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Handling Movements of Snake Robot Using Anusaraka System

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Abstract: *In this paper, we propose a method for handling the movements of snake robots using Anusaraka system, which supports natural Language translations. As our input domain we use Hindi an Indian Language, rich in syntax and semantics. The commands given to snake robot in Hindi are converted into necessary actions to be performed by the snake robot. The efficiency of working of this system proposed will be remarkable.*

Keywords: *Snake Robot, Anusaraka Speech Synthesis, Machine Translation.*

I. INTRODUCTION

Intelligent robots must be capable of action in reasonably complicated domains with some degree of autonomy. This requires adaptivity to a dynamic environment, ability to plan and also speed of execution as in the case of helper robots, or domestic robots. The problem addressed is one of how a user could instruct the robot to perform tasks which manufacturers cannot completely program in advance?. In such a case the system would not work at all if it could not learn [1].

In the proposed system Instruction Based Learning (IBL) concept is applied, where robots acquire user-specific skills based on verbal instructions given by the user [1].

Instruction-Based Learning (IBL), using facility of unconstrained speech, has several potential advantages. Natural language can express rules and sequences of commands in a very concise way. Natural languages uses symbols and syntactic rules and is well suited to interact with robot knowledge represented at the symbolic level. It has been shown that learning in robots is much more effective if it operates at the symbolic level [2].

Snake robot and Anusaraka System are used as main components in the proposed system.

1. Snake Robot

A preference is given for using snake robot because of its small size and weight. It tends to be very easy to move through thin holes and gaps. Low expenses are involved for its handling for searching and rescue. It has low center of mass, and does not lift its body off the ground much during locomotion. It supports large contact areas and reaches places where humans can't. Surveys of dangerous situations are also supported. Physical forces supported by the system can be below the thresholds of the plastic deformation of the soil. It supports high redundancy and loss of short segments would still permit mobility and reliability [3].

Snake robots are a class of hyper-redundant mechanisms that locomote through internal shape changes. Snake robots' unique shape and make situations possible to navigate highly variable environments, such as the pipe in Figure 1, make them suitable for urban search and rescue missions [4].

2. Anusaraka System

Anusaraka System in the proposed environments is used for converting Hindi Language input to English Language output. For an example in Hindi we may use the word 'RUKHO' which is converted by the Anusaraka System to the English word 'STOP'.

Anusaraka tries to take advantage of the relative strengths of the computer and the human reader, where computer takes the language load and leaves the world knowledge load on reader. Anusaraka are evolutionary systems. Anusaraka delivers something practical today without waiting for several years and has a potential to keep pace with developments in technology. Anusaraka system uses a Bilingual Dictionary, Vibhakti Dictionary, And TAM Dictionary, Anusaraka output is usually not the target language, but close to it. Some additional notation may also be used in the output. A users requires certain amount of training to get used the Anusaraka output language [5].

II. RELATED WORK

A snake robot play an important role in handling small things that cannot be well done by humans. These may be inspection of structures, etc. This system permits us to handle small things easily and efficiently. In this paper we develop a system for Hindi language using Anusaraka system because

sometimes a person who is not perfect in English but perfect in Hindi also handles this system. A person is enabled to work more accurately and efficiently. The system will be more popular since in India Hindi is the national language and most of regular work is done using Hindi language.

III. METHODOLOGY

The flow of the proposed system is as shown in figure 1. The system flow consists of the following components.

1. An Hindi Language Input
2. Anusaraka System
3. Speech recognition and Synthesis to English Language
4. Snake Robot System
5. Actions of Snake Robot As Output

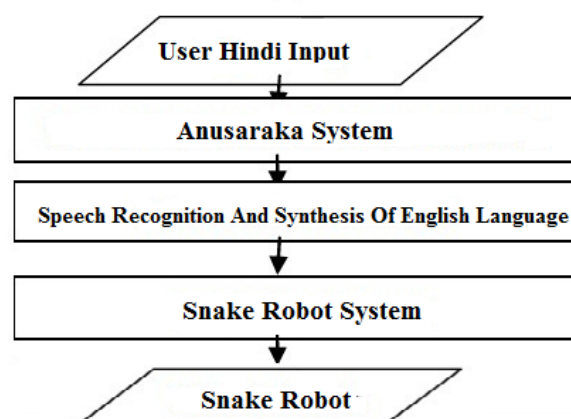


Fig 1: Flowchart of Proposed System

3.1 User Hindi Input

In this component Hindi, an Indian language is given as Input. Some of the commands given to the proposed system in Hindi are as indicated below.

