009[9] ..... 19
2.7.3 Step Down Converter LM 2596[10] ..... 19
2.8 Steering Wheel Driving Force GT[11] ..... 19
2.9 Fuzzy – PID Controller ..... 20
2.10 Liquid Crystal Display (LCD) 16 x 2[16] ..... 29
**BAB 3** ..... 30
3.1 Gambaran Umum Sistem ..... 30
3.2 Perancangan Sistem Minimum ..... 31
3.3 Perancangan Aktuator ..... 34
3.3.1 Driver Motor DC ..... 34
3.3.2 Motor DC ..... 34
3.4 Perancangan Mekanika Sistem ..... 36
3.4.1 Perancangan dasbor setir kemudi ..... 37
3.4.2 Perancangan mekanik motor DC ..... 37
3.4.3 Perancangan dudukan sensor kecepatan ..... 38
3.5 Perancangan Logika Fuzzy - PID ..... 39
3.5.1 Fuzzification ..... 40
3.5.2 Rule Interface ..... 43
3.5.3 Deffuzification ..... 44
3.5.4 PID Controller ..... 44
**BAB 4** ..... 45
4.1 Pengujian Sudut Putar Setir Kemudi (*steering wheel*/ *steering game DFGT*) ..... 45
4.2 Pengujian Sensor Kecepatan ..... 48
4.3 Pengujian Sensor Sudut Putar Roda Kemudi ..... 50
4.4 Pengujian Eksekusi Kontrol Fuzzy - PID ..... 52
**BAB 5** ..... 59
5.1 Kesimpulan ..... 59
5.2 Saran ..... 60
**DAFTAR PUSTAKA** ..... 61
**LAMPIRAN** ..... 1
5.2.1 LAMPIRAN A ..... 2
5.2.2 LAMPIRAN B ..... 20