International Journal of Engineering Research in Computer Science and Engineering (IJERCSE) Vol 3, Issue 3, March 2016

Flood Alert System (FAS)

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Abstract **Flood caused major impact in many areas which includes Chennai, cuddalore etc...And there are many applications which alert flood, but the alert without mobile network becomes complex in existing system. And also they used mini robots to measure draught and topographical life under water. Thus in proposed system we combine android mobile application and embedded technology to alert people when mobile network is not available. Zigbee used for wireless communication for particular area coverage here, and we include android device in which we created an android application through which the alert arises. Here with help of water level sensor and water flow sensor we can analyze during flood and can alert the people nearby before the flood arises.**

Keywords **– Water level sensor, Water flow sensor, Zigbee**

I. INTRODUCTION

Multirobot systems have the potential to dramatically impact robotic applications through improved performance and the enabling of completely new capabilities. Robots offer strength, speed, precision, repeatability, and the ability to withstand extreme environments combined in a Multi-robot system, additional advantages are very efficient even in low power and works with any type of environment. Our work focused on the highly integrated robot applications with end of the control spectrum applications, with target applications that include active escorting/ guarding object tracking, object manipulation, and sparse antenna arrays. Given that these applications require active control of the relative spatial characteristics of the multiple robot formation, we have developed flexible and powerful formation-level control architecture, known as the cluster space formation multiple level control technique, which provides a great level of abstraction at the application level in existing system. The work presented in base paper focuses on the use of multiple, spatially distributed robots to sense a spatially distributed varied parameter of interest, measures the local spatial gradient/contour of this field, and then navigate with respect to this contour or gradient. This approach offers the ability to navigate with respect to possible features of interest, such as local max/mini locations or perhaps along a specific parameter contour. This is in contrast to traditional parameter mapping approaches in which a single platform systematically navigates through a region, often in a "mow-the-lawn" fashion, in order to map an entire area. If the ultimate goal is to locate/perform gradient related features/tasks, the Multi-robot gradient-based mapping capability offers benefits such as faster identification with higher accuracy of areas of interest and ability to dynamically track these features in time-varying fields. There are many real time illustrations for gradient-based navigation through a parameter field by a single robot through the use of bio inspired control strategies. In one system, a robot was built to follow the direction of an odour source. With respect to Multi-robot approaches, Hayes *et al* implemented a bio inspired, multistage approach to localizing odour sources in which the cluster robots initially identified the existence/presence of a plume, then moved/attracted toward the plume's source, and finally located the source position accurately. In this work, a single robot combined an outward spiralling motion in attempts to sense the binary presence of an odour (e.g., the sensed level was above or below a given threshold) with periodic "surges" of motion in the upwards direction, determined by two sensors mostly but here they used flow sensor, in order to move toward a source. Multi-robot execution always includes algorithm as follows 1) using all robots to initially find a plume but then following the plume with only the first robot to locate it; or 2) having upward-surging robots command downwind robots and any robots with no plume information to surge in the direction of the

commanding robot. Thus with the help of above technique they analyse topographical effect of water. They used SWATH technique thus covering areas was easier. They take frequent analysis by which they assured of water species and temperature level accordingly.

II. SYSTEM OVERVIEW

2.1 WATER FLOW SENSOR

Here we use YF-S201 Water Flow Sensor. This sensor sits in line with your water line and contains a pinwheel sensor to measure how much water has moved through it. There's an integrated magnetic Hall Effect sensor that outputs an electrical pulse with every revolution. The Hall Effect sensor is sealed from the water pipe and allows the sensor to stay safe and dry. By counting the pulses from the output of the sensor, you can easily calculate water flow The pulse signal is a simple square wave so it's quite easy to log and convert into litres per minute using the following formula.

Pulse frequency (Hz) / 7.5 = flow rate in L/min.

MODEL	YF-S201
SENSOR TYPE	HALL EFFECT
VOLTAGE	5-18DC
FLOW RATE	1-30L/M
DURABILITY	300000cycles
TEMPERATURE	-25 to +80°C
PULSE/LITRE	450
ACCURACY	±10%

2.2 WATER LEVEL SENSOR

Whenever waterlevel raises the sensor senses the water level and measures by resistance manner. Thus the string attached indicates every pin point a raise in level and indicates the current water level thus we can check the condition low,medium,high.The level measurement is collected by ZigBee and transferred to base station.

2.3 PIC BOARD:

It includes pic microcontroller.In which it includes led display through which we can easily see the water level and water flow measurements. It is easy to interface components and to embed coding in it. It is also cost efficient. Pic microcontroller includes 40 pins.in pic board it includes A,B,C,D,E points in which A and E are only digital, where others support both digital and analog.