1. Theharo.
2. Chalo.
3. Bayen Mudho.
4. Daaye Mudho.
5. Ankit Karon.

3.2 Anusaraka System

The Anusaraka system plays an important role to convert Hindi language input to the English language output. Table 1 gives Hindi language input and converted Anusaraka output.

Table 1: List of commands in Hindi And Converted Output

User Hindi Input	Anusaraka System Hindi output
Theharo	Stop
Chalo	Start
Bayen Mudho	Move Left
Daaye mudho	Move Right
Ankit Karon	Record

IV. SPEECH RECOGNITION AND SYNTHESIS

3.3 Speech Recognition And Synthesis

This part of the proposed system plays an important role to make the snake robot know from which command what action it supposed to perform. In this component Anusaraka system converted English language commands are converted to the machine level commands recognized by the snake robot. The snake robot then produces the necessary actions.

3.4 Snake Robot System

This is an important part of the proposed system. It enables the snake robot to move from one direction to another, left , right, start, stop, make video recording, etc as per the instructions received.

This system is subdivided into 2 parts

- Instruction manager
- Instruction executor

Instruction manager manages commands which are given by speech recognition and synthesis component. It then processes the request and gives the processed request to Instruction Executor.

The Instruction executor then executes these commands given by instruction manager and makes the snake robot to work accordingly

V. ARCHITECTURE OF PROPOSED SYSTEM

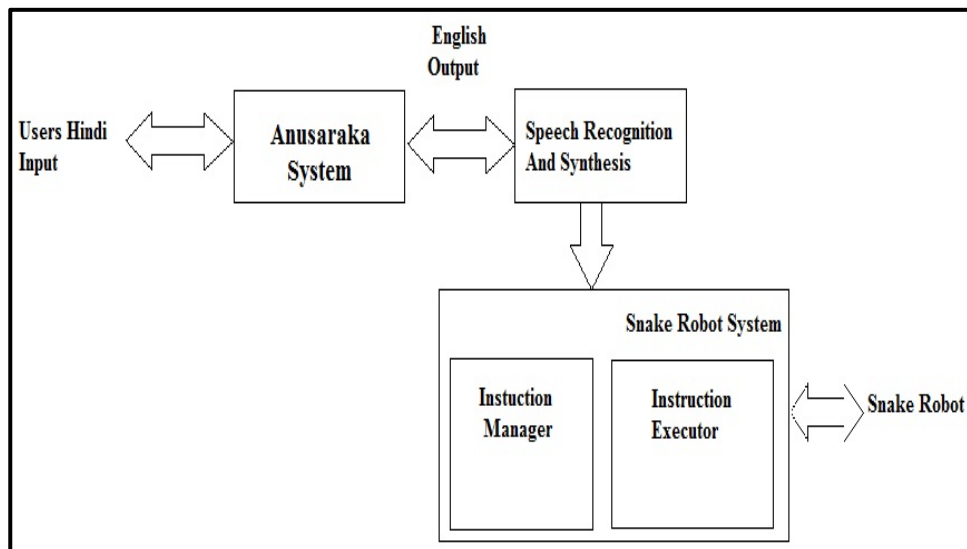


Fig 2: Architecture of Snake Robot with Anusaraka System

VI. APPLICATION OF PROPOSED SYSTEM

The proposed system is a totally atomized system used for Language Translation and creation of executable command. The system will find its applications in the following areas:

1. Bridge inspection.
2. Large construction sites.
3. Natural disasters [3].
4. To move through thin holes and gaps [3].
5. For Inspection of Determination for pipe blockage, Nuclear reactor detection [3].
6. For Searching and rescuing Mine accident probe, Survivors search from disasters [3].
7. Military applications.

VII. CONCLUSION

This paper proposes a new method related to robotics by using natural language processing Machine Translation. This system plays an important role in the effective working of snake robot using Hindi language commands. This efficient system may be used in a number of applications in the future.

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