Bartini Drink Dispensing System

by

Lightweight Enterprises

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Introduction

The *Bartini* system is a device servicing the entertainment and amenities industry, consisting of intuitive graphic software control for mechanical dispensing of mixed beverages. The *Bartini* is a fully autonomous machine which can perform the majority of a bartender's basic duties. A Raspberry Pi is used to control a variety of peripherals including solenoid valves to regulate fluid flow, DC motors, pumps, and a stepper motor system. This project will provide a consistent, entertaining experience to its end users while reducing operating costs and increasing efficiency for its clients. We differentiate ourselves from the scarce competition with our relatively inexpensive, modular, and scalable design.

Schedule

An updated version of the Gantt Chart reflecting the current project progress is given below in Figure 1. This Gantt chart has some differences from the schedule found in the project proposal document, most notably the delay of mechanical and hardware tasks as well as the advancement of testing phases into the development cycles. It should be noted that the schedule anticipated by the team at Lightweight Enterprises has changed rather significantly from that first proposed. The delay in the start of many of the streams was caused by the unforeseen challenges and time associated with part acquisition and ordering.
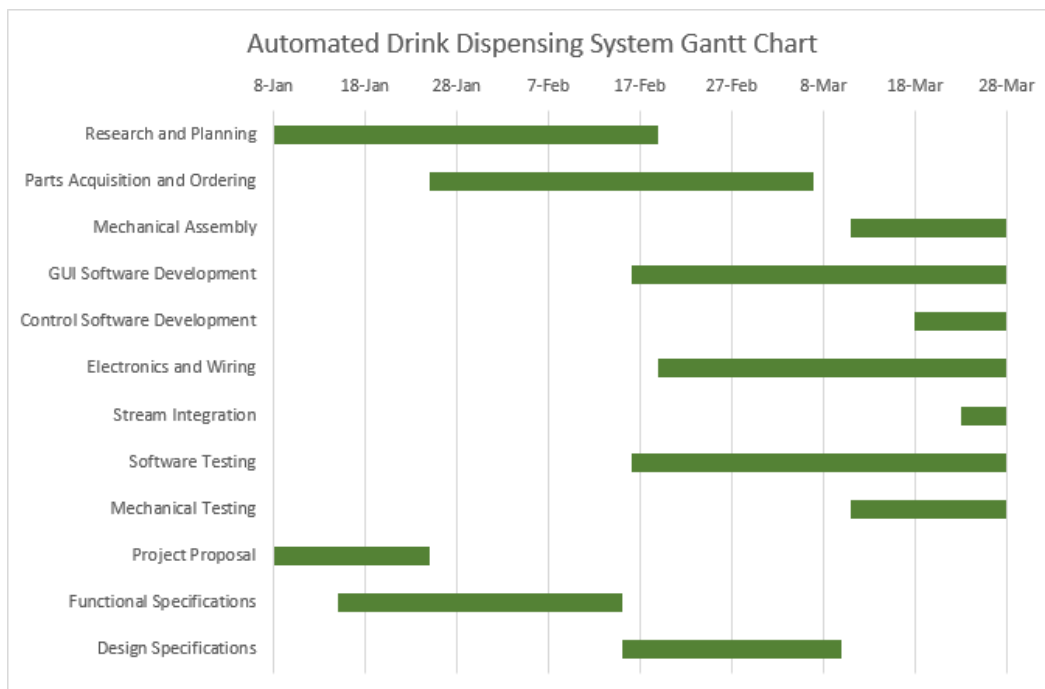

Figure 1: Updated Gantt Chart

Finical Report

A summary of the current financial state of the project is presented in Table 1. Lightweight Enterprises was awarded 450 CAD from the Engineering Science Student Society Endowment Fund (ESSSEF) and the remainder has been paid out of pocket by the three members. The team plans on requesting reimbursement funding from the Wighton fund at the end of the semester.

