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MODE CONTROL OF DOOR-OPENING USING MULTIFINGERED ROBOT HAND

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ABSTRACT: *This paper presents the robot opens the door with a great force due to their occur friction and these is a loss of mechanical parts. In order to overcome two sensors are introduce in the proposed system. ULTRA SONIC SENSOR and PIR SENSOR are used to avoid the loss of mechanical parts due to friction. These sensors accurately detect the human arrival and open the door with less friction. Instead of gripper here magnet is use to save power. To develop a new concept that utilizes the multiple working modes of the MRR modules. The control design is significantly simplified by switching selected joints of the MRR to work in passive mode during door-opening Operations. Different control schemes are used for control of the joint modules in different working modes. The active joint modules, a distributed control method based on torque sensing is used to facilitate the control of joint modules working under this mode. The main concern of opening a door is how to prevent the occurrence of large internal forces that arise because of the positioning errors or imprecise modeling of the robot or its environment, specifically, the door parameters. The active joint modules, a distributed control method based on torque sensing is used to facilitate the control of joint modules working under this mode*

Keywords - *Door-opening, mobile manipulation, motion and path planning,MRR, Multiple working mode control.*

I. INTRODUCTION

Modern robot applications, including mobile manipulation, have far higher performance demands than those of assembly and repetitive tasks. Mobile manipulators become more useful when they perform tasks that are second nature to humans, such as door-opening. Humans can readily tell a door's opening direction and then apply appropriate force to open the door. In doing so, they instinctively use vision, memory, and/or trial-and-error to quickly estimate the radius of the door and the position of the hinge.

These robot do not look or behave like human beings, but they do the work of humans. Robots are particularly used in a wide variety of industrial application. Current research effort focus on creating a "smart" robot that can "see", " hear", "touch" and make decision.

Lars Petersson(2008) et al describes on, off-the-shelf algorithms for force/torque control are used in the context of mobile manipulation (i.e. coordinated motion of a mobile robot base and the arm mounted on top of it). In particular, the task of opening a door is studied. Keiji NAGATANI et al describes One approach of how to pass through a doorway by a mobile robot is discussed. In this taskoriented approach, proposed task is to realize a total behavior with opening a door and pasring through a door-way using a mobile robot equipped with a manipulator.

Torsten Kr¨oger et al design the Reflexxes Motion Libraries and describes, how they open doors for next generation robot motion controllers. When robots become capable to perform sensor-guided and sensor-guarded motions, there is no predefined path anymore, and motions have to be calculated online, that is, during the motion.

Sachin Chitta, et.al. describe an autonomous robotic system capable of navigating through an office environment, opening doors along the way, and plugging itself into electrical outlets to recharge as needed.

II. EXPERIMENTAL ANALYSIS

The robot opens the door with a great force due to their occur friction and reduces a loss of mechanical parts. This type of robot similar to normal pick and place. It could be installed for normal existing door. It could be applied for opening door in hospital rooms for patient, for old age people in houses and even for opening doors for physically handicapped people. The main concern of opening a door is how to prevent the occurrence of large internal forces that arise because of the positioning errors or imprecise modeling of the robot or its

environment, specifically, the door parameters. The passive joint modules , a feed forward torque control approach is used to compensate the joint friction to ensure passive motion.

