ERRATUM

Erratum to: On Different-Dimensional Deployment Problems of Hybrid VANET-Sensor Networks with QoS Considerations

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The original version of this article unfortunately contained mistakes. The changes are enumerated below:

1. “Hsing-Wen Wang” should be deleted from the author group section.
2. “Chun-Cheng Lin” should be the corresponding author of this article.

The online version of the original article can be found at <http://dx.doi.org/10.1007/s11036-015-0667-3>.

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3. Algorithms 1, 2, and 3 should be presented as:

Algorithm 1 EVALUATE COST(HARMONY X^*)

```

1:  Let all penalty counters  $count_{hop}$ ,  $count_{cover}$ ,
    $count_{capacity}$  to be zero
2:  for  $i = 1, 2, \dots, m$  do
3:    Find the RSU  $j$  that is the closest to sensor
    $i$ , according to the locations of RSUs
   determined by harmony  $X^*$ 
4:    Compute the distance  $L_i$  from sensor  $i$  to
   RSU  $j$ 
5:    Compute number of hops  $H_i$  from sensor  $i$ 
   to RSU  $j$ 
6:    if  $H_i > 2$  then
7:       $L_i = H_i = 0$ 
8:       $count_{hop} = count_{hop} + 1$ 
9:    end if
10:  end for
11:  for each grid point of the road do
12:    if the grid point is not covered by any
   sensor or RSU then
13:       $count_{cover} = count_{cover} + 1$ 
14:    end if
15:  end for
16:  for each RSU  $j$  do
17:    if number of sensors in the range of RSU  $j$ 
    $> Q$  then
18:       $count_{capacity} = count_{capacity} + 1$ 
19:    end if
20:  end for
21:  Output the cost value in (24)

```

Algorithm 2 HSA FOR DEPLOYING HVSN ON A GRID ROAD

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1: Randomly generate the hms harmonies in the HM matrix
2: Evaluate costs of the hms harmonies
3: Initialize the iteration number  $k = 1$ 
4: while  $k \leq$  the maximal iteration number  $\eta$  do
5:   for  $i = 1, 2, \dots, 2n$  do
6:     if  $\text{rand}(0, 1) < \text{HMCR}$  then
7:        $x_i^{\text{new}} =$  randomly selected from  $\{x_i^1, x_i^2, \dots, x_i^{\text{hms}}\}$ 
8:       if  $\text{rand}(0, 1) < \text{PAR}$  then
9:         if  $i$  is odd then
10:           $x_i^{\text{new}} = \max\{x_i - H/2, 0\}$  or  $\min\{x_i + H/2, H\}$ 
11:        else
12:           $x_i^{\text{new}} = \max\{x_i - bw, 0\}$  or  $\min\{x_i + bw, W\}$ 
13:        end if
14:      end if
15:    else
16:      if  $i$  is odd then
17:         $x_i^{\text{new}} =$  a random number from  $\{0, H/2, H\}$ 
18:      else
19:         $x_i^{\text{new}} =$  a random number from  $\{0, 1, \dots, W\}$ 
20:      end if
21:    end if
22:  end for
23:  Evaluate cost of the new harmony  $(x_1^{\text{new}}, x_2^{\text{new}}, \dots, x_{2n}^{\text{new}})$ 
24:  Accept or reject the new harmony according to its cost
25:  Increase the iteration number  $k$ 
26: end while
27: Output the solution corresponding to the harmony with the minimal cost in the HM matrix

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Algorithm 3 GSHS FOR DEPLOYING DENSE HVSN

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1: Randomly generate the hms harmonies in the HM matrix
2: Evaluate costs of the hms harmonies
3: Initialize the iteration number  $k = 1$ 
4: while  $k \leq$  the maximal iteration number  $\eta$  do
5:   for  $i = 1, 2, \dots, 2n$  do
6:     if  $\text{rand}(0, 1) < \text{HMCR}$  then
7:       Select a note  $x_i^{\text{new}1}$  from the HM matrix via tournament selection
8:       Select a note  $x_i^{\text{new}2}$  from the HM matrix via tournament selection
9:        $x_i^{\text{new}} = \alpha \cdot x_i^{\text{new}1} + (1 - \alpha) \cdot x_i^{\text{new}2}$ 
10:      if  $\text{rand}(0, 1) < \text{PAR}$  then
11:        if  $i$  is odd then
12:           $x_i^{\text{new}} = \max\{x_i^{\text{new}} - ms \cdot \text{rand}(0, 1) \cdot x_i^{\text{new}}, 0\}$  or  $\min\{x_i^{\text{new}} + ms \cdot \text{rand}(0, 1) \cdot x_i^{\text{new}}, W\}$ 
13:        else
14:           $x_i^{\text{new}} = \max\{x_i^{\text{new}} - ms \cdot \text{rand}(0, 1) \cdot x_i^{\text{new}}, 0\}$  or  $\min\{x_i^{\text{new}} + ms \cdot \text{rand}(0, 1) \cdot x_i^{\text{new}}, H\}$ 
15:        end if
16:      end if
17:    else
18:       $x_i^{\text{new}} = \min_i + \text{rand}(0, 1) \cdot (\max_i - \min_i)$ 
19:    end if
20:  end for
21:  Evaluate cost of the new harmony  $(x_1^{\text{new}}, x_2^{\text{new}}, \dots, x_{2n}^{\text{new}})$ 
22:  Accept or reject the new harmony according to its cost
23:  Increase the iteration number  $k$ 
24: end while
25: Output the solution corresponding to the harmony with the lowest cost in the HM matrix

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4. Page 7, a square symbol should be added at the end of the following sentences:

Hence, all the three loops in Algorithm 1 can be done in $O(H+m+H \times W+n)=O(H \times W+m+n)$. $\square$

Hence, the loop with η iterations in Lines 3–26 can be done in $O(\eta(2n+H \cdot W+m+n+hms))=O(\eta(H \cdot W+m+n+hms))$. $\square$

5. Page 9, Equation 26 should be presented as:

$$\frac{\lambda \sum_{i=1}^m L_i / (C_R + C_S) + (1-\lambda) \sum_{i=1}^m H_i / 2}{m - count_{hop} + count_{hop} \cdot penalty_{hop} + count_{capacity} \cdot penalty_{capacity}} \quad (26)$$

Note: The original version of this article was corrected based on the above enumerated changes.