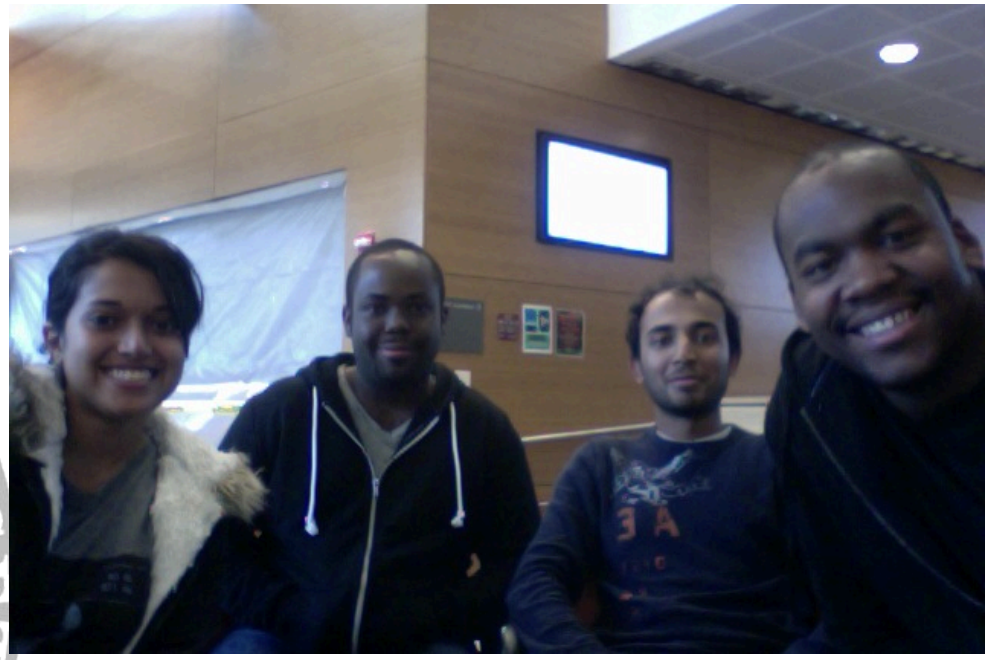
UMassAmherst

Clockade



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Adviser: Prof. T. B. Soules

Department of Electrical and Computer Engineering

Introduction

- Students with special needs require toys that can assist with learning
- About 1/3 of students in the West Springfield school district have special needs including:
  - Auditory
  - Motor Skills
  - Autism

The Client

- Megan Ferrari
- Special education teacher, West Springfield Middle School

The Client

Student Profile

- 6th to 8th grade students
- Functioning level – 2nd grade

Needs

- Require a lot of repetition to internalize lesson
- Extra adult support
- Auditory feedback

Problem Statement

Telling Time

- Ms. Ferrari students cannot look up at a wall clock to read the time
- Constantly ask the teacher to read the time for them

Lunch Numbers

- Students get nervous to dial Student Identification Numbers for lunch
- Overwhelmed by crowds
- Need a way to practice without stress

