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Mobile Operated- Automatic Drilling COBOT Machine

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ABSTRACT: This project is designed to build COBOT that automatically detects the obstacle on its path and guides itself whenever an obstacle comes ahead of it. This COBOTvehicle is built, using AVR Microcontroller. An ultrasonic sensor is used to detect any obstacle ahead of it. A motor driver IC and 2 DC motors are used for controlling the movement of the COBOT. A servo motor is also used in this project. The ultrasonic sensor is then mounted on the servo and by rotating the servo to different angles we will obtain the readings from the ultrasonic sensor in those angles. This will help the controller to detect the each path to navigate. A Bluetooth module is also added to the project in order to control the COBOT from your android phone when it is in manual mode.

I.INTRODUCTION

A collaborative robot, also known as acobot, in its most basic definition is a robot which has the ability to safely work directly alongside human workers to complete a task. At Universal Robots (UR), however, we believe the accessibility of the technology through ease of deployment is similarly integral to the cobot definition. A robot that can operate directly alongside and interact with its co-workers does open up a huge number of new possibilities for task automation, but many of these possibilities could go unfulfilled if the robot system is not easy to program, 5affordable, and flexible enough that it can be re-deployed to different tasks at very short notice. For this reason, we strive to make UR cobots safe and collaborative, easy to program and deploy at an affordable price, to make robotic automation technology truly accessible to everyone. There are still many things that a human can do faster than a robot, due to our immense dexterity and ability to handle variations in our environment. However, for highly repetitive tasks, involving objects that are predictable in both size/shape and the orientation in which they are presented, a robot that can work for 24 hours a day without needing breaks in between is likely to result in a significant productivity gain. Often a worker's job will consist only partially of these repetitive, easy to automate tasks, so the optimal configuration can be to have the person continue doing the variable parts of the task and make use of the robot as a smart tool to speed up the repetitive parts to increase his/her overall output. This only really works if you can stand right next to the robot, passing objects back and forth. The productivity of an automated solution is also inherently easier to monitor than a manual solution, as data on the number of cycles completed by a cobot can be conveniently extracted over a network and incorporated into overall production data.

II.LITERATURE REVIEW

Automated Drilling Machine Based on PLC on IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 3, March 2015. byYousef M. Abueejela, A. Albagul, Ibrahim A. Mansour and Obida M. Abdallah.

This paper aimed to design and fabricate an automated drilling machine based on PLC to produce holes (8mm depth) in the center of a cubic work pieces (3 cm ×2 cm × 3cm). The drilling machining process proposed for a cycle of drilling. The cycle process is start when the start switch is pressed; the linear motor is put in place the drilling head in home position, and rotate the rotary disk to bring the first work pieces to desired position. Meanwhile, the drilling process is running after the

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inductive sensor in the (desired position) sense the object. Then the process will stop automatically when made the hole and went back to the home position, after that the rotary disk start to rotate quarter cycle to carry the drilled object out the table during the lower rotary disk. The PLC used to perform these operations, by reading data from sensors and actuate the DC motors. At the end of this project, the result shows that the designed system was able to run the drilling process autonomously for three object per minute based on the desired sequence. the automated drilling machine was successfully designed and implemented based on PLC control system. The prototype is done to drill a small hole in wood work-piece about (8mm) in depth, and perform drilling for 3 objects per minute, in order to increase the efficiency of small drilling machines instead human work. From the results of drilling performance testes, the system was apple to drill small holes and all the objectives were done successfully as proposed.

MICROCONTROLLER BASED AUTOMATIC DRILLING MACHINE by Lakshya A. Shrungarpure ,Parita H. Patel, Kandarpi V. Shah, Ramanuj K. Gupta Student, Electronics and Communication Engineering, Sigma Institute of Engineering 4Asst. Prof., Electronics and Communication Engineering, Sigma Institute of Engineering.

