

Autobot Monitor using Smartphone Device

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Abstract-Autobot is a system that can be used for logic development of school going children. As we already know, we need to learn languages so as to be able to code the robots so that they can do the required function. But here we are trying to develop a system that will facilitate coding of a robot using an Android powered mobile device. This system can be used on almost all Android powered mobile phones and tablet PCs. The system will provide the user with a GUI which can be used by the user to draw a flowchart or more specifically, a logic diagram. The logic diagram will help the user express the required functionality in terms of logic blocks that are provided by the system. After the user is done with the graphical depiction, the system can convert the graphical representation into relevant code so as to make the robot functional.

Our aim is to develop an application which enables to do this using only the “Logic” of the person .A system to be developed using an Android phone, which has never been done before. The communication of the phone with robot will be handled by Android Open Accessories. A Freeduino board will be used for connectivity of phone & robot. The flowchart created in application and for that flowchart code is automatically generated in the backend. As per the flowchart in the application robot will make the movements.

This system is not much costly and can be used by anyone from school going children who can develop enough logic to professional people who want to avoid the hassles of learning a hardware language.

Keywords— *Freeduino, Logic, Autobot, GUI*

1. INTRODUCTION

The aim of our project is to develop a training kit for school children to develop their own logic of programming. Any person with/without the knowledge of any programming language will be able to code a ROBOT. The only skill required is the “Logic” along with an Android phone installed with our app. If school going children are exposed to logic development at early age, they can develop their logic to a great extent. If one has to code a robot, he/she needs to know some programming language. Our aim is to develop an app which enables to do this using only the “Logic” of the person. The app uses an UI i.e. an app on an Android phone.

Connectivity:

The board provides robust connectivity to an Android device via a USB or Bluetooth connection and is fully controllable from within an Android application. An android phone can easily interact with the various accessories via Bluetooth or USB.

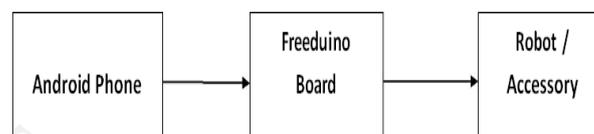


Fig 1.1: Connectivity of android phone with Robot

Android's user interface is based on direct manipulation, using touch without using physical keypad that enriching the efficiency of inputs that loosely correspond to real-world actions performed by user in device, like swiping, tapping, pinching and reverse pinching to manipulate on-screen objects. The acknowledge to user input is designed to be immediate and provides a fluid that make sure that touch interface, most of the time using the vibration capabilities of the device which easily sense a touch and corresponding response to provide haptic feedback to the user. Smartphone's are popular amongst those who wish to use some of the powers of a conventional computer in environments where carrying one would not be practical. Android is a Linux-based open source operating system designed primarily for touch screen mobile devices such as smart phones and tablet computers. The applications basically are used to ease the task of the user in order to get the desired output as required by the user.

A. Modules

- User Interface :

The UI will consist of various palettes which will contain the various logic blocks. There will be another pane which will be used to configure a particular logic

block. A Programming Area will contain all the blocks in a sequential manner.

- Flowchart Compiler:

A flowchart compiler will be required to convert the flowchart composed by the user to the final working code.

- Transfer of Code (From Phone to Accessory):

This module is responsible to transfer the code generated by flowchart compiler to the target accessory.

- Execution of Compiled Code on Accessory:

The final stage requires execution of the transferred code on the target accessory. The code will be executed & will be stored on accessory.

B. Project Methodology

Agile project management technique is going to be used for project development. It is an iterative and incremental method of managing the design and build activities for new product in a highly flexible and interactive manner.

While following Agile methodology for this project, the actual implementation shall be preceded by a familiarization assignment wherein the basic technology shall be used to make a small working model to better understand actual implementation and to complement literature survey.

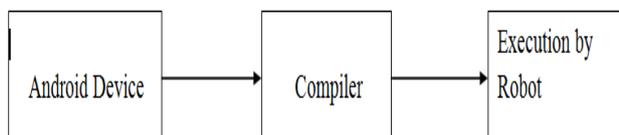


Fig 1.2: Flow of Project

2. LITERATURE SURVEY

A. Graphics System for Automatic Computer Code Generation:

UNITED STATES PATENT NUMBER 5,187,788
(Feb. 16, 1993) Invented by Robert E. Marmelstein, Huber

Height, Ohio. The Avionics Program Expert (APEX) is an automatic code generation tool for Ada programming language. It provides the programmer using APEX with the ability to quickly create a graphical representation of his initial program design.