Table 1: Financial Report

Equipment	Proposed Cost ($)	Cost to Date ($)	Difference
Raspberry Pi 2 Model B	60	54	+6
Servos, Mixing Motor, and Carousel Motor	100	32	+68
Tubing	40	30	+10
Solenoid Valves	110	135	-25
LEDs and Visual Components	30	0	+30
Building Materials and Manufacturing	300	337	-37
Touchscreen for Raspberry Pi	90	0	+90
Cooling and Refrigeration	90	0	+90
Subtotal	820	588	+232
Tax	98	72	
Contingency	150	0	
Total (After-Tax)	1,068	660	+408

Progress and Remediation

Lightweight Enterprises is slightly behind schedule. As such, a further increased amount of time will be spent working on the project in the coming weeks. Unforeseen difficulties have caused an number of delays thus far and future issues will be dealt with as quickly as possible as the project works to conclusion. Possible time slippage will be compensated for by further prioritizing essential tasks in an attempt to deliver a functional demo.

Software Progress

Software projects have made the most progress in areas that did not require physical components. As a result, the graphical user interface (GUI) and database (DB) components of the software are nearly complete. The control component is lagging behind schedule as it is

largely dependent on the state of the electro-mechanical assembly. A summary of the software tasks is shown in Table 2.

<div align="center">**Table 2: Software Progress**</div>

Component	Completed	Outstanding
GUI	• Ability to choose (by mouse input) a number of predefined drinks • Ability to customize and save a user-defined drink • Images of drinks and recipe information available to user • Prevention of invalid modifications to DB and ordering of unfulfillable drink orders	• Minor Tweaks
Database	• Structure for drink objects defined • Predefined drink objects populated • Custom drink object programmable by UI • Liquid contents recorded in text files for use between sessions	• Update predefined drink DB to reflect liquids in Proof-of-concept machine
Control	• Interface between GUI and Database code files	• Confirm GPIO mappings • Write routines to control electromechanical aspects of machine

Mechanical/Hardware Progress

The mechanical aspects of the project have been the most affected by part acquisition challenges and as a result, have experienced the greatest delay with respect to our initial plan. Lightweight enterprises acknowledge the challenges inherent in mechanical systems and plan to spend a significant amount of time in the coming weeks working on the mechanical/hardware systems of the *Bartini*. Table 4 shows the current state of the mechanical/hardware system.

<div align="center">**Table 3: Mechanical/Hardware Progress**</div>

Component	Completed	Outstanding
Enclosure	• Metal pieces cut and re-enforced • Cutting Holes	• Final Assembly •
Motors and Gears	• Epoxied to mounting plates	• Final Assembly
Metalwork	• Sanding and Finishing • Epoxied Jointing	• Silicone sealing
Carousel	• Assembled and mounted to rotating bearing plate	• Mounting dispenser valves

Electronic Progress

While the wiring schematics and much of the electrical design was completed in a timely manner, the delay in the mechanical/hardware aspects affected our ability to implement our electronic design. A progress report of the electronic system is shown in Table 4.

Table 4: Electronic Progress

Component	Completed	Outstanding
Solenoid Valves	• Wiring Schematic	• Physical Wiring • Testing
Switch-based Motors (Servo, Mixing, etc.)	• Wiring Schematic	• Physical Wiring • Testing
Stepper Motor	• Physical Wiring	• Testing

Conclusion

Although all members of Lightweight Enterprises have been invested in the project, part acquisition difficulties and increasing project complexity have put our three-man team behind our original schedule. There is still a significant amount of work required to realize the *Bartini* system. The final structure of the enclosure and all the mechanical parts will be completed by the first week of April and then all that is required is soldering the switching circuits and blending our software functionality with the hardware. It is our goal to have a working proof-of-concept demo for the teaching staff on April 22nd, 2016. Although slightly different from Lightweight Enterprises' original vision, at the current progress being made, it is likely that a working prototype of the *Bartini* will be completed in time for the scheduled presentation.