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TWO WHEEL SELF EQUILIBRIUM SWARM ROBOT CONTROLLED BY PORT FORWARDING METHODS USING IOT

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ABSTRACT: *Background/Objectives:* This paper proposes a modified method to implement two wheel swarm robot control around anywhere using Internet-of things and also this paper is that we can control multiple robot simultaneously in different places using port forwarding concepts. *Methods/Statistical analysis:* The invertered pendulum concept is used for the balancing of two wheeled robot. This system utilizes sensor, cameras, and DC-motor are used for detecting obstacle judgments, image viewing and wheel movements. *Findings:* The main advantage of this paper is that we can control multiple robots simultaneously in different places using port forwarding concepts. If any problems persist in single robot method we cannot achieve the target. But while using the swarm robot, we can achieve the target even though any problems occurs in the other robot. *Applications/Improvements:* Swarm robot can be used in such way as to travel forward and backward, the current day short distance usage vehicles can be substituted by them. Another advantage of the proposed method is we can control several robots using single IOT.

KEYWORDS: Robot controller board (RCB), Port forwarding on router (PFR), Internet of things (IOT), Inverted pendulum (Ip), internet protocol (IP).

1 INTRODUCTION

We came across a many of journal papers that aspect the accessing files and feature from inside and outside of belonging network. This in most cases covers forwarding ports that opposition difficult discouraged for starting point, but it is beautiful easily done. Many of projects we have spread that use your computer as a server for another devices. When we are inside our network things are reliable to work respectively.

When we are analyzing to access unspecified object from outside our network, things get significantly. So if we analyse why it happens we can easily access remaining computers but when they all access the router has an IP address that's relative for our network but it also has an external IP one which uses when interacting with things outside of our network.

Whenever the computers access request towards the interact, they all access the same IP address. (eg. 127.34.73.214). Simple request as loading web sites one automaticles handled by too hardly because each computer initiated with unique request so it is not hard for the router to figure out where things should more forward as we look forward we got tri computers with unique IP address all are linked to a router ports and protocols ports make a pathway to make this process easier. It an IP is like a college address then ports are imagined as various blocks in the college for education.

Earlier numbered ports have Identified application which is achievement all the way through the computing industry. When we use a webpage for (eg: it uses port 80 and the receiving computers software observing that port 80 is used for serving http documents. So it a request there are responders respectively. If we something to go an http request over different port, they complies VNC is usually applied excessively port 5900 these ports can be changed for different uses running for different purpose.

To avoid being carried out properly with other standard enduring application it is best to access a large numbers for those alternate configurations. PLex media server uses port 32400 for example and mine craft servers uses 25565 for both numbers that fall into this ridicule territory lets explain we are out and about what to access a file on our network. Our computer conveys a request to our home networks IP 127.34.73.214. Which then access through the router your router does not know which computer to send it to Gratefully for ours we can arrenge in a particular way our router to forwarding ports. This implies that depending on the port number that the request is sent over the router can pass it along the IP address. So in this example when we are out and about and using our laptop. We can use different ports to made our request.

When we access our home network. IP address using Port22 our router inside the network. Then SSH daemon on our linex installation will act respondent at the mean time we can make an act of asking politely over port 80 which our router will send to the web server 192.168.1.150 or else we can try remotely mauepulate it and controlsister Laptop with VNC and our router will comet you at 192.168.1.200.

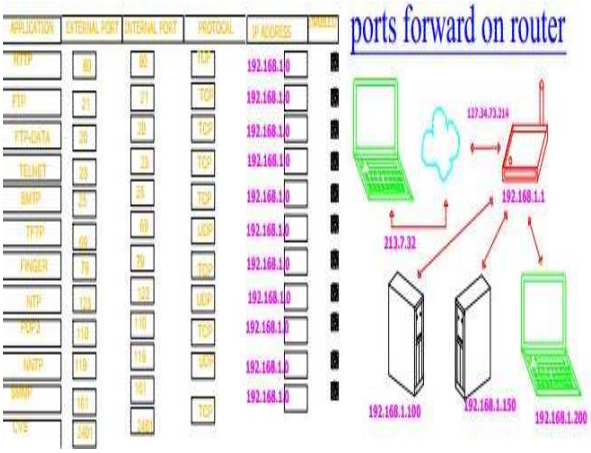

Figure1 Ports forwarding router model

Figure.1 explains the port forwarding methods between internets with controller board. The details explanation mention in this paper above paragraph.

This paper described above is for synthesizing control polices for inhomogeneous swarm to achieve our target. It uses two models of swarm. One is micro continuous model for realistic represent at individual robot activities and the second is macro scopic model that capture the variability of the swarm robot. As the swarm population increases, this microscopic model is more computationally intensive to run, this also require the simulation under may different condition to study the effect of parameter variation because of these drawbacks the macro-continuous model is preferred to achieve the parameter[1].