Proposed Solution

Trainer Clock with Keypad

Normal Mode

- Displays current time
- Will speak current time when button is pressed

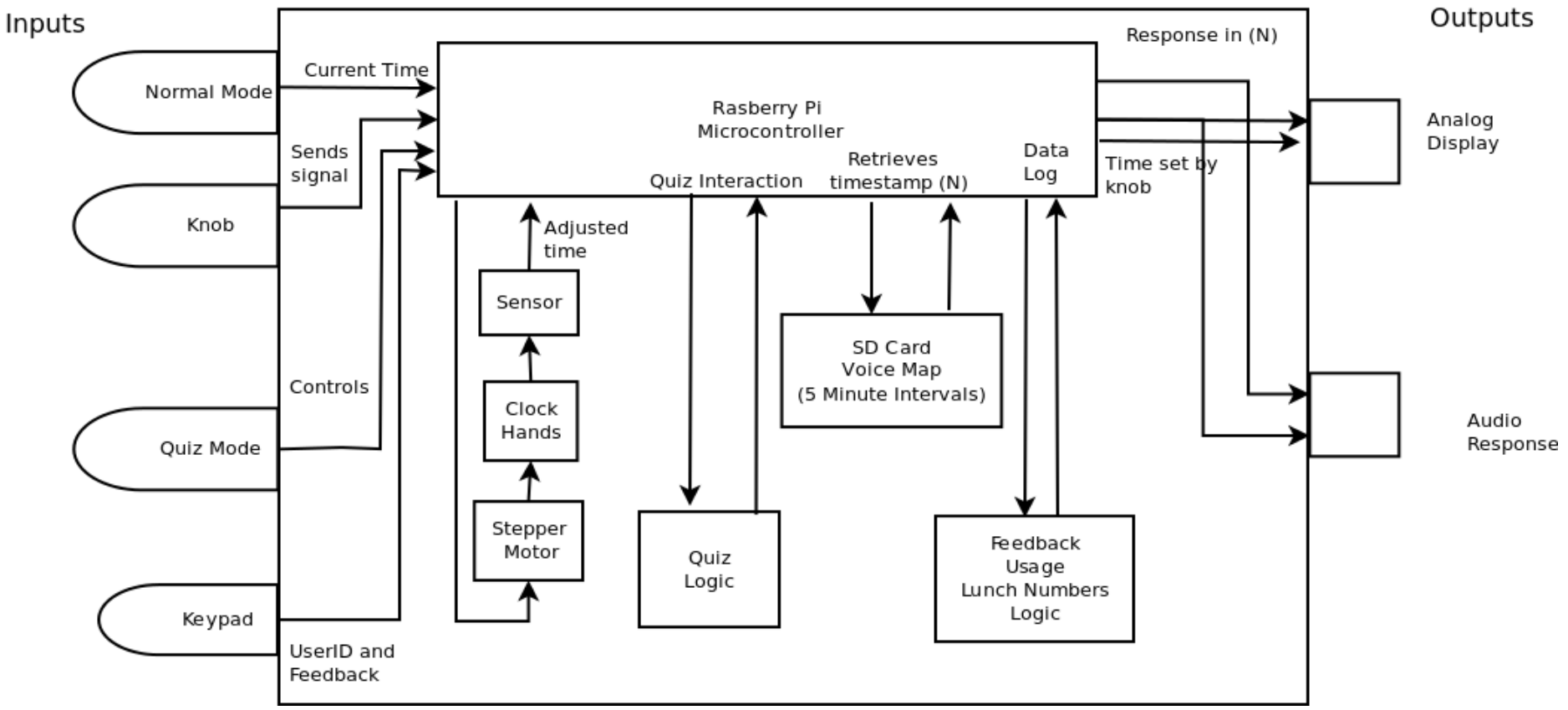
Quiz Mode

- Will interact with child by asking him/her to set the clock to a specified time
- Provide feedback depending on how the child responds

