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ROBOT FOR PATH PLANNING OBSTACLE AVOIDANCE (RPPOA) MODEL IN HOMELAND ENVIRONMENT

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ABSTRACT

In this paper, problem of obstacle encountered by using various trials and examinations. It is suggested that in large surroundings home land surroundings with regards of robot requests, it can become more effective if the trials of robot considers acquaintance already gained and its results during rest of the plan of actions. This philosophy of trials on the robot is verified in a model test situation with home land environment. The main problem of obstacle examination considered is robot claims that is totally depend on time and environmental situation. This situation may be dangerous. It has also some planning of action with firstly unidentified home land situations. And different routes are to be proposed to take best possible route with short amount of time. After implementation of the program in to the arduino motherboard robot will learn automatically and self independently. The test results also suggest that the robot's behaviour be contingent on material about the environment.

KEYWORDS: *Path Planning, RPPOA, Homeland Environment*

INTRODUCTION

A RPPOA robot working in a home land environment faces several significant problems. Most vital of them is the aptitude to figure the model of the home land environment, to plan ways and to follow them while avoiding obstacles. This type of problem tackles by different robot also and implements techniques. Many researches are taken into consideration which was developed and explore. Ahead information about the home land surrounding environment and keeping it rationalized is the necessary complaint of successful presentation. Such as many applications of practically investigated in this type of home land environment. The home land environment can be damaging the robot. Investigation of a large home land environment takes lots of time and computational resources.

If it thought that in terms of all points home land environment is very much useful the recital of this robot. In many cases of the trials taken by us, the submission require the exploration of the whole home land environment while in other applications, such as the task definition implies a systematic research of the whole area. It discusses the problem finding examination of inspection for time-critical mobile robot missions. It is shown that environment is very big and therefore finding is tedious. But one thing is testing environment will be difficult and also takes much of time also degrade the performance of the robot. The assumption is that examination and mapping are not goals by it but means that permit the robot to fulfill its mission. The work which is done in respect to related work does not address utility of exploration of the work. It proposes a heuristic exploration strategy that chooses between drifting new areas and exploiting knowledge about the already explored areas. The decision is based on the plan which is taken and finalized by thus. While decision making amount of knower acquired and into consideration. Then we test the policy in a model environment with robot. Test results shows that this mission- oriented heuristic can be useful for mobile robots on time- critical missions.

FINDING INNOVATIVE ROUTES

To investigate the problem and to explain its importance, let us verify 2 test runs with the robot Autonomous. The RPPOA robot has to negotiate from the starting point in the lowering left corner of the map to the specific point in the upper right corner in both cases. The home land environment is completely unknown. During track following the robot follows the instruction as per programmed and changes its path as the obstacles are comes in front of the ultrasonic sensor. Plan of execution is according to the program feed inside the adrduinouno. The any obstacles come in front of the robot but robot sense the obstacle and change its rouge as per situation. Many obstacles we are already makes with different situation with different configuration so that difficult routes also find by the robot. The difference is that while in Figure 1 the robot is trying to find the shortest route by just avoidance the crash. In figure 1, the possibility of path finding is showing. When moving from one position to another position robot must take suboptimal path so that he cans rich with shortest possible route. As the goal is achieved by the robot, he stored the data in the memory and take next trial to find next route also and follow the same procedure to avoid the obstacle and best possible route.

Many RPPCOA robot repeat the same point which we finalized the target points. If the robot is avoid obstacle while travelling the route then he takes next iteration. The problem is thus how to find trajectories that increase the obviousness of robot's behaviour and reduce risk.

