Progress Report for the Smart Pet Feeder Wednesday March 5, 2008

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Introduction

• Automated pet feeder that:

- Reliably provides food to a pet at the time the owner wishes
- Keeps the pet from reaching the food stored for later feedings
- Does not allow a "forbidden pet" to eat from a given feeder

Progress-to-Date (1 of 20)



Progress-to-Date (2 of 20)





Progress-to-Date (4 of 20)



Progress-to-Date (5 of 20)





Progress-to-Date (6 of 20)



Progress-to-Date (7 of 20)

NEMA 17 Stepper Motor

- Unipolar
- 1 revolution per second
- 1.8° step size
- Maximums: 24VDC, 4.5 Amps







Progress-To-Date (8 of 20)

o Driver Chip

- Supplies power to motor
- Isolates current from entering microprocessor



Progress-to-Date (9 of 20)



Progress-to-Date (10 of 20)

CML12S Microcontroller

- Up to 91 I/O ports
- Storage

o 4 kB of EEPROM

o 512 kB of Flash EEPROM

 14 kB of SRAM available



Progress-To-Date (11 of 20)

Electrical Control Schematic



***NOTE: LCD PANEL IS PATCHED INTO LCD PORT OF CML12S

Progress-To-Date (12 of 20)

•RFID Tags

Active Tag

Onboard Power Source

• Range: > 4 inches



Passive Tag

- No power source
- o Range: Around 4 inches



Progress-To-Date (13 of 20)

RFID Reader

- Powered by single +5V DC supply
- 2.5" x 3.5"
- Logic device



Progress-To-Date (14 of 20)

o Timing System

- DS1286 Watchdog Timekeeper
 - o RTC chip
 - Keeps time to the hundredth of a second
 - Outputs 2 types of alarms
 - Accurate to ± 1 minute/month
 - Onboard power



Progress-To-Date (15 of 20)

Timing system (con't)

- Push Buttons
 - Used to program the time to the RTC
- Toggle switch
 - o System override
 - Allows user to suspend the unit's operation





Progress-to-Date (16 of 20)

LCD display

- Made to work with the CML12S
 - Plugs straight into the LCD port on the board
- 4 x 20 character display



Progress-To-Date (17 of 20)

o IDE: "Embedded GNU"

- Open source software
- Verified to be working with our microcontroller
- Works similarly to the IDEs that we are used to working with
- Allows us to program in C

Progress-to-Date (18 of 20)

Program

5 subprograms

in main program

- Clockset
- Pet detect
- Motor Rotate
- Feeding time
- Countdown



Progress-To-Date (19 of 20)



Progress-To-Date (20 of 20)

Feeding Time Subprogram

Yes Override Switch On? No **Feeding Time** Subprogram TC sending Yes Call INC BOWL signal? "Clockset" No Yes Call "Pet RFID Reader Detect" detecting tag? No Rotate CCW Rotate CW SLICE (BOWL-1)*SLICE Yes Wait 30 Sec BOWL=7? Set BOWL=0 No RFID Reader Yes Call "Pet detecting tag? Detect" No Rotate CW BOWL*SIICE

Problem Areas (1 of 3)

o Group member absence

- One less person to contribute to presentation
- Slightly behind schedule

Problem Areas (2 of 3)

o IR sensors

- Range too small
- Sensing angle too small

o RFID tags/receiver

Out of manufacturer's stock
 Own't be shipped until about March 14th

Problem Areas (3 of 3)

- Stepper motor
 - Bipolar
 - No experience
 - More complicated circuitry
 - Driver purchased wouldn't work
 - Resolution
 - New motor ordered
 - Shipped in the next week or so
 - o Old motor returned

Plan for the Next Reporting Period

• Programming

- Preliminary code/flow charts for all programs
- Understand how to use the RTC to perform specific tasks
- Become familiar with IDE

o Design

- Purchase base and cover materials
- Machine cover and base
- Weight distribution system

Schedule Status

ID	0	Task Name	Start	Finish	March April 1 2 4 5 5 7 9 0 4044 1913 44 15 45 47 19 10 2021 2022 2022 2022 2022 2022 202
42		Write Progress Report	Tue 2/26/08	Tue 3/4/08	Group
43		Rehearse Presentation	Mon 3/3/08	Tue 3/4/08	Group
44		Create flowchart / preliminary code for the alarm/clock set program	Tue 2/26/08	Mon 3/17/08	Kris
45		Create flowchart / preliminary code for motor control	Tue 2/26/08	Mon 3/17/08	Filip
46		Create preliminary code for Reader triggering and RTC trigger	Tue 2/26/08	Mon 3/17/08	Ali
47		Teach Group how to use CodeWarrior	Mon 3/3/08	Mon 3/3/08	Rachel
48		Design the system to keep the weight of the base off the shaft of the motor	Tue 2/26/08	Mon 3/17/08	Filip
49		Machine parts	Sat 3/1/08	Fri 3/7/08	File
50		Progress report 2 due	Mon 3/3 1/08	Mon 3/31/08	Group
51		Assemble Prototype	Sat 3/1/08	Tue 4/15/08	
52		Complete Prototype	Tue 4/15/08	Tue 4/15/08	Group
53		Test and Debug Prototype	Tue 4/15/08	Thu 4/24/08	Group
54		White Final Paper	Wed 2/20/08	Wed 4/30/08	
Project (Date Su	Gantt Cl in 3/2/08	hart 20080302 mpp Task 8 Split		Progress Mileston	summary External Tasks Deadline

Conclusion

 In recap we have designed our system to:

- Provide food to a pet at a user programmed time
- Keep the pet from eating later servings
- Does not allow a "forbidden pet" to eat from the feeder

Thank you!

Questions? Comments?

Bibliography

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- "Full size Toggle Switch." <u>Jameco.com</u>. 03 Mar. 2008.

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- "CML-9S12DP256." Axiom Manufacturing. Garland: 2004.
- "MC9S12DP512 Device Guide V01.25." Freescale Semiconductor, Inc. Chandler: 2005
- "DS1286 Watchdog Timekeeper." Dallas Semiconductor.

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