ABSTRACT

PATH PLANNING USING BEE COLONY ALGORITHM INFINDING PLANTATION ROUTES USING DRONE AT A COFFEE PLANTATION IN ALAM INDAH VILLAGE IN BANDUNG REGENCY

By

Fico Davin Adriyansyah

1202184148

The extent of coffee plantations and the different levels of coffee maturity make it difficult for coffee farmers to monitor which coffee is ready to be harvested and which is not. In contrast to other fruits, each color of coffee indicates a level of maturity which greatly influences the conditions and quality of different coffees such as taste, aroma, physical bean, and others. The selling value of coffee itself depends on the level of maturity of the coffee. The coffee plantation in Alam IndahVillage, Bandung Regency has an area of 84 ha or about 840,000 m2, making it difficult for farmers to monitor the condition of coffee one by one. There are several techniques proposed to monitor coffee to be more efficient, one of which is by using a drone equipped with image capture and processing. Basically droneshave a certain time limit to be able to circle an area. In large plantation areas, aspecial route is needed for drone routes so that the route is fast and efficient but can still reach the entire plantation area. For this reason, in this study path planning was carried out to find out the fastest route that drones could take in thecoffee plantation area of Alam Indah Village, Bandung Regency using the bee colony algorithm. Path planning is divided into 2 areas that have been adjusted to the operating capabilities of the DJI Phantom 4 drone. Implementation is carried out with the initial phase first to determine the colony size and the numberof iterations carried out. Determination of the best route is carried out using the neighborhood principle using the highest fitness value calculation. Each iterationenters the employed bee phase, the onlooker bee phase, and the scout bee phase. Each phase that is passed updates the trial value based on the resulting fitness. There are 24 blocks with the best route that can be traversed by drones, namely the route in region 1 which can be reached in 18.4 minutes and the route in region2 in 13.4 minutes with a speed of 30 km/hour and a drone altitude of 10 meters. The fastest route in area 1 that can be traversed by drones is through plantation block A-B-C-D-E-F-M-N-O-P-Q-L-K-G while in area 2 is through block I-J-R-T-U-X-W-V-S-H.

Keywords**:** *Path planning, bee colony, drone, coffee plantation*