PROBLEM STATEMENT

The test which is to be done is very big and not easy to tackle that much of space. And it is not possible to keep the speed same throughout the travelling time of the robot. The test environed is having lot of obstacle with different configuration such as l shape, c shape, I shape, and etc. the test environment is placed at a specific distance to maintain by the us. The ultrasonic sensor are attached at the front side of the robot body which emits the signal continually and send the data to the motherboard of the Arduino uno, this processor continuously monitoring the situation and obstacle. As the obstacle are come in the front of the robot. Robot will send back to the signal and arduinouno makes changes as per programmed installed into it. He gives to the signal output to the control drive and this control drive makes changes in the speed of the different wheels automatically. The RPPOA robot is expected to fulfill its mission as fast and safely as conceivable. Errors are small and do not collect and therefore it is possible to follow a pre-planned path rather precisely. The robot tries to find reliable path and study from previous path and takes decision according to that to avoid collision and best possible route. Our mission is depending on the trials taken by us.

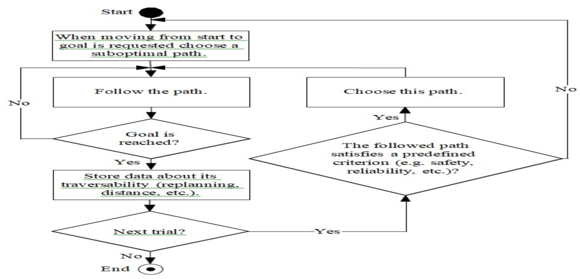

Figure 1: The Path Selection Algorithm.

Mission-Oriented Examination

Here the problem and outline of the project is discussed. The main aim of the robot is assumed that RPPOA robot is with full functioning in the home land environment. But we require a fulfilled plan of execution of the project. The plan we discussed is already be made and syntheses as per our difficulties we make in the path finding so that the robot will be tries to live in many difficult situation as per well as different environed conditions. The points are plotted as per discussed and take x and y position of that points. In this study of project it also investigates the strategy of time, situations dangerous positions and therefore we make plan of action on the map and it is assume that that localization of the robot plan of action. The robot has no knower in prior time as he put inside the home land environment he automatically tries to learn the many thing which includes obstacle avoiding and best possible route finding.

Exploration Strategies to Implement

The routes which are filled by the robot, he gains some knower as his trial in the route finding. There are two strategies by the first is that as he taking into the new route to the target it is tractable than the previous. And second is that it has more accuracy than the previous path he followed. RPPOA that is used in the nearest future is gained more probably than knowledge used after a long time. The robot has some predefined points which are mention in the home land.

T□PPt_1, t_2,t_n} where t is points which are mentioned inside the map. The assignment consists of traversing the target points in a predefined order

M □m_1, m_2,m_3,..., m_i, m_i □ ,..., m_k, where

m_j□wht_u,t_v)

m_j□,h□,ht_v,t_w)

In calculation to the existing map which is constantly modernized the RPPOA robot also saves the entire followed this path P. The path which is finding in these routes is followed by the prior path and takes to new path followed. The average timing is noted by us and noted down and mentioned in the table. Every time of existing the robot crosses the environment the map is updated by the information about the environment during this mission and time when a new path is planned this new information is taken into account.

Examination Strategy

When robot entered into the home land region, it tries to avoid the obstacles and finding the best possible path or route. And the main point of the project is that choosing the new path for best one. So the required average time for the new path is calculated by the average time for the verified route such as l,s or c type path. $Ti\ (P_{newly})$ is verified to average time of the path stored so far $Ti(P_{good})$. If $Ti(P_{newly})$ □ $Ti(P_{good})$ then the new path $P_{newly}$is chosen.

TEST ENVIRONMENT

This trail is taken using the robot is equipped with ultrasonic sensor, motor drives, drive panel, Arduino Uno board. The program is built in arduino.cc software which is open resource software and easy to make programs by using geranial concept of C language and C++ also. We can clearly see that the various routes are mentioned. These routes are made with different shapes such as rectangular, l type, s type and etc. as the program is build, and it is uploaded through the USB cable. Then it is compiled through the software itself and finally as there is no error then it is uploaded to the robot. If the error is occurred inside the program then manage it and corrected it. As per shown while compiling the execution. The wire is used to connect the all parts as shown in figure 3. The external supply is needed to run the robot. The power supply is through motor drive to motherboard. Male to male, male to female type of wire are used for the connection.

