Mr. Bot – A Survey on Arduino Based Autonomous Robotic Vehicle

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Abstract –

Robots have an increasing involvement in real-world contexts, such as homes, schools, hospitals, labs and workplaces. With the fast-moving world we like everything automated which is increasing the development of autonomous systems to perform both minor and major tasks which would save our time and effort. Mr. Bot acts as a helping hand and tries to reduce the human effort and is the first step in the involvement of robots in daily use. Mr. Bot is a robotic vehicle that has the capability to reach a particular destination to deliver small items and/or convey messages. Mr. Bot has sufficient intelligence to follow the shortest path in the provided space and detect the obstacles in both day and night vision. Mr. Bot acts as helper and it can be summoned to any required place and it can be sent to any destination to deliver small objects (such as cables, papers, books, etc.) and conveys messages via LCD.

Keywords - Robot, autonomous system, intelligence, LCD

I. INTRODUCTION

The origin of robot's marks to the ancient world. The concept of robots came into existence as early as 3000 BC, they were certain mechanical devices which would carry out particular functions involving physical tasks as per the instructions. The early built in mechanical devices were Egyptian water clocks to strike the hour bells, wooden pigeon(400 B C) developed by Archytus of Taremtum could fly, hydraulically operated statues(second century B C) built in Hellenic Egypt could speak and show gestures, Petronius Arbiter made a doll(first century A D) that could move,

Giovanni Torriani built a wooden robot(1557) that could fetch bread from the store, Talking doll(19th century) by Edison, Steam-powered robot(19th century) by Canadians. These inventions and discoveries were the seeds of inspiration in the field of robotics then in the 20th century the field of robotics took a huge leap and surpassed all the previous inventions. The recent inventions of robots include AMECA which has the capability of face and multiple voice recognitions, ARMAR-6 has the capability of moving objects and handing them to the desired person, DIGIT has fully functional limbs, JIAJIA can express certain emotions such as laugh and cry, SOPHIA can process visual, emotional and conversational data for better interaction with human beings and many more to go.

The term robot has several definitions but all of them come down to the same concept of "a reprogrammable, multifunctional, manipulator device that is designed intelligently to perform certain physical tasks such as moving materials, tools, delivering objects through various programmed motions for completion of the tasks. The word "Robotics" was coined by Russian born American Science fiction writer Isaac Asimov in his short story "Runabout" in the year 1942.

Asimov proposed three laws of robotics which are being followed till date and those are:

1. A robot must not injure a human being via any form.
2. A robot must obey it's master's commands except where it would conflict with the first law.
3. A robot must protect it's own existence as long as it wouldn't conflict with the first and second law.

The world of robotics has taken a huge leap from just being certain mechanical devices to the development of humanoid robots. Robots in today's world are very well developed and assist human beings in their day-to-day life in various fields such as hospitals, education and healthcare.

Our concept of Mr. Bot has a better improvised version from the early century robots but less features compared to our current day humanoid robot it tries to inculcate a lot of features such as detecting the obstacles, live streaming it's path and can also capture and store them, reads characters, it can be controlled by voice and responds to it and it can also be summoned via mobile.

II. LITERATURE SURVEY

SI NO.	TITLE	AUTHOR	ADVANTAGES	DISADVANTAGES
1	Arduino Based Voice Controlled Vehicle	M Saravanan, B Selvababu, Anandhu Jayan, Angith Anand, Aswin Raj	Higher accuracy in voice recognition and is highly sensitive to surrounding noise.	Voice commands must be provided via the android app.
2	An Abstraction Layer Exploiting Voice Assistant Technologies for Effective Human-Robot Interaction	Ruben Alonso, Emanuele Concas, Diego Reforgiato Recupero	Interaction between the robot and the user.	Language and pronunciation of certain words might create confusions and lead to different search results.

3	Review on Optical Character Recognition	Muna Ahmed Awel, Ali Imam Abidi	Character recognition system uses diverse approaches and many of them get good accuracy.	Can only detect English, Arabic and Devanagiri characters.
4	Optical Character Recognition based Auto Navigation of Robot by Reading Signboard	Prof. Suneel K Nagavi, Mahesh S Gothe, Prof. Praveen S Totiger	It allows a robot to discover path automatically by detecting and reading textual information in signs located(sign board) by using OCR	It is standardized by using black colour with character size from 34-48 and written in ariel style.
5	Night Vision Patrolling Robot	Poojari Manasa, K Sri Harsha, Deepak D M, Karthik R, Naveen Nichal O	The robot captures the objects on both day and night by night vision camera.	It can only be controlled by sound sensor and not by manually or by Wi-Fi.
6	Robot Voice – A Voice Controlled Robot Using Arduino	Vineeth Teeda, K Sujatha, Rakesh Mutukuru	Robot takes voice commands, executes them and gives acknowledgement through speech output.	The effect of the distance between the mouth and microphone on the robot, the performance of the robot, effect of noise on the speech to text conversion.
7	Development of an Arduino – Based Obstacle Avoidance Robotic System for an Unmanned Vehicle	Kolapo Sulaimon Alli, Moses Olluwafemi Onibonoje, Akinola S Oluwole, Michael Adegoke Ogunlade, Anthony C Mmonyi, Oladimeji Ayamolowo, Samuel Olushola Dada	The robot was made to be remote controlled using an IR receiver and a remote controller	The robot cannot detect the long distance objects as it is using IR sensors.
8	Moving Obstacle Avoidance of a Mobile Robot Using a Single Camera	Jeongdae Kim, Yongtae Do	It detects moving objects using camera	It fails when the distance between objects is more, object's colour and reflected light.

