# TABLE OF CONTENTS

| Preface | i |
| Acknowledgement | ii |
| Editor | iii |
| Table of Content | v |
| 1. Visual Tracking for Human Face | 1 |
| A.A. Shafie, Iqbal and M.R. Khan |
| 2. Robot Design: A Case Study of Team Learning Experience and Outcome | 7 |
| A.A. Shafie |
| 3. Development Neck Support for Humanoid Robot Head | 14 |
| A.A. Shafie, M.N. Kasyfi and N.I. Taufik Y |
| 4. Development of Cooperative Mini Robot | 21 |
| Amir A. Shafie, Siti E.M.Z and Shazeela A |
| 5. Humanoid Robot Arm | 26 |
| Amir A. Shafie and Mohd N. Y. |
| A. Iqbal, A.A. Shafie, and M.R. Khan |
| 7. An Overview of Fuzzy Based Person Following Robot | 38 |
| T. Alamgir, I.J. Alfar and M.M. Rashid |
| 8. Mechanical Design of a Person Following Robot | 43 |
| Tarik Bin Alamgir, Ibrahim Jawad Alfar and Muhammad Mahbubur Rashid |
9. Development of Fuzzy Based Person Following Robot part 2 49
   Tarik Bin Alamgir, Ibrahim Jawad Alfar and Muhammad Mahbubur Rashid

10. Mobile Robot for Fined Tube Inspection 56
    Muhammad Mahbubur Rashid

11. Robot Aided Upper Limb Rehabilitation System: Mechanical Design 64
    Shahrul Na’im Sidek, Hidayatullah Mohamed Nawi

12. Robot Aided Upper Limb Rehabilitation System: Electronics for Sensors and Actuators 69
    Shahrul Na’im Sidek, Khairul Anwar Khalid

13. Robot Aided Upper Limb Rehabilitation System: Results and Analysis 73
    Shahrul Na’im Sidek

    Raisuddin Khan, Mitsuru Watanabe and Masum Billah

15. Multiple Hexapod Robot and Collaborative communication 86
    Raisuddin Khan, Masum Billah and Mohiuddin Ahmed

    Atika Adrina Teepol, Nur Fadhillah Mohd Fauzy, Shahrul Na’im Sidek, Yasir Mohd Mustafah

17. Autonomous Unicycle Robot Using Reaction Wheel Pendulum: Controller Design 103
    Nur Fadhillah Mohd Fauzy, Atika Adrina Teepol, Shahrul Na’im Sidek, Yasir Mohd Mustafah
19. Develop an Algorithm for Goal Finding Robot using Reinforcement Learning
   M. Kamal, R. Khan, S. Bazuhair and M. Billah
   118

20. Design and Development of 2 Fingers Robotic Hand Actuated by Active Grasping Data
    MdMozasser Rahman¹, MohdZoolfadli B MdSalleh
    126

21. Design and Development of Interactive Fish Robot
    MdMozasser Rahman¹, RizaMuhida and Mohammad Zukhair b MohdNazmi
    144

22. Design and Development of A Digger Robot
    MdMozasser Rahman, MohdRuzaini Bin AbdRalim and Others
    154

23. Glass Wall Cleaning Robot: A Review
    Md Mozasser Rahman, Ahmed Murgab Mohammed Mahil,
    Norsofiana Bt Umar and Nurul Izzati Bt Samsuddin
    170

24. Glass Wall Cleaning Robot: -Electrical design and control
    Md Mozasser Rahman, Ahmed Murgab Mohammed Mahil,
    Norsofiana Bt Umar and Nurul Izzati Bt Samsuddin
    177

25. Glass Wall Cleaning Robot: -Electrical design and control
    M. M. Rahman, M. R. b A. Ralim
    187

26. Development of Robotic Manipulator to assist human using brain signal
    Mahbuba Hossain, Raisuddin Khan, and Masum Billah
    198

27. Glass Wall Cleaning Robot: Mechanical Design
    Mahbuba Hossain Raisuddin Khan, and Masum Billah
    204
28. Intelligent SCADA Based Monitoring Scheme for Low Voltage Distribution System 210
   M. J. E. Salami, A. M. Aibinua, Mohd Shafie Bin Sani and Nurfaizal Bin Wahi

29. Intelligent SCADA Based Monitoring Scheme for Low Voltage Distribution System 218
   Abdullateef Ayodele Isqcel and Momoh Jimoh Eyiomika Salami.