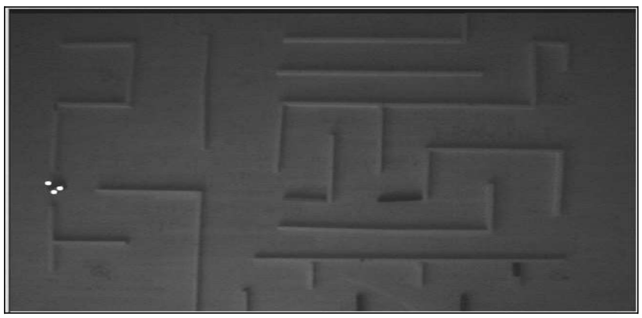

Figure 2: The Test Environment.

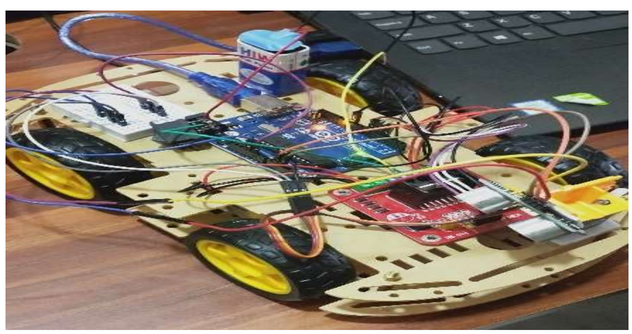

Figure 3: The Home Land Environment looked Through the Overview Camera with the Robot.

Test Trials

In test trials many tasks and readings are taken to fulfill the execution of the robot for which it is made for. The fineness of the results is obtained through lot of trials taken because at the starting programs which are uploaded in the robot is not giving proper result. So to optimize the path detection and obstacle fining we modified the programs four to five times and take the reading again. So the different points are mentioned in the home land environment they are as followsM1 M2M1M3M1M2 G4 M2M1M2M1M3M1M2 G4 M2M1M2M1M3M1M2 G4 M2M1M2M1M3M1M2 G4M2.The target point M1resembles to the point marked with M1.

Since Home land environment is making static, the robot in environment still has problems because of uncertainty in the sensor readings, audiometric errors and minor localization errors due to the image acknowledgement and therefore the act of the robot be subject to a great extent on a stochastic algorithm.

Obstacles

The shape of the obstacle is mentioned in the Table 1.The shape of the obstacles is I-shape, L-shape, C-shape, rect.1 and rect2.now keep the location as fixed in the environment and makes different run to verify the experimental results.

Table 1: Obstacles Requirement

	I	L	C	Rectangle 1	Rectangle2	Rectangle 3	Rectangle 4
value	2	2	1	1	1	10	8
size (mm)	322×40	126×320	160×240×160	140×385	100×105	80×80	40×40
		&					
		160×280					

Table 2: Obstacles in Home Land Environment 2

	I	L	C	Rectangl e 1	Rectangle 2	Rectangle 3	Rectangle 4
value	2	2	1	1	1	10	8
size (mm)	322×40	126×320 & 160×280	160×240×160	140×385	100×105	80×80	40×40
Changing probability	0	0	0	0	0	0	0
type	modelled	modelled	modelled	modelled	modelled	unknown	unknown

Table 3: Obstacles in Home Land Environment 3

	I	L	C	Rectangle 1	Rectangle 2	Rectangle 3	Rectangle 4
amount	2	2	1	1	1	10	8
size (mm)	322×40	126×320 & 160×280	160×240×160	140×385	100×105	80×80	40×40
Changing probability	0	0	0	0	0	0	0
type	unknown	unknown	unknown	unknown	unknown	modelled	modelled