B. Existing Systems:

A case study on Lego Mindstorm shows that the product is suitable for Artificial Intelligence and Robotics Courses at the college level.

Also, Microsoft Robotics Studio is another example.

Disadvantages of these existing systems:

1. These technologies are costly.
2. One product Lego mindstorm costs around \$ 270 - 300.
3. The person needs to be able to use a System computer or any device. Also, children will determined it difficult to get acquainted to the computer interface.
4. Also, requirement of a laptop increases the cost of the set.

C. Proposed Systems:

A system to be developed using an Android phone, which has never been done. The application will be compatible with most of the Android phones & tablets. The application will have an intuitive user interface which will help the user create a flowchart for a robots operation with the help of various logic blocks. The application is developed for Android phones which is easy for even children to get acquainted with. The cell phone will convert the flowchart into the code required to control the robot. Thus the robot will be automated using Android phone with our application.

D. Advantages of the System:

1. Low cost system.
2. Easy to use, easy to learn.
3. No prior programming language knowledge required.
4. The robot is automated as per the logic used by the user.
- 5.No laptop/PC required; all you need is an Android phone.

3. Project Flow (Concepts)

A. Generating an string from block diagram:

In application, using GUI we create a block diagram. String is consist of following pattern (e.g. s:forward(7):backward(5):left(2):e) Where s: stands for start , forward is movement selected and (7) is number of seconds. The string is generated form block diagram. Which while drawing takes no. Of seconds as input with movements.

B. Passing string to Bluetooth shield:

After creation of string, we must pass it to the Freeduino. For which medium is required. This is Bluetooth shield. Bluetooth shield is to be integrated on Freeduino kit. For passing string from android device to BS, we must create a client-server/master slave connection through JAVA API for Bluetooth. Where android device is to work as master while BS works as slave. For which JAVA Bluetooth Server Socket is used.

C. After receiving string by Freeduino :

After receiving string from Bluetooth shield. Freeduino scans the string. For which C++ APIs are used and respecting signal. For which C++ APIs are also used to program such signals.

D. Final step:

In this step, binary signal from Freeduino is passed to dagu magical robot. The robot makes movements as per the signals received from Freeduino.

C. Features:

1. Max Motor Voltage: 6VDC
2. No Load Speed: 90±10rpm
3. No Load Current:190mA(max.250mA)
4. Torque: 800gf.cm
5. Stall Current: ~1A
6. 65mm Diameter Wheels (30mm Wide)
7. Plastic Rims with Solid Rubber Tires

D. Hardware's used:

- A. Bluetooth shield class-2.
- B. Freeduino.
- C. Dagu Magician Chasis.

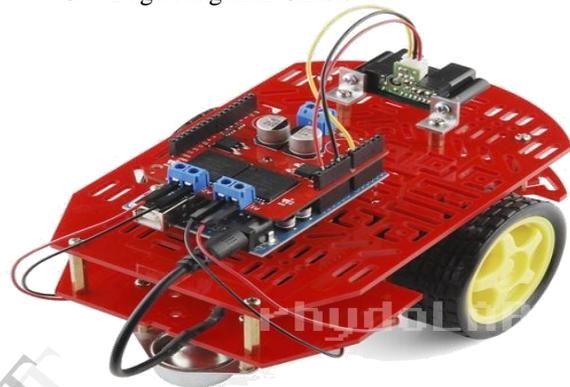


Figure 4.1: Dagu Magician Chasis

4. DESIGN AND SPECIFICATION

A. SYSTEM ARCHITECTURE

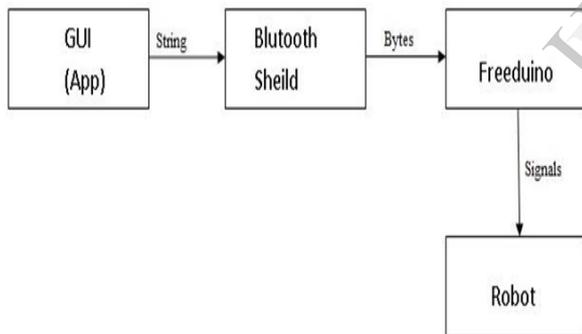


Fig 4.1: Block diagram

B. Dagu Magician Chasis :-

The Magician Chassis has been developed from recent year, its robot platform from Dagu. It features two gearmotors with 65mm wheels and a rear castor. The chassis which are cuts of plates from acrylic with a wide variety of mounting holes for, power, controllers, sensors etc. Simply bolt have two pre-cut platforms that attach together, attach castor and the motors and also add your favorite automatic robotics controller which use being used widely. This kit includes all of the parts needed to assemble the chassis as well as a 4xAA battery holder with barrel jack termination.

