Proc. 1st International Conference on
Machine Learning and Data Engineering (iCMLDE2017)
20-22 Nov 2017, Sydney, Australia
ISBN: 978-0-6480147-3-7

MPU Based 6050 for 7bot Robot Arm Control Pose Algorithm

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Abstract

In recent years, domestic and foreign researchers using the robot arm in traditional manufacturing industry, medical treatment, space exploration, education and other fields and made some successful results. The accuracy and stability of the manipulator has been an important topic of many scholars, especially in some specific areas ex) industrial assembly, security, explosion prevention, medical and other fields with special requirements ex) higher precision and movement are required to produce very small deviations. on the mechanical stability arm. This paper introduces the attitude operator sensor MPU6050 with 7BOT multi DOF robot arm manipulator to improve the stability of extremely precise experiments.I fix MPU6050 on 7BOT mechanical arm, MPU6050 mechanical arm posture by clearing the number According to the esp8266 wireless module to transmit to the server, the waveform and generation of 3D position speed and angular speed, including processing and produce the 3D mechanical arm motion model, while the 7BOT attitude data sent to the server, automatic data and waveform than on. If large deviations are corrected in a timely manner, the revised data sent to the 7BOT arm, arm posture timely correction. The experiment proved that can greatly improve the mechanical arm to complete a given task accuracy in initial position.

Keywords: Attitude calculation, MPU 6050, 7BOT Robot Arm,

1. INTRODUCTION

Mpu6050 attitude sensor is used in many kinds of application scenarios. L. Anusha and Y. U. Devi Implementation of gesture based voice in and language translator for dumb people in the MPU6050 collection with the gesture recognition algorithm of precise orbit information back to the deaf, and converted into normal language output in Implementation of IMU s. Ensor for elbow movement measurement of Badminton players Jacob W. N. the A., Wan Zakaria and M. R. B. Md Tomari MPU6050 for arm joints for athlete's motion capture system, can accurately capture the athlete's movement speed, improve the efficiency of data of athlete analysis. In the D Bassily C Georgoulas,, J Gue Ttler, T Linner, T Bock Intuitive and Adaptive Robotic Arm Manipulation using the Leap Motion Controller the mechanical arm through the combination of leap motion, to implement the real-time control of the manipulator by leap motion gesture recognition, greatly reducing the control of the mechanical arm threshold.

In addition MPU6050 can be widely to improve the mechanical arm movement In the Trajectory optimization using time-separating efficiency, strategy with improved PSO on mechanical arms Meng P. Feng the Z., P., Chao, L. Weixing and G. Qi is a combination of attitude sensor and particle swarm optimization algorithm for joint trajectory optimization, the test results show that can greatly improve the accuracy of the manipulator trajectory . The use of mechanical arm is very broad, recently in A. Joly, R. Zheng and K. Nakano A Scaling Method for Real-Time Monitoring of Mechanical Arm Admittance, "a text, the author proposes a manipulator to obtain the parameters of road safety system driving intention to timely modify the driving error based on, this paper proposes a to improve the method of manipulator calibration. In K. Nishikawa, K Furukawa, I. Kawate, T. Miyazaki, T. Nouzawa and T. Tsuji Design of steering wheel characteristics based on human arm mechanical properties in an article by mechanical arm and arm compared to the direction of vehicle design disc system. In the Y. B. Li and Z. L. Jin Kinematic analysis of a Novel 3-DOF hybrid mechanical arm, "a paper mechanical arm motion analysis plays an important role in the application of mechanical arm, according to each different mechanical arm manipulator is established, inverse displacement equation, can fast and improve the operation efficiency and accuracy of the manipulator.

2. RELATED WORK

In general, the manipulator of predetermined initial position and the actual initial position will have a certain deviation, then make some actions according to the demand will have a certain deviation between the actual position and the predetermined position, the main reason is caused by the mechanical structure of the 7bot manipulator, 7bot joint in according to the need for the moving distance is according to the rotation angle number of turns of mechanical arm joint gear to the actual control, so the distance and angle of the actual control of the number of laps the mechanical arm movement will have a certain gap in different types of the same mechanical arm. In general, the manipulator of predetermined initial position and the actual initial position will have a certain deviation, then make some actions according to the demand will have a certain deviation between the actual position and the predetermined position, the main reason is caused by the mechanical structure of the 7bot manipulator, 7bot joint in according to the need for the moving distance is according to the rotation angle number of turns

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This experiment will be 6 degrees of freedom MPU6050 attitude sensor and 7bot manipulator with combination of trajectory optimization algorithm, algorithm is improved by 7 BOT mechanical arm to complete the established rate and accuracy of sensor fusion. In Chongran Jiang, Qingjun Shi, Wenping Chen and Binshan Xu Research and design on distributed controllers for mechanical arms of Inertial sensors are used in humanoid robot, and the advantages of using sensors to optimize robot arm trajectories and prevent excessive fluctuations are considered: small size, low cost and so on.

3. MAIN GOAL

This algorithm mainly through the attitude calculation based on sensor to solve the manipulator control system leap motion control problem is inevitable because the desktop manipulator itself the mechanical structure of the angular position error.

Figure 1 is show about 7bot robot arm initial pose problem. When initial pose value to 7bot robot arm, it's Arduino due board programing setting servo motors to initial pose Like {85, 120, 60, 90, 90,90} the value is factitious. It's changlle to setting value to accuracy. So need other approach checking pose estimation, this paper support pose estimation using MPU 6065 make it more better.