30. Autonomous Goal Finding Robot 227
    M. Kamal, Md. R. Khan, Faisal and M. Billah

31. Intelligent SCADA Based Pipe Monitoring System 236
    M. J. E. Salami, A. M. Aibinua, Mohd Shafie Bin Sani and Nurfaizal Bin Wahi

32. Path Tracking of Car Like Mobile Robot 250
    A. A. Isqela and M. J. E. Salami

33. A New Energy Efficient Building System 255
    M. J. E. Salami, Md. R. Khan, O. A. Abdulquadric

34. Automatic Car Parking System 262
    M. J. E. Salami, Md. R. Khan and O. A. Abdulquadria

35. Anthropomorphic biped robot 267
    A. A. Shafie, M. F. Baharudin
CHAPTER 28
Intelligent SCADA Based Pipe Monitoring System
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28.1. Introduction

A SCADA system, utilized as a leak detection system, employs various sensors to measure physical or chemical parameters (pressure, temperature, flow rate, level, and concentration) in pipelines or tanks and converts these parameters into electronic signals. These signals are sent to a data acquisition system, a signal conditioning unit, and are finally analyzed using computer algorithms to produce a leakage determination. SCADA systems are used to control large networks of pipelines such as oil and gas monitoring. A central computer monitors the system for changes in pressure, flow rate, and volume of liquid. More than one leak detection algorithm can be integrated into a SCADA system to monitor the entire pipeline network. This allows for accurate leak detection, including leak location and flow rate identification. (Baile, 2003)

One of the most important applications of SCADA system is in Oil and Gas transportation. This industry is among the important business in the world. Oil and gas regarded as the main energy source of the world nowadays. However, this business exposes human being to risk. The rise in oil and gas industry can be fatal especially with respect to ecosystem and pollution. Throughout history, there are many cases of oil pipeline burst which cause losses to the oil and gas company. Monitoring is important to detect earlier damage of the pipeline. This action can save the cost of maintenance while prevent serious damage along the pipeline. (Clark, 2004). A very long oil and gas pipeline is hard to monitor. Long range pipeline used to transport crude oil from oil field or to transport oil to transporting port. Minor leakage is hard to be detected and accident can happen anytime as oil and gas is an highly flammable material. Continuous monitoring system is a must in oil and gas pipeline. Thus, SCADA present an effective solution to these problems. Oil and gas pipeline built to optimize the oil and gas company revenue. The pipeline operation must not disturb in order to maintain maximum output of processed oil from the refinery. Leakage detection must be done without shutting down the pipeline system. To conclude, SCADA system will save time and money by detecting the leakage location. (Baile, 2003)

The purpose of this project is to design and develop an Intelligent SCADA-Based pipe monitoring system for oil and gas in particular. The aim of this project is to study technique of detecting pipe burst, leakage and weak flow rate. All parameters monitoring need to be done by SCADA. In addition, the intelligent SCADA system also can make its own decision in handling situation.

The significance of this project is that it can prevent worst leakage and burst coming inside the pipe. It can detect the crack that occurs inside the pipe and further actions needed to be taken before it get worst. The government usually distributes the crude oil using pipeline installed offshore. So, it is crucial to maintain this pipeline to guide against any burst or leakage as the cost of maintenance is high. Instead of spending money on repairing pipes, it can be control directly or treated immediately.

Oil and gas pipeline is an important element in oil and gas industry. It is used for oil and gas transportation and it is more efficient than other method such as tanker ship and railroad. However, it also has its drawbacks, firstly, it can be very dangerous. Secondly, minor leakage can cause fatal losses and pollution of the ecosystem. Detection of leak in pipelines is an important task for