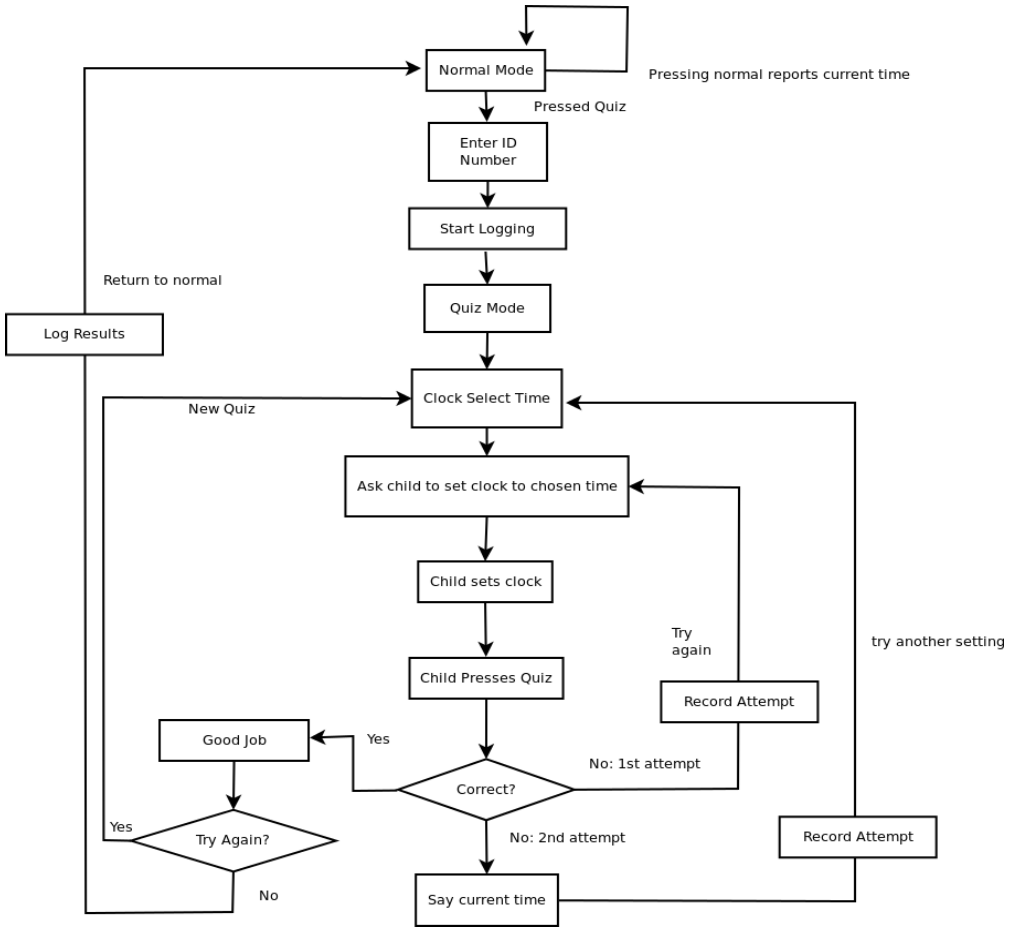
Keypad

- Students enter ID numbers
- Numbers are used to differentiate students in data log

Block Diagram



Workflow


Normal Mode
Pressing normal reports current time
Pressed Quiz
Enter ID Number
Start Logging
Return to normal
Quiz Mode
Log Results
Clock Select Time
New Quiz
Ask child to set clock to chosen time
Child sets clock
Try again
try another setting
Child Presses Quiz
Record Attempt
Good Job
Yes
No: 1st attempt
Correct?
Yes
Try Again?
No: 2nd attempt
Record Attempt
No
Say current time

Competition

Below: Onearoo Clock

Above: The Momo Clock

Priced between $25 to $50

Innovation

Feedback

- Keeps track of progress
- Can be viewed by teachers
- Can be sent to parents
- Increases the value of the toy

- Open Source
  - All code (including our website) and design files available on GitHub: https://github.com/SDP13-Team10

Requirement Specifications

Dimensions (LWH)

- Trainer Clock
18 in. x 12 in. x 12 in.
- (Detachable) Keypad

- Minimize number of buttons for simple operation
- Robust and sturdy
- Easy to maintain

MDR Deliverables

- Trainer Clock with Keypad
  - Characterization of Stepper Motor
  - Record voices for time playback (in M5 Recording Studio)
  - Familiarization with microcontroller and keypad

Rough Budget

Trainer Clock with Keypad

- Raspberry Pi - $35
- Buttons, Knob, Casing, Peripherals - $100
- SD Card (2G) - $15
- Stepper Motor - $75
- MISC - $25
- Keypad - $50

Total = $300

Questions?

Thank you!

References:

Massachusetts Department of Elementary and Secondary Schools

Megan Ferrari Slideshow Presentation (Sept 20th)