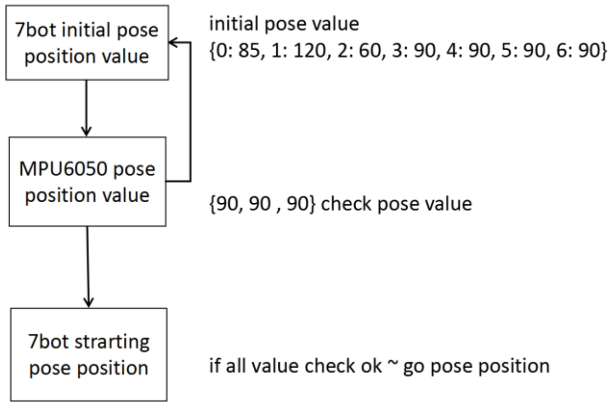

Figure 1 . Flowchart initial position check algorithm

The attitude sensor will produce settlement data drift phenomenon, this study uses Kalman filter and two order filter algorithm of attitude sensor is fixed on the back arm above the data filtering, the actual movement of the 3D model of mechanical arm movement is extremely close to the mechanical arm. The initial value of 7bot value for the initial steering, when the steering gear assembly is difficult to achieve accurate initial value. If the initial position angle of 90 degrees 7bot reality should be the value is set to the value of the steering gear. This value is consistent after the initial pose and initial value. When the need to change the posture change of steering gear the value to control. This benefits cost feedback value will be very fast. When the frequency value does not appear The initial value can only be made. For example, after being used to replace the 7bot actuator to the initial value of angles = {0: 85, 1: 120, 2: 60, 3: 90, 4: 90, 5: 90, 6: 90} 1 steering gear had been biased 5, other position also address actuator is not precise. Because the 7bot value to determine the position of reverse gear can see its driver C language inside filter three ForceFilter.h, MedianFilter.h, PressFilter.hforcefilter for mechanical arm mode of protection, soft mode and normal mode corresponding to each of its function, normal pause change value until the next input value position, soft mode to pause servo value feedback, in order to handle staff after moving this process value preservation and 3-D visualization of this process. Protected mode is reserved for pauses and initial values or current values. Figure 2 is show the six axis sensor, which is in three directions: velocity, angular velocity, and acceleration data. Figure 3 is show MPU 6050 gyro sensor and acceleration of gravity transfrom psoe to x,y,z 3D space, using this value to checking 7bot pose estimation is accuracy problem. Improve 7bot initial pose value accuracy.

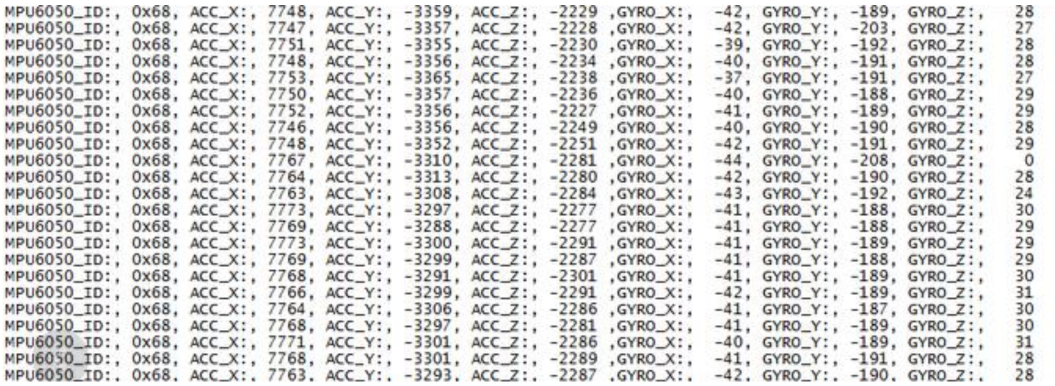

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Figure 2. MPU 6050 Six axis sensor data

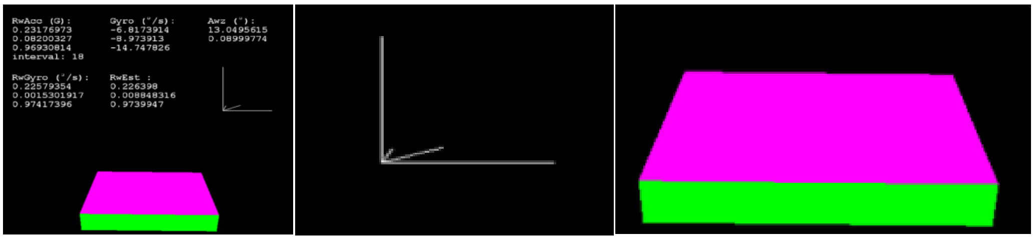

Figure 3. MPU 6050 gyro sensor and acceleration of gravity

4. CONCLUSION

The experiment proved that the sensor can be modified through the gesture manipulator of the actual position and position of the original gap can be corrected because of 7bot desktop manipulator position error is inevitable because of the mechanical structure itself, although in the actual experiment because processing programs such as delay reasons, the mechanical arm position correction will produce minimal delay. But has a significant effect on improving the accuracy and efficiency of the manipulator.

5. ACKNOWLEDGMENTS

This work is supported by the General Programs of China National Science Foundation under grant No. 61772090.

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