2.1 BLOCK DİAGRAM OF RF TRANSMITTER

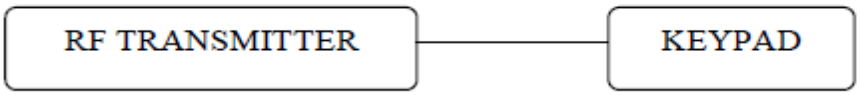

Fig.1.RF TRANSMITTER

2.2 RF RECEIVER

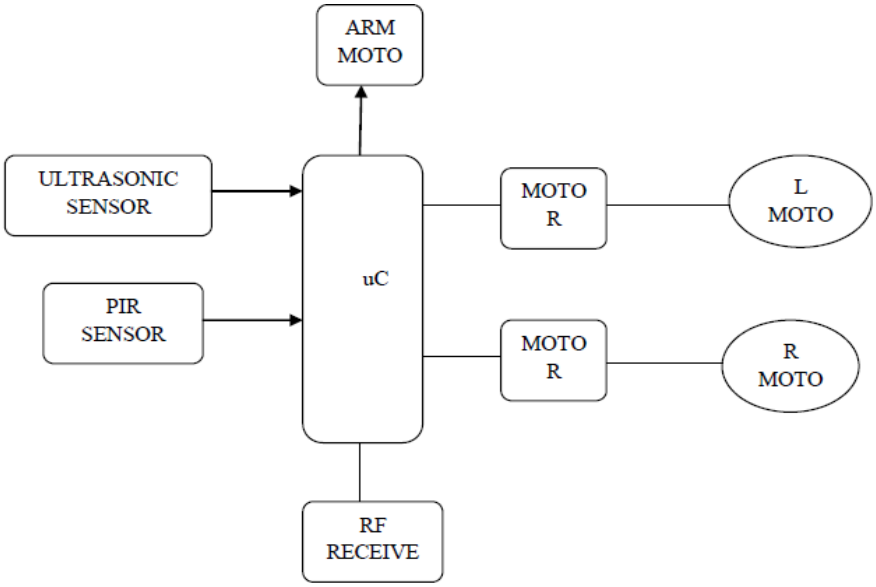

Fig.2.RF RECEIVER

2.3 SELECTION OF MATERIAL

In this paper the selection of materials are discussed below, some of the components used in this paper are

2.3.1 DC MOTOR

A drive motor mainly consists of DC Motor and Gear system and controlled by Motor drive circuit. They are used in lifts, winches,medical tables, jacks and robotics.

Fig.3.DC MOTOR

2.3.2 RF RECEIVER

RF receiver is a device that operates in the radio frequency spectrum. The corresponding frequency range varies between 30 kHz & 300 GHz .In RF system the digital data is represented as variations in the

amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK).Transmission through RF is better than IR (infrared) because of many reasons.

RF Receiver

Pin No	Function	Name
1	Ground (0V)	Ground
2	Serial data output pin	Data
3	Linear output pin; not connected	NC
4	Supply voltage; 5V	Vcc
5	Supply voltage; 5V	Vcc
6	Ground (0V)	Ground
7	Ground (0V)	Ground
8	Antenna input pin	ANT

III. FUNCTION OF RF RECEIVER

2.3.3 MOTOR DRIVE

The Motor Driver Controls the Motor Forward/Reverse Direction and Speed. This motor driver module controls the speed and direction on 2 DC motors, up to 40V 3A. The module itself is powered and controlled from a main board but the motors are powered from a separate power source. A battery can be safely used to power the input on the power module (a red module, like USB Client DP) and also power the motors, by wiring the battery to both.

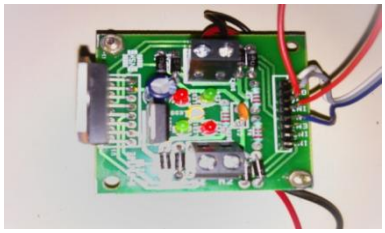

Fig.4.MOTOR DRIVE

2.3.4 MICROCONTROLLER AT mega8

The low-power Atmel 8-bit AVR RISC-based microcontroller combines 8KB of programmable flash memory, 1KB of SRAM, 512K EEPROM . The device supports throughput of 16 MIPS at 16 MHz and operate between 2.7-5.5 volts. The Register File is optimized for the AVR Enhanced RISC instruction set. In order to achieve the required performance and flexibility, the following input/output schemes are supported by the Register File .There are Five Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, and Standby.