In this paper they have proposed that short lived navigational markers can be used to assist mobile robots when they contribute to some navigational task. using a trail tracking algorithm it provides good tracking speed and trail following. Trails can be followed at speeds over few centimeter per second. The robot system which described under this paper proves that the tracking speed is rebutal to the maximum speed of the robot, the response time of the sensor and the smallest radius turn and get in corporated into thermal related parameter (hot water pipes) and under the shafts of sun light. The above articles can interfer with a heat trail. By using SLNNs it offeres a easy way to detect, non intrusive and inexpensive[2].

In order to overcome these issues the researchers of swarm robotics have drawn upon decentratized self-organizing fiological systemsin general and from the collective behaviour of social insects in particular. The overall model contributes complex behaviour. In this study i have presented the frist-self organized system of robots which displays a dynamic hierrachy of team work with cooperation also ocuring in high high order entities. A team work explicts neither individual recognition nor difference between the individuals. Hence robot can locally communicate with the network to find a path in the sourounding environment. In this paper used different type of sensors and camera are used. Hence it is presented as an experimental study in which a homogenous colony of atonous robots was actively involved to tackle complex forging task [3].

This paper presents low argatans to find shortest path between points or food source and nest. Argentne ant has only limted individual capacity for orientation, yet by interacting with each other via their trail pheromar, they are capable of selecting shortest route between nest and food. This uses monte-corlo simulation methods to arsive at the shortest path. The selection of shortest branch is a collective and self organising process resulting from the interacted between ants

masking in both the experiments are carried out under red light(dark) to which ants are insensitive and the results are similar to that obtained in presence of light[4].

In this paper focused on proposed virtual phenomena system in which chemical signals get stimulated with the graphics projected on the floor and mean while the robots decide their action depending on the colour information of the graphics. We examined the performance of system through the foraging task which is one of the popular task for multi robot system and it is generally observed in and around societies hence treat induct communication by stimulating chemical signal between the robots and then investigating a for ageing behaviour by a multi robot system, hence it get stimulated by their own behaviour by a large scale computer simulation and can be executed by mathematical analysis and proved the solution equation. It discusses the simulation results in a structured manner[5].

In this paper by using two control algorithms for a swarm robot are presented. This swarm robot is enabled to orient itself by using information from the trial bifurcation with in a trail network. Two algorithms for the orientation in a trail networks for the food algorithms are used to turn the left, right and straight by using light sensor. In left and right wheel and again towards the nest algorithm. The correction term is up to 35 degree smaller then the correction turn of the food algorithm and in the same it change to extra condition that checks for a high brightness at both sensors. Hence the hypothesis is not accepted by presenting an algorithm with better performance[6].

Here paper highlighted the maxbot, a miniature mobile robot. This miniature maxbot helps in differential-drive treats to offer lough-ferrain mobility. It should explict a large batterry life and enable to perceive its peers and cabable of interacting with them. It provide a high quality vision by using two cameras differently interfaced with an Arm processor match the related purpose, hence a quality battery management gets evolved and recharge itself having one improvement for other one (s-bot). It performs basic operations such as assembling effectively[7].

This model was a carryout in micro robots alice and successfully recreated the agregation dynamics which is observed in a group of cockroaches. It proves that this aggregation process is based on a small set of simple behavioural rules and interactions among individuals and also it can be used by the robots to select collectively. An aggregation situated among two identical or different shelters. Collective ideas should be associated for further evidence, with a constructive behaviour which allow the group of robots to select a place to construct a nest which adopted to these size of three population or having some environmental properties. It is a work based on self organized mechanism and or biologically inspired behaviours. It describes that the group of robots is able to "sense and compare" the size of the shelters' while performing the collective decision process. A performance which is beyond the direct scope simple aggregation process used in these experiments and it is not directly proved in individual robots[8].

This paper estabilishs robot navigation using RFID tages. Here robot is navigated based on animal behaviour. Randomly data was carried using system then robot realization of artificial pheromone. The system simulation using matlab coding and RFID sending and receiving data between system and robot. Its very simple to design and control and is also of less cost. It is a simulation of only one robot for short distance. we cannot control for far distances[9].

In this paper we discuss about decision communication between swarm robots. The method use self organised decision making where each robot makes its own decision for the work and sends the decision to other robots. Similarly all robots communicates with each other and shares the decision of one and other. After analaysing all the decision by manto-carlo method through positive feedback simulation technique. This the decision making speed of the robot increase with increase in operating speed. Due to this the execution of the work by the robot increases[10].

From the literature review the two wheel robot is designed to move from one place to another place through shortest path available . Papers on Swarm robot concept are controlled only by short distance ,but if we use IOT concept, these robots can be controlled world wide. And also easy to learn this port forwarding concepts to assign unique port number for each robot. Here port forwarding concept is clearly explained in the methodological title.

