Progress Report

Over the course of three months, Elysian Innovations has nearly completed the first prototype of the Avatar 3G. This first draft of the device does not meet all the qualifications specified in the Design Specification and Functional Specification documents previously submitted by Elysian Innovations. However, for the purpose of testing at Phase I, it is more than capable. The details of Phase I are listed below.

Phase I

1. Requirements Analysis
    a. Background Research
    b. User Functional Requirements
    c. User Interface
2. System Level Analysis
    a. Block Diagrams
    b. Hardware Considerations
        i. 3G Modem and 3G Router
        ii. Arduino Uno
        iii. Battery
        iv. Motors and Treads
        v. Camera and Speakers
        vi. Sensors
    c. Software Considerations
        i. Android Application
3. Technical Specification
    a. System Requirements
        i. Quality Issues
        ii. Error Handling
        iii. Security Issues
        iv. Maintenance

Requirements Analysis

The Avatar 3G was designed to help people that have trouble mobilizing themselves, for a reasonable cost. With the Avatar 3G, they can regain enjoyment in many aspects of life without leaving the comfort of their homes. Elysian Innovations has invested time and resources in identifying the user's functional requirements. One of these requirements involves designing easy to setup and easy to use applications.

System Level Analysis

In order to complete the Avatar 3G on schedule, Elysian Innovations has divided the project into different sections in order to increase the efficiency of the prototype development.

After some detailed research, we finalized and ordered many of the hardware components within the first two weeks. We then split the project into three main parts; two engineers working on the motors and treads as well as the battery; two engineers working on the camera and speakers and also the android application of the Avatar 3G; and last but not least, the CEO working on the networking of the proof-of-concept product.

For the 3G modem, the Huawei E1750 was ordered. However, hardware failure occurred, and the Huawei E1750 was replaced with the ZTE MF636. The TP-Link MR3220 was purchased as a suitable 3G capable router, and both modem and router have been configured and tested.

The Arduino Uno was chosen as the microcontroller for motor control. The Arduino Uno requires a network shield and a motor shield in order to control motors through Ethernet. The Arduino Uno, as well as the network and motor shields have been purchased and are currently undergoing their final stages of programming.

For the battery, the BP 75 Lithium-Ion battery was ordered and tested. The BP 75 will be used to supply 12 volts to the 3G modem, and 5 volts to the IP webcam. Initially, this battery was to supply voltage to the Arduino Uno and motors as well. However, a recent revision of our design requires the use of six AA Sanyo Eneloop NiMH batteries to supply the proper voltage to the motors without the need for wasteful voltage regulators.

For the motors and treads, we initially chose tracks and motors made by Tamiya. These parts proved to be inadequate for satisfactory locomotion. We have since replaced them with the more powerful Dagu Rover 5 tracked chassis, and are in the process of programming and testing it with the Arduino Uno and motor shield.

For the camera and speakers, we decided on using the Foscam Fl8918W IP webcam. It was chosen because of both the video and audio capabilities of the camera as well as the cost. It provides video feedback of adequate quality with a two way audio communication system.

For the Android application, we have tested the first prototype of the application. Communication between the IP webcam and Android has been established; audio and video signals can now be broadcast from the IP webcam to the Android phone. Further investigation on video compression is required due to latency issues. The Arduino Uno is now capable of receiving motor control commands from the Android application. Integration of the control interface (motor control and camera control) will be completed in the following week.

We have chosen to use the Sharp GP2Y0A21YK0F IR Range Sensor with a range between 10cm to 80cm of detection. It was chosen for its compatibility with the Arduino Uno, as well as operational range. Testing of these sensors has been completed and they await integration with the project after motor programming has been completed.

The enclosure has been built using 3mm clear Perspex. The enclosure currently measures 22cm x 24cm x 13 cm, with a built in shelf. Integration of parts into the enclosure will begin once programming and testing of the Arduino Uno and Dagu Rover 5 have been complete.

Technical Specification

Elysian Innovations has already begun the final stage of development of the Avatar 3G. We will assemble the proof-of-concept product and start testing within the next week. By that time, the requirements listed in the functional spec will be met.

Budget

To date, Elysian Innovations has disbursed $641.18. The majority of funds have been spent on components, and a small amount on mobile services. All essential parts have been purchased. Back-up parts for the motors and motor drive boards have also been purchased. These back-up parts provide a contingency plan in the event of component failure, but have increased the development costs. We are approaching our initial budget of $675. Should we exceed the allocated budget; all members have agreed to split the excess costs equally.

Human Resources

Elysian Innovations is working in a productive pace with a happy atmosphere among its members. We enjoy working with each other as a team and are looking forward to sharing the achievement of completing the Avatar 3G together. Our weekly scheduled meetings have been successful and constructive, and will aid us in completing the project as scheduled.

Action Items

December 5th marks the first milestone for programming completion. This includes the final release of both the Arduino Uno sketch and Android application. December 12th marks the second milestone in which the following will have been completed: full motor control of the Rover 5 via 3G, cutouts for wiring the enclosure, integration and testing of the enclosure and Rover 5 chassis, integration of proximity sensors into enclosure, system testing, and specification.