

INTISARI

Seiring perkembangan *modern*, manusia banyak sekali melakukan aktivitas yang beresiko terjadi kecelakaan. Salah satu aktivitasnya yakni saat mengambil benda pada ketinggian. Di samping itu masa sekarang sudah banyak pekerjaan manusia yang dilakukan oleh robot. Robot mempermudah manusia untuk melakukan hal yang beresiko terjadinya kecelakaan. Selain robot juga berkembang pula teknologi *speech recognition* yang berguna untuk mengenali ucapan manusia. Dengan kedua teknologi tersebut memberikan ide untuk mengendalikan lengan robot dengan suara manusia untuk mengambil benda

Lengan robot akan bergerak berdasarkan perintah ucapan yang diterima. Lengan robot memiliki 4 buah servo yang terletak pada *base*, *shoulder*, *elbow* dan *gripper*. Benda yang diambil terbuat dari *sterofoam* berwarna putih. Ucapan manusia akan diterima menggunakan *microphone* menuju PC/laptop. Perintah ucapan untuk mengambil benda yaitu balok, bola, kubus, dan tabung. Semua ucapan diproses melalui tahapan seperti *pre emphasis*, normalisasi, pemotongan sinyal, *zero padding*, *framing*, *windowing* data masukan dan ekstraksi ciri DFT (*Discrete Fourier Transform*). Hasil ekstraksi ciri akan dibandingkan dengan variasi *database* 1, 2, 4, dan 8 ucapan dengan melakukan perhitungan similaritas kosinus.

Pengenalan ucapan untuk pergerakan lengan robot pengambil benda telah berjalan dengan baik terhadap 3 *user*. Perintah masukan ucapan berhasil dideteksi dan lengan robot telah bergerak sesuai perintah ucapan masukan. *Gripper* lengan robot dapat mengambil benda dengan ukuran 5cm. Didapatkan hasil terbaik dengan *database* 1, *segment averaging* 8, dan nilai kNN 1. Program pengenalan *real time* dengan nilai *thresholding* mampu mengenali rata-rata persentase semua user sebesar 87,5%.

Kata kunci : lengan robot, *speech recognition*, DFT (*Discrete Fourier Transform*), kNN, *thresholding*, similaritas kosinus.

ABSTRACT

As the time goes on, human have done numerous dangerous high risk activity. One of the examples is process of taking object at a certain height. Other than that, most human activities can be done by robot these days. Robot ease human in doing high risk activity that could lead to accident. Other than the advance of robot technology during the few last decades, speech and voice recognition technology in identifies human verbal command also found and improved. With the two new technologies, it gave an idea to control an artificial robot arm with voice recognition to taking object.

Robot's arm will move according to command that it receives. Robot's arm have 4 servo which are located at base, shoulder, elbow, and gripper. Object that will be used for grabbing is made with a white colour styrofoam. Human speech will be receive by using a microphone which will linked to a PC/laptop. Verbal command to take object with different kind of shape, such as beam, ball, cube, or tube. All verbal command will be processed in few stages, such as pre emphasis, *normalisasi*, *pemotongan sinyal*, zero padding, framing , windowing of input data and character extraction of DFT (Discrete Fourier Transform). Result of character extraction will be sampled against verbal database 1,2,4, dan 8 to be analyzed of cosinus similarities.

Voice recognition usage to move robot's arm movement in taking object have gone well for three users. Input of verbal command successfully detected and robot's arm have moved according to commands. Robot arm gripper can pick up objects with the size of 5 cm. Best result is in database 1, segment averaging of 8, and kKN score of 1. Program with the introduction of real time thresholding able to recognize the value of an average percentage of 87.5% of all users..

Keywords: Robot arm's, speech recognition, DFT (Discrete Fourier Transform), thresholding, cosinus similarities.