III. OBJECTIVES

- To develop a robot which has both manual control and automatic control to deliver small objects and/or convey messages from one place to the other. The robot is always stationed at specific point and can be summoned in front of any room in its path and can be sent to any other room to deliver objects or conveys messages, after the work has been done the robot returns back to its station.
- In order to do this task successfully the robot has to perform various operations such as obstacle detection, path detection, night vision, character reading.
- Mr. Bot detects the path using path and obstacle detection mechanism by following the specified path marked on the floor by connecting all the rooms, when an obstacle is encountered it tries to avoid the obstacle if possible else takes a different path, if a different path is not available it alerts with a buzzing sound, it also reads the unique labels marked in front of each room using character reading to reach it's destination.
- Night vision enables the robot to perform obstacle detection and path detection in absence of light.

IV. EXISTING SYSTEM

In the existing project, we will find robots that implement only a specific feature instead of implementing as a whole with multiple features. Our project, Mr. Bot tries to sum up the existing project, add few additional features and create a single multifunctional bot.

V. PROPOSED SYSTEM

Mr. Bot is a mini robot that is developed to perform minor tasks. Mr. Bot can assist human beings in their day-to-day life in various fields such as hospitals, schools and colleges. Mr. Bot has both manual control and automatic control to deliver small objects or convey messages by performing various operations inculcating a lot of features such as detecting the obstacles, live streaming it's path and can also capture and store them, reads characters, it can be controlled by voice and responds accordingly and can be summoned via mobile.

VI. PROPOSED METHODOLOGY

Our suggested robot would follow simple commands provided via the mobile app or voice commands and with better future enhancements it can be used to perform tedious tasks.