Any industry desires to maintain safety and security while drilling to the material. Addressing this challenge is an important task as any injury to the worker costs company a lot. This system provides safety to the workers. This also provides accurate and automatic drilling due to the IR sensor used. After sensing the object, the drilling machine comes to the target position through the automatic lift system. The drilling machine drills the particular position and moving up direction. Then the object will rotate to the next place n the conveyor. The drilling machine drills the next position also like this. The machine drills number of objects. The automatic sensing of the object is provided with the IR sensor that is placed at target place. The sensor gives the proper object location to the embedded controller. The controller operates the drilling machine as per the received signal from the IR sensors. The present project is designed around a microcontroller as a control unit. The microcontroller senses the object through the IR sensor and controls the drilling machine, and it continuously monitors the drilling machine.

Due to using of automatic drilling machine it has been obsevered the production time of drilling is reduced by greater amount. As automatic positioning of workpiece result in increase in efficiency of machine and thus overall machining time is reduced which fit best in mass production type industries. Reduction in employee fatigue due automatic positioning.

Simulation and Experimental Research on Robot Drilling by J.R.V. SaiKiran, V.N.BPrasad SodisettyonInternational Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8, Issue-2S3, July 2019.

This paper describes the experimental and analytical performance of robot drilling on alloy materials. In heavy structures manual drilling consumes time and quality of holes drilled is unstable. The industrial robot with agile motion is possible to machine a component. Industrial robots with high precision and six axis Degree of freedom are considered for better robot manufacturing processes. This work is to significantly improve performance of robot drilling over conventional drilling. The industrial manipulator used is ABB - IRB1410 with work volume of 2.6 meters and controlled by IRC5 Controller. Drilling machine utilized is specified with maximum speed of 3000 RPM. The speed of the drilling machine can be varied by voltage regulator and maintain different speeds at a difference of 100 RPM. The parameters like surface roughness, time consumed, circular entry and exit, roundness is considered. Relay is utilized to turn on/off the drill at the required places. The industrial manipulator robot and vertical CNC machine drillings are compared by random values of Design of Experiments. The process parameters like drill bit size, speed of drill and feed rate are considered. Conventional material removal techniques like CNC have been proven to be able to tackle nearly any machining challenge but major drawback of using conventional CNC machine is restricted work volume. The comparative study of drilling process using an industrial manipulator, Conventional machine suggests that the relative error of the performance characteristics is less than 6%. In robotic drilling the reason for dimensional error is due to low stiffness of the end effector and at higher feed rate, high speeds the robot tends to have higher vibrations. Despite these phenomena the dimensional accuracy is satisfactory with a reasonable error. The suggests with a better end effector with higher damping capability, alloy like armoured steel and ballistic metals can be drilled using robot drilling which cannot be done using CNC machine and reduces lead time in

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manufacturing a heavy structure. A robot is capable of performing multiple operations like drilling, spray painting, welding, material handling and so on, where CNC will hold on only specific operation like drilling. But we cannot achieve higher accuracy rates with the robot as CNC, as it is manufactured for sole purpose of drilling.

III. METHODOLOGY OF PROPOSED SURVEY

Servo Motor:

A servo motor is an electrical device which can push or rotate an object with great precision. If you want to rotate and object at some specific angles or distance, then you use servo motor. It is just made up of simple motor which run through servo mechanism. Servos are used in radio-controlled airplanes to position control surfaces like elevators, rudders, walking a robot, or operating grippers. Servo motors are small, have built-in control circuitry and have good power for their size. The Servo motor comprises of three wire system known as Power, Ground and Control whereas DC motor is two wire system known as Power and Ground. Servo motor has an assembly of four things DC motor, gearing set, control circuit and a position sensor. DC Motor does not comprise of any assembly.

Ultrasonic Sensor:

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). For ultrasonic sensing, the most widely used range is 40 to 70 kHz. The frequency determines range and resolution; the lower frequencies produce the greatest sensing range. At 58 kHz, a commonly used frequency, the measurement resolution is one centimeter (cm), and range is up to 11 meters.