E. Activity Diagram:-

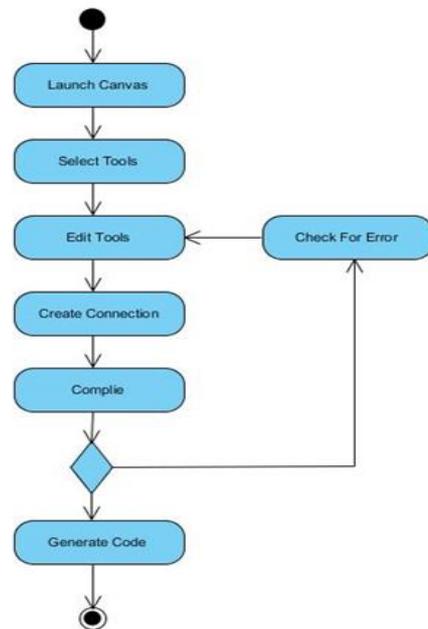


Figure 4.2: Activity Diagram

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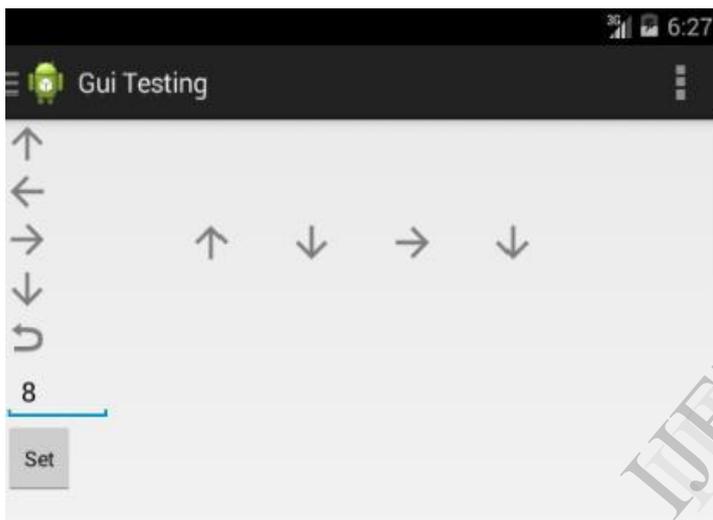
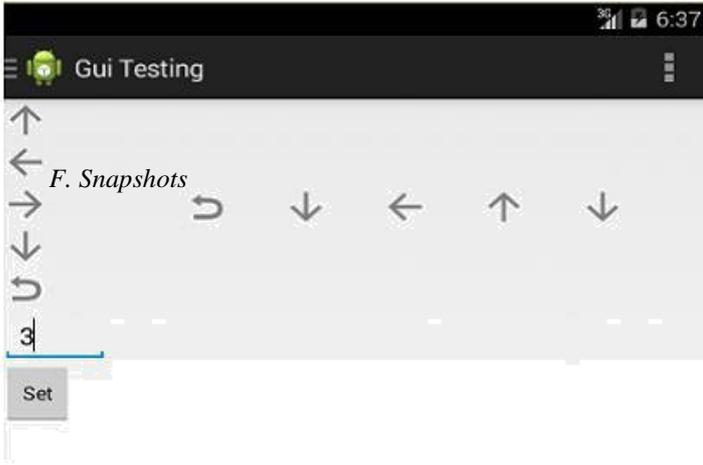


Fig-4.3 GUI for Autobot.

5. CONCLUSION

The various hotspots that are geographically distributed can be managed effectively using the visualized graphs. The graphs will play a vital role and provide a way to analyze complex data in efficient way and also publish the information about the various regions, users, and the revenue gained by the company. We can use the VTS protocol. Limitation of our project is the range because we are using Bluetooth. By using VTS protocol, we can extend the range of device, In this sim-card is embedded on the robot and one sim-card is there in the android device. The string generated from the device is passed to robot through message. Hence the problem of range can be avoided.