2.4 *ZIGBEE*

ZigBee technology is a standard Wireless based Technology designed at a very low cost and high level communication protocol. It is also known as Wireless Personal Area Network (WPAN). This is based on IEEE 802.15 standard. It is similar to Bluetooth using which data can be transferred to the distance of 20 to 25 meters at the rate of 250 kbps. This can be increased to 100 meters using high power consumption. ZigBee can be used to cover greater distance using Radio Frequency. This is reliable and ultimately long life for more than 3 years.

Figure 1ZigBee Module

ZigBee Coordinator (ZC): It is the root of the network tree and acts as the bridge to the other network. This ZigBee Coordinator is responsible for storing the information about the network.

ZigBee Router (ZR): ZigBee Router is nothing but an ordinary router which is responsible for the transmission of data from server to the receiver. This information are transformed to the ZigBee Devices.

Figure 2 Applications of ZigBee

ZigBee Devices (ZED): ZigBee Devices are the devices which acts on the receiver end such as mobile phone or centralized server.

2.5 ANDROID APPLICATION:

Here an android application is developed for alerting people. Whenever the level sensor reaches emergency state it sends alert to base station through which it receives android mobile .Thus in order to alert individual alert application for android is developed. It runs on android platform above 4.0, thus we can cover many people. In android application user can register and request for level and flow rate whenever, thus they can be updated, as it works without mobile network , other existing system use gsm messages and gps they use more data which can be avoided here.

III. LITERATURE SURVEY

3.1Autonomous Surface Vessels Navigation Using Cluster Space Control Technique in Multi-Robot System"

Multirobot system is not used in all water measurements, because it is high cost. But they were used to measure many features of water which includes topography, thus for mainly this purpose autonomous robots used. Robots can withstand many natural changes in accordance with temperature and others. Thus cluster formation used here in order to measure water infrastructure. Recently some students used multikayaks on which robots were kept and embedded with sensors, they calculated draught level and how the lake environment changes. They frequently taken graphical measurements thus any change in water is clearly shown, with help of it they developed a report for the lake and precautions taken to overcome loss of species in that lake and water topography also analyzed.

Through this study they analyzed 40-60% of water level. But they cannot analyze entire water level which becomes major drawback for them. They followed triangle pattern which is easier to measure water strategies and produce graph based on it. As it is autonomous we may not need to monitor frequently which is bigger advantage.

3.2 CLUSTER SPACE MULTIROBOT FRAMEWORK

The cluster space control technique represents a group of robots which works based on kinematic mechanism thus provides easy way to measure. The group of robots, termed a "cluster," With help of cluster framework it becomes very easier to measure geometric pattern and analyze geometric gradient position.

This following section defines the robot space and cluster space representations of a Multirobot system and introduces the kinematic transforms that relate the positions and velocities

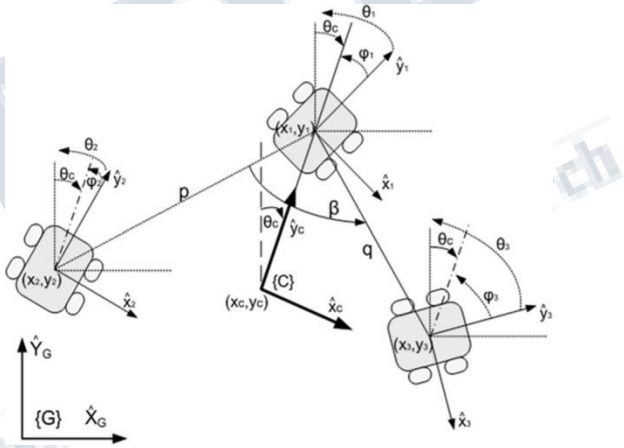


Fig. 1. In the above three-robot cluster, showing a cluster space representation of pose: cluster location (x_c, y_c,θ_c), cluster shape (p, q, β), and relative robot orientations with respect to the cluster ($Ø_1$,$Ø_2$,$Ø_3$) in these spaces. They include Jacobin transform architecture thus whenever any changes occurs then it calculates based on it. Here in above with respect to geometric position the three cluster changes its direction by moving or rotating which can be easily identified though graph represented.

A. Kinematic Formulation

The general kinematic formulation for a cluster of n robots, each with m degrees of freedom, is provided before in many theories. Here, we provide the specific formulation for a three-robot planar system, as shown in Fig. 1, which we have used to demonstrate the gradient-based navigation technique. A conventional robot-oriented representation of this system consists of describing the three cluster robot in terms of the position and orientation

of each robot.

$$^{G}R = (x_1 , y_1 , \theta_1 , x_2 , y_2 , \theta_2 , x_3 , y_3 , \theta_3)^T \quad (1)$$

Where (x_i,y_i,θ_i) is the position and orientation of robot i for i =1, 2, 3 as defined within the global frame, $\{G\}$.To consider the system as a cluster, a cluster reference frame $\{C\}$is defined; in this example, it is located at the centroid of the formation and oriented in the direction of robot 1. The shape of the cluster is naturally defined as a triangle, thus easy to analyze and expressed in this case through a side-angle-side description of geometry. Given this, the system's cluster-oriented pose is

$$C= (x_c , y_c , \theta_c , \emptyset_1 , \emptyset_2 , \emptyset_3 , p, q, \beta)^T \quad (2)$$

where the values (x_c, y_c) is the position, θ_c is the orientation of the cluster frame with respect to $\{G\}$, (p, q, β) quantify the side-angle-side description of the cluster's shape in which each robot is expressed, and $(\emptyset_1 , \emptyset_2 , \emptyset_3)$ denote the relative angle of each robot with respect to the cluster frame. Thus with all the above angles we can identify the three cluster pattern.