Table 4: Obstacles in Home Land Environment 4

	I-Shapes	L-Shapes	C-Shapes	Rect. 1	Rect. 2	Rect. 3	Rect. 4
amount	2	2	1	1	1	10	8
size (mm)	320 ×40	120×320 & 160×280	160×240×160	140×385	100×105	80×80	40×40
Changing probability	0	0	0	0	0	0	0
type	unknown	unknown	unknown	unknown	unknown	unknown	unknown

Table 5: Obstacles Made in Home Land Environment 5

	I-Shapes	L-Shapes	C-Shapes	Rect. 1	Rect. 2	Rect. 3	Rect. 4
amount	2	2	1	1	1	10	8
size (mm)	320×40	120×320 & 160×280	160×240×160	140×385	100×105	80×80	40×40
Changing probability	0	0	0	0	0	0	1
type	unknown	unknown	unknown	unknown	unknown	unknown	unknown

Table 6: Obstacles in Home Land Environment 6

	I-	L-	C-	Rect. 1	Rect. 2	Rect. 3	Rect. 4
amount	2	2	1	1	1	10	8
size (mm)	320×40	120×320 & 160×280	160×240×160	140×385	100×105	80×80	40×40

Changing probability	0	0	0	0	0	0.2	1
type	unknown	unknown	unknown	unknown	unknown	unknown	unknown

Table 7: Shortest Path in Modelled Home Land Environment

No. of Trial	No. of Preplanning	Travel Time (Sec)	Deviation (Mm)	Dista
1	0	105	29,2	2535,3
2	0	103	58,4	2551,2
3	3	108	29,2	2561,3
4	0	104	58,4	2576,9
5	0	102	29,2	2535,7
6	0	104	58,4	2592,7
7	0	104	29,2	2540,8
8	0	102	58,4	2540,8
9	0	105	29,2	2543,0
10	0	103	58,4	2573,0
Average	**0,3**	**104**	**43,8**	**2555,1**

Table 8: Number of Trials

Environment	1	2	3	4	5	6
Path Following	12	52	52	52	52	52
Path Selection	-	1	5	16	14	31
Global Learned Path	-	10	26	35	37	18
Path Sub	-	-	-	8	28	17
Local Preplanning Learned Path	-	-	-	42	22	33

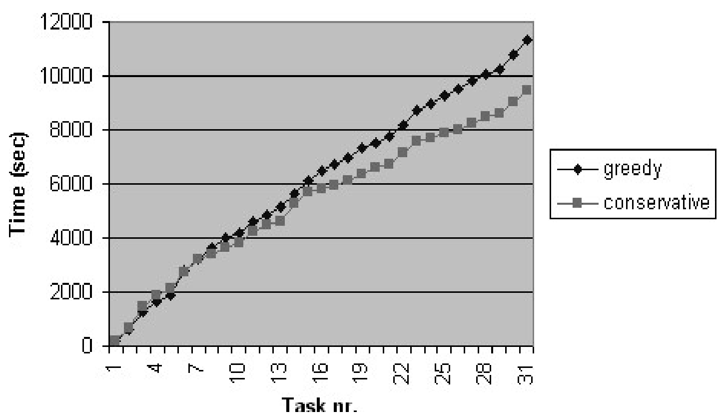

Figure 4

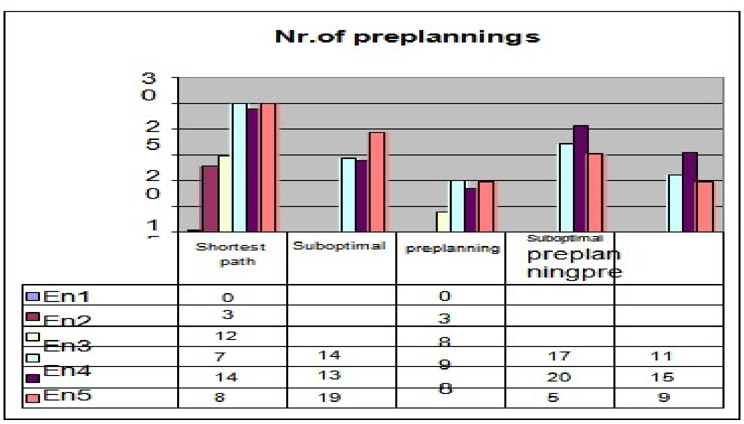

Figure 5: The Duration of the Mission.