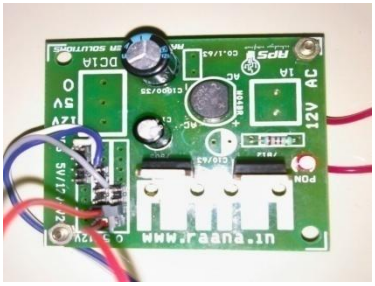

Fig.5 .MICROCONTROLLER AT mega8

1.3.5. ULTRA SONIC SENSOR

The Ultra Sonic sensor has a continuously variable gain for beam control. They are reliable and have stable range of operation. The interface output formats included are pulse width output, analog voltage output, and serial digital output. Learns ring down pattern when commanded to start ranging Can be triggered externally or internally .User can choose any of the three sensor outputs.

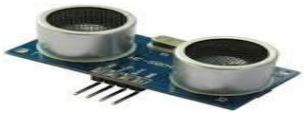

Fig.6.ULTRA SONIC SENSOR

2.3.6 PIR SENSOR

A Pyroelectric Infrared sensor (PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view PIR sensors are often used in the construction of PIR-based motion detectors .They do not emit any energy, and called a Passive Infrared Sensor.

Fig.7. PIR SENSOR

I. RESULTS AND DISCUSSION

Simulation is the imitation of the operation of a real-world process or system over time.[1] The act of simulating something first requires that a model be developed; this model represents the key characteristics or behaviors/functions of the selected physical or abstract system or process. The model represents the system itself, whereas the simulation represents the operation of the system over time.

3.1 ISOMETRIC VIEW OF ROBOT

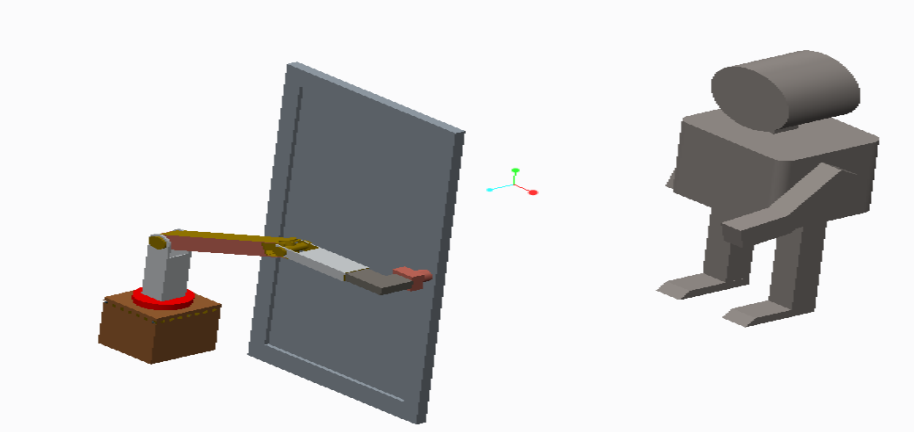

Fig.8. ISOMETRIC VIEW OF ROBOT

IV. CONCLUSION

IN THIS PAPER LOSS OF MECHANICAL PARTS IS REDUCE BY THE USE OF SENSORS. THIS ALSO BE USED AS A MULTI- PURPOSE ROBOT. IT HAS ANOTHER ADVANTAGE THAT THE MAGNETIC END –EFFECTOR IS USED INSTEAD OF GRIPPER. THE PRESENT METHOD SOLVES A MAJOR PROBLEM OF DOOR-OPENING WITHOUT USING COMPLICATED CONTROL ALGORITHMS OR ANY SPECIAL MECHANICAL DESIGN, AND IT CAN BE IMPLEMENTED ON ANY OTHER ROBOT THAT HAS JOINTS CAPABLE OF WORKING IN BOTH ACTIVE AND PASSIVE MODES. THE USE OF THE MULTIPLE WORKING MODES OF THE MRR JOINT MODULES WILL BE FURTHER INVESTIGATED IN SOME OTHER MOBILE

MANIPULATOR APPLICATIONS. THE NEXT GOAL OF THIS PAPER IS TO REALIZE AUTONOMOUS DOOR LOCALIZATION AND DOOR KNOB GRASPING BASED ON A STEREO VISION SYSTEM.

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