3.3 GRADIENT-BASED MULTIROBOT NAVIGATION

To adaptively navigate, we first estimate the direction of the local gradient using real-time measurements made by sensors which is embedded on each of the distributed robots. Given this estimate, we then identify the cluster with respect to the gradient in order to navigate in a manner appropriate to the given task and calculate the values.

IV. EXISTING SYSTEM:

In **Existing System,** Rapid floods is one of the irremediable calamities, they are always dangerous causing heavy damage at the surroundings due to heavy rainfall which cannot be figured out .Safety measures are not taken into consideration for rapid flood. Monitor system with only network is used nowadays. But, whenever the whole network crashed we cannot send any alert to near areas of flood zones. Thus, resulting huge loss.

DISADVANTAGES:

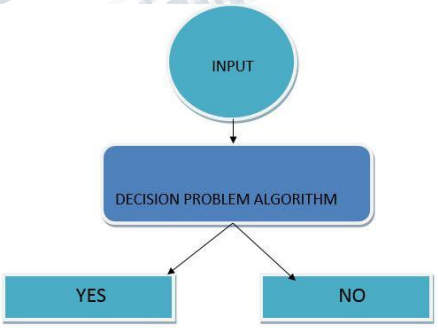
- There is no automatic system to detect the flood in the area
- There is no alert system without network based
- Unreliable
- Less security
- Less effective

V. PROPOSED SYSTEM:

In proposed System, The data must be collected and analysed for particular area and various attributes are taken for analysis purpose .Here analysis of risk is based on certain attributes to check whether the flood may cross the limit or not. Here, we used ZigBee for wireless communication. Thus we can alert whenever mobile network is not present. Another important feature is mobile application for android through which the alert reaches people. A user can request and also check for water level and flow.

VI. ALGORITHM USED:

DECISION PROBLEM ALGORITHM:



In computability theory and computational complexity the ory, adecision problem is a question in some formal syste m with a yesor-no answer, dependingon the values of som e input parameters.

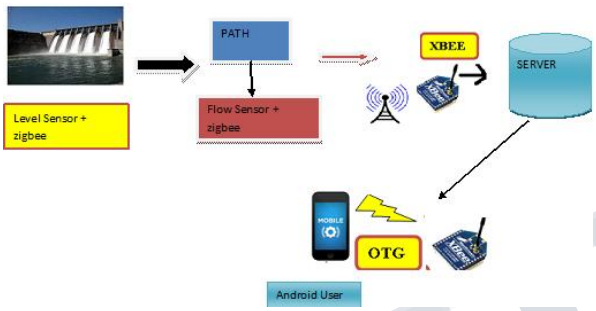
Decision problems typically appear in mathematicl questio ns ofdecidability, that is, the question of the existence of a n effectivemethod to determine the existence of some obje ct or its membership

in a set; Some of the most important problems in mathema tics are undecidable.

For example, the problem "given two numbers x and y, do es X,evenly divide y?" is a decision problem. The answer can be either'yes' or 'no', and depends upon the values of th ex and y A method forsolving a decision problem, given in

the form of an algorithm, iscalled a decision procedure for that problem. A decision procedurefor the decision proble m "given two numbers x and y, does x evenly,divide y?" w ould give the steps for determining whether x evenly,divid es y, given x and y. One such algorithm is long division, ta ughtto many school children. If the remainder is zero the a nswerproduced is 'yes', otherwise it is 'no'.

VII. OVERALL ARCHITECTURE:



Here, we used water level sensor and water flow sensor which is embedded in PIC board along with ZigBee. The level sensor measures the range of level is low, medium, high. Whenever the level reaches high then it is emergency condition, thus alert through android phone with help of an android application. The level sensor values get by ZigBee which is wireless and send values to base station/server. In server only it checks for three conditions low, medium or high. Thus based on condition provided before now the ZigBee in server transfer message to android phone which is received by another ZigBeepresent in end of on the go cable. The cable is connected to end of android mobile phone; with help of code we can connect both ZigBee and android application with help of OTG cable, Thus in android application the flood alert raised.

VIII. CONCLUSION:

Since, our project mainly focuses on wireless system it's easy to maintain and as it alerts before flood arises,people living near flood zones and river banks can safe their family and important materials safely,by which we can avoid men and material loss. Thus,in future we may predict flood and act accordingly

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