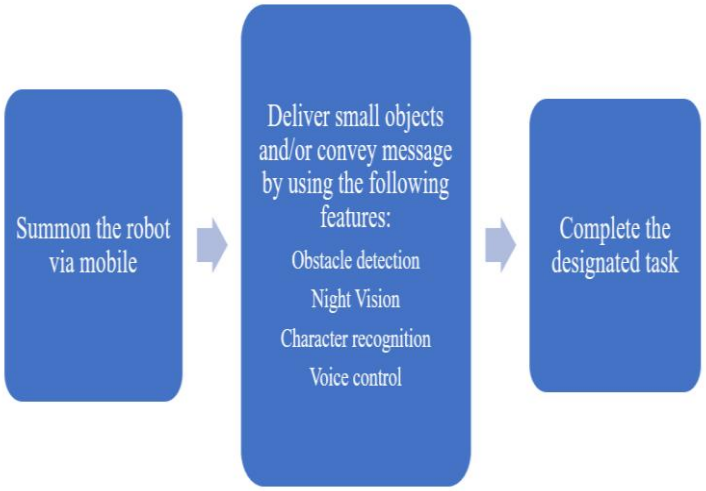

Fig 6.1 System Architecture

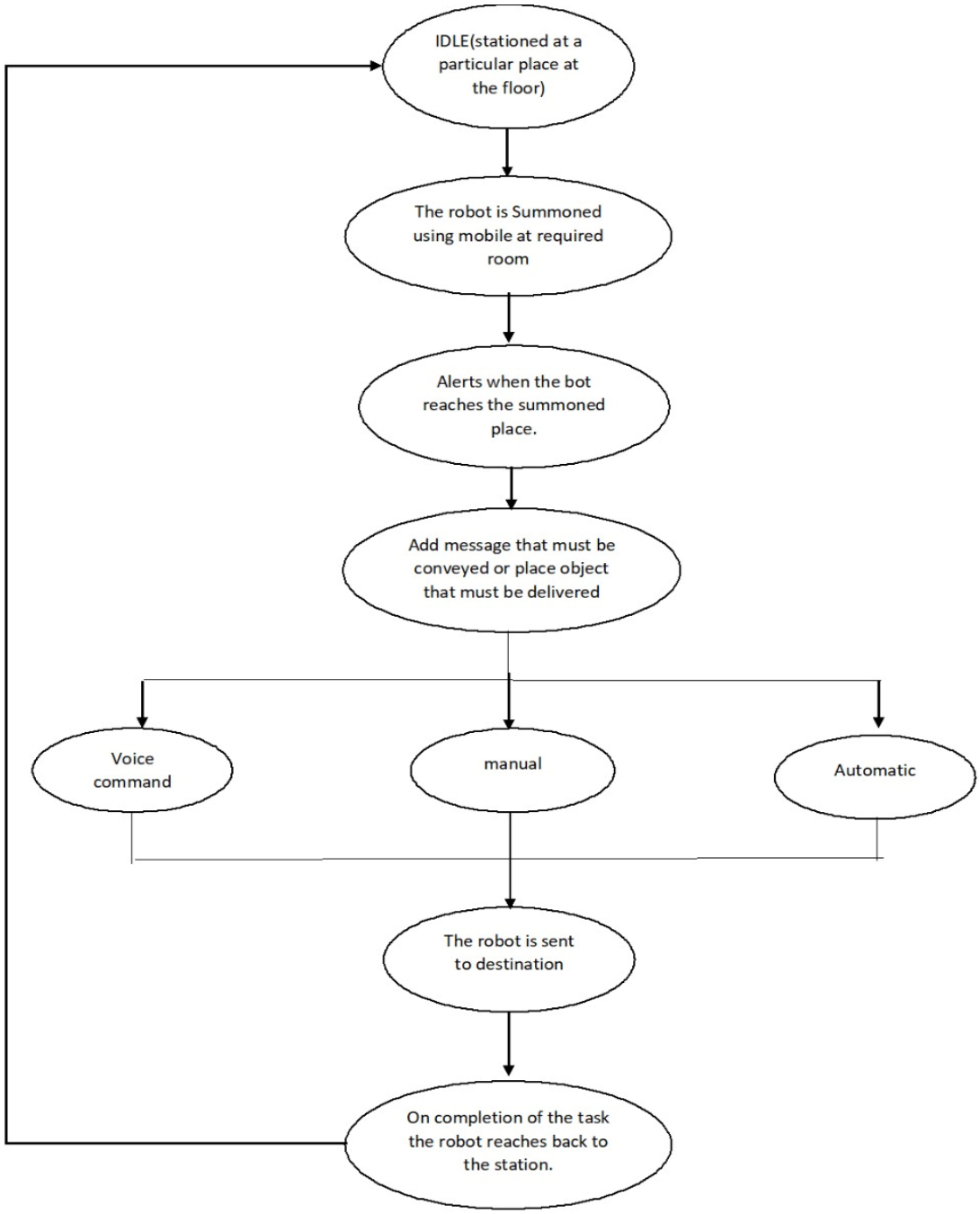

Fig 6.2: Flow Diagram

The diagram displays the basic working of the bot. Mr. Bot is initially in it's idle state, stationed at a particular place, when it is summoned it reaches the desired place and alerts. The user can add any message to be conveyed or place any object that needs to be delivered, these instructions can be provided via voice command or app and then the bot will be sent to the destination, after completion of the task the bot goes back to it's station.

The Major features are listed below:

Obstacle Detection: It is achieved using IR sensors and ultrasonic sensors to detect the object size and decide whether it can pass over it or take a diversion and find a new path and if it is not able to find a new path then it will stop and alert with a buzzing sound.

Character Recognition: The robot uses camera to read the characters and/or numbers to reach it's destination.

Night Vision Camera: It is designed using night vision camera which uses infrared light to detect path and obstacles

in the night vision where there is no sufficient lighting condition.

Voice Control: It is achieved using microphone to interact with the robot, where we can directly give commands to the bot instead of using the mobile app. The bot not only accepts the command but it also responds to it with certain short messages.

LCD Screen: It displays the message that has to be conveyed to the desired person.

Mobile App to Monitor: An app is built to manually control the robot. It is basically used to summon it, give instructions to it, type a message that needs to be conveyed and provide a path to it. The app also helps us to control the movement of the robot.

VII. APPLICATIONS

- **Schools, Colleges, Universities:** The bot can be used to collect the attendance sheet from every classroom, call the teachers for the meetings, etc.
- **Hospitals:** To deliver the medicines to the required patient, guide any person to reach a particular destination such as pharmacy, emergency ward, labs, etc.
- **Shopping mall:** Helps the customer to find any required object, can be used like a cart to carry small objects.

VIII. EXPECTED RESULT

- A fully functional robot which can be used to deliver small objects and convey messages using a LCD screen, from the summoned point to the required destination.
- Detects and tries to avoid obstacles if possible else alarms everyone about the obstacles.
- Performs character reading to identify room numbers which marked on its path.
- The robot will be enabled with night vision to perform the tasks smoothly in absence of light.
- Mr. Bot can be summoned in front of any room in its path from its original station and can be sent to any other room its path, after which it will return to its original station.
- Mr. Bot can be controlled manually or can be automated, certain voice commands are understood by the robot and will respond accordingly.

IX. CONCLUSION

Mr. Bot is a robotic vehicle that acts as a helper and can be used in schools, colleges and hospitals. Mr. Bot can be used to deliver small objects and display message via it's LCD screen. It is always stationed at a particular place and can be summoned via mobile; it can be sent to any other place on it's path to complete our desired task. With better future enhancements it can replace peons in any institutions and not only be limited to one floor.

X. FUTURE ENHANCEMENTS

- The robot can move freely without a specific path on the ground.
- AI technology for face and object recognition to, identify the required person and the objects that are been delivered.
- Security surveillance feature can be added for night safety.
- Complete speech recognition and voice control for performing all tasks.
- Moment between multiple floors by using lift or stairs.

XI. REFERENCES

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