2 METHODOLOGY

It consiste ofon-board battary charger,Motor board,Memorydevices,Sensors,Switches,I/O Pins and Microprocessor. Here input and output pins are used to control the Robot depending upon Read/Write functions. The control board having TKD0 to TKD5 those pins used. Digital I/o pins. TKDO to TKD3 those pins used as analog i/o pins. Here sensors are used to measure the distance like distance sensor. Ultrasound sensors used to acting mechanical switches

Each pin operating max of 40mA and 5V. Some pins are used to special function. Input and output connectors pre-soldered with Robot. Board need 9V Dc supply from ac to dc adaptor. This is normal charger only. the charger does not operate like USB port. That power given to controller board. Here 32KB(Atmega32U4) memory using(4KB used for the boot

loader 2.5KB of SRAM and 1KB of EEPROM). The control board has an extra 512Kbit EEPROM that canbe achived from I2I chips.

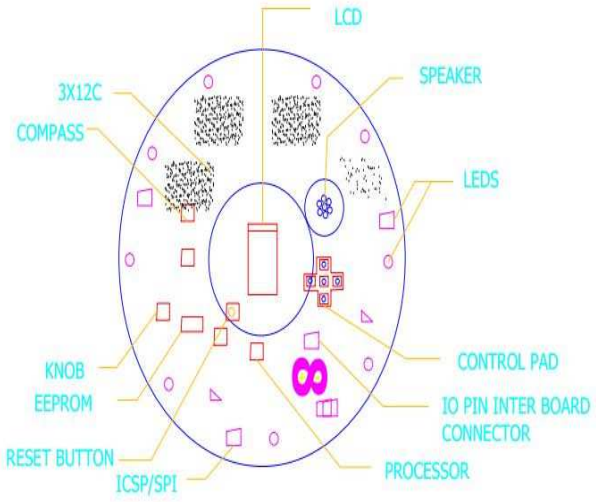

Figure2 Robot controller board

Below mention program used to control robot wheel .

```
void loop()
 {
float previousTime = time;
time = millis();
float interval = time - previousTime;
    P = orientation / kP;
    I = I + (P * interval) / kI;
    D = (orientation - previousOrientation) /
        interval / kD;
    float PID = P + I + D;
if(P > 90) P = 90; //stop inc or dec of the value
if(P < -90) P = -90;
if(PID <= 1 && PID > 0) PID = 0; //cut off micro-corrections
if(PID >= -1 && PID < 0) PID = 0;
left.write(81 - PID);
right.write(81 + PID);
previousOrientation = orientation;
}
```

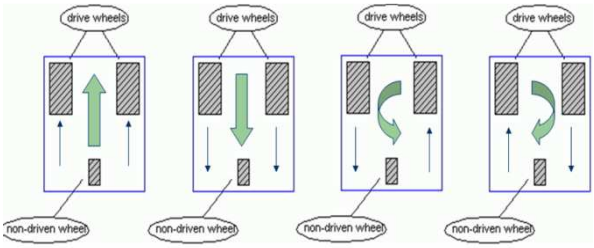

Figure3 Robot wheeling

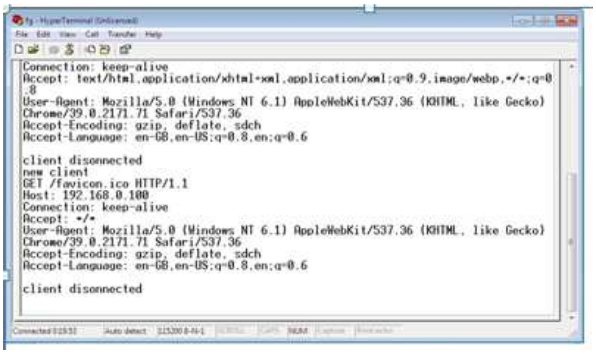

Figure4connection between controller board and internet screen shot

Above diagram shows the connection between controller board and internet. Its clearly represents whether they are connected or not.

Figure 5 robot wheel controlling using WIFI web server

In figure 2 shows the controller board architecture. Figure 3 shows the wheels movement and control. Figure 4 shows screen shot of the program for hardware and internet server connection. Figure 5 shows the screen shot of wheel's controller.

3 CONCLUSIONS

From the experimental setup the robot was controlled by inverted pendulum concepts. These robots uses cameras for image viewing, sensors for obstacle judgments, motors for movement of vehicles and we use inverted pendulum concept for balance of the robot. But the only disadvantage of the current method is that remote operating range is low and limited to few meters. As proposed in this paper if we use IOT concept in the above application, then these robots can be control worldwide through internet. Here theoretical explaination of port forwarding concepts and simulation result are proved for one robot only. We can use the same concept to control more robots at the same time in different places.

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