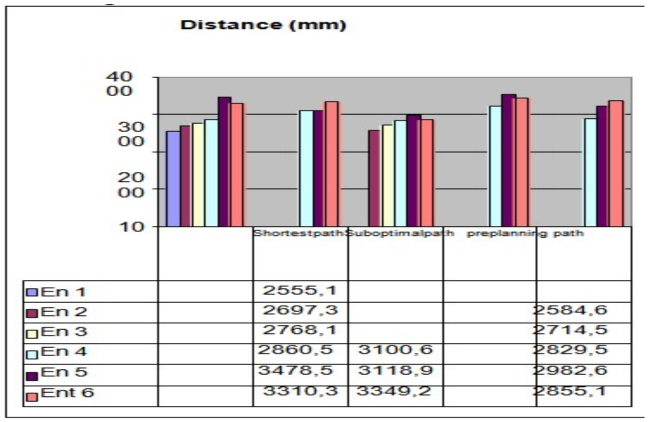

Figure 6

EXPERIMENTAL RESULTS OBTAINED

The main target is to complete the all trials in this region and taking much iteration. Time taken to satisfying the test of 35 readings is shorter than conventional strategy. Therefore, the uneven time for the task is very much critical to get the proper results. The table which is showing that the duration of time required to complete the route plan.

Learning

In the learning technique for the robot it is clearly shows that the increased efficiency is obtained during the test run in both local and global planning. These tests are conducted in the Environment 4, a static home land environment. The trial which is taken shows that robots behaviour clearly during the running test. The algorithm for the path selection is rather than quickly as they find the route within less time of execution.

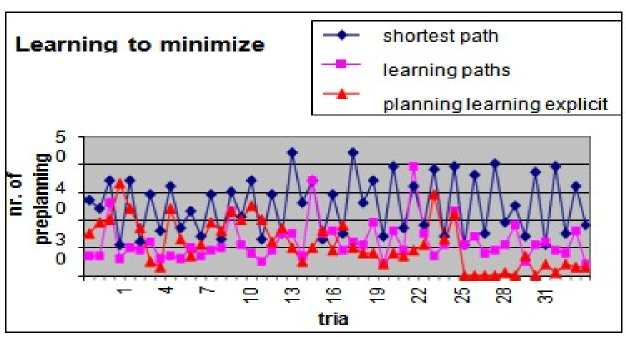

Figure 7: The Learning Curve of the Path Selection Algorithm in the Home Land Environment 4.

CONCLUSIONS

The conclusion of this paper is accessible an exploration strategy for a RPPOA robot in large hazardous environments. It was supposed that the robot is working under time constraints. We obtainable an experiential exploration strategy that chooses among exploration and maltreatment considering the amount of material gained so far and of this knowledge during the rest of the tests which are conducted. We simulated a time-critical mission by showing experiments in a home land environment and verified the heuristics with a greedy exploration strategy. The test results showed that the robot using the conservative exploration strategy is able to fulfill the mission around 18 % faster than the robot using the greedy examination strategy. These test results expose that useful to choose between investigations of the environment. Knowledge as possible about the surrounding is not necessarily beneficial if the mission time is limited. The presentation of the traditional exploration strategy undoubtedly depends on the environment where the RPPOA robot is operating and, on the mission, assigned. We therefore are wary with generalizing these results too much. Certainly, there exist home land environments and assignments where the greedy examination strategy would be more efficient. More experiments in different environments and unlike path planning methods are required to validate the presented approach. We conclude that oriented exploration heuristics could be considered in mobile robot applications that are time critically, where the robot is action in a large unknown environment and when this environment is hazardous. It suggests similar can be applied for other learning problems in mobile robotics

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