Arduino UNO:

The Arduino UNO is the best board to get started with electronics and coding. If this is your first experience tinkering with the platform, the UNO is the most robust board you can start playing with. The UNO is the most used and documented board of the whole Arduino family. Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worring too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

Gear Motor:

A gear motor is any electric motor coupled with a gear train. Gear motors use either AC (Alternating Current) or DC (Direct Current) power. In most cases, the addition of a gear box is intended to limit the speed of the motor's shaft, and increase the motor's ability to output torque. Gearmotors are a fairly well-established technology. And recently, there is renewed interest in gearmotors, following a trend in integrated systems in general.

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Figure 1 Automated Drilling COBOT Machine

IV. CONCLUSION AND FUTURE WORK

Thus the manually operated automatic drilling COBOT were built as design and tested under various conditions such as moving front and back and thus make drilling in any material without the needs of the humans. All the results are satisfied as. We have attached the drilling components and materials in the front of the COBOT wheel. The operations are controlled through various components such as AVR Microcontroller and motor drive IC and 2 DC motors are controlled the movement of the COBOT. A Servo meter is also used in the project. The main operation are controlled by ultrasonic sensor and it is a device that measures the distance of target object by emitting ultrasonic waves and reflect the sound in to an electrical signal and also Bluetooth module is also added to the project in order to control the COBOT from our android phone.

The AVR microcontrollers and the ultra sonic sensors are the main sensing element in the drilling machine which has more numbers of circuits are inside the devices. The ultra sonic sensor is mounted on the servo and by rotating the servo to the different angles we will obtain the reading from the ultrasonic sensor in those angles. A demonstration of the capability we have established a goal mission scenario of performing a multi agent, mixed initiative search and persuit in elusive target.

Future work will be improve the performance of the capabilities enabling search and persuit and establish the drilling operation for seamless collobration to maximize the estimation. Thus it has been concluded the mobile operated COBOT drilling machine are controlled by the blutooth module and it has successfully tested.

REFERENCES

[1] Yousef M. Abueejela, A. Albagul, Ibrahim A. Mansour and Obida M. Abdallah. “Automated Drilling Machine Based on PLC” on IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 3, March 2015.

[2] J.R.V. SaiKiran, V.N.BPrasad Sodisetty “Simulation and Experimental Research on Robot Drilling” onInternational Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8, Issue-2S3, July 2019.

[3] J. G. Blitch(2003), “Adaptive mobility for rescue robots,” Proc. SPIE(Sensors, and Command, Control, Communications, and Intelligence (C3I) Technologies for Homeland Defence and Law Enforcement II), vol. 5071, pp.315–321.

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 5.928|

| Volume 4, Issue 9, September 2021 |

|DOI:10.15680/IJMRSET.2021.0409009 |

[4] J. Carlson and R. Murphy (2003), "Reliability analysis of mobile robots," in Proc. IEEE Int. Conf. Robot. Autom. (ICRA), Taipei, Taiwan,pp. 274– 281.
[5] M. Micire (2002), "Analysis of the robotic-assisted search and rescue response to the world trade center disaster," master's thesis, Univ. South Florida, Tampa.
[6] R. Tiron. (2003, May) Lack of autonomy hampering progress of battlefield robots. National Defense. [Online]. Available: www.nationaldefensemagazine. org
[7] R. R. Murphy (2000), Introduction to AI Robotics. Cambridge, MA: The MIT Press.
[8] Y. Beauchamp and T. Stobbe (1995), "A review of experimental studies on human-robot system situations and their design implications," Int. J. Human Factors Manuf., vol. 5, pp. 283– 302.
[9] Starr, R.Wynne(1999), and I. Kennedy, "Failure analysis of mature robotsin automated production," Proc. Inst. Mech. Eng.—Pt. B (J. Eng. Manuf.), vol. 213, pp. 813–824.
[10] R. Nourbakhsh(2002), "The mobot museum robot installations," in Proc. IEEE/RSJ IROS 2002 Workshop Robots in Exhibitions, pp. 14–19.

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