MECHATRONICS FINAL PROJECT

SUBMITTED BY:
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WHAT’S GOING ON?
TANGIBLE TODDLER TEACHING AND MONITORING SYSTEM
IDEA

To develop a Mechanical System to help teach basic Alphabets to the kids.
ALPHABET GURU:

• Puzzle solving game to facilitate the learning of Alphabets and associated Animals.
• By using three rotating pointers we can get input the word.
• The input will be seen on the LCD which is so calibrated to display correct input even when upside down.
• If the word matches with the name of an Animal the pointer on the wheel points to that animal.
CIRCUIT & CODE:  
PART 1 ADC

' ($STAMP BS2)
' ($PRASIC 2.5)
HIGH CS
LOW CS
PULSOUT CLK, 210
SHIFTIN DataIn, CLK, MSBPOST, [ADC3\$]
IF (ADC<32) THEN
  SEROUT TX, baud, [0]  'A
  Alpha3 = 0
ELSEIF (ADC<64) THEN
  SEROUT TX, baud, [1]  'B
  Alpha3 = 1
ELSEIF (ADC<96) THEN
  SEROUT TX, baud, [2]  'C
  Alpha3 = 2
ELSEIF (ADC<128) THEN
  SEROUT TX, baud, [3]  'D
  Alpha3 = 3
ELSEIF (ADC<160) THEN
  SEROUT TX, baud, [4]  'E
  Alpha3 = 4
ELSEIF (ADC<192) THEN
  SEROUT TX, baud, [4F]  'F
  Alpha3 = 5
ELSEIF (ADC<224) THEN
  SEROUT TX, baud, [5]  'R
  Alpha3 = 6
ELSEIF (ADC<256) THEN
  SEROUT TX, baud, [6]  'T
  Alpha3 = 7
ENDIF
PART 2 SERVO MOTOR:

```plaintext
' {$STAMP BS2}
' {$PBASIC 2.5}
gotoCOD:
    FOR i = 1 TO 200
      PULSOUT servoPoint, 193
      PAUSE 20
    NEXT
RETURN
```

Careful! Don’t mix up these wires!
PART 3 LCD DISPLAY

`'(S$PAMP S$2)
'(S$PASIC 2.5)
Reset:
HIGH TX       ' setup serial output pin
PAUSE 100     ' allow LCD to initialize

SERGUT TX, baud, [$19, $0C]  ' cursor on, clear display
'A
SERGUT TX, baud, [$F8, $00, $11, $11, $1F, $11, $11, $0A, $04]
'B
SERGUT TX, baud, [$F9, $00, $0F, $11, $11, $0F, $11, $11, $0F]
'C
SERGUT TX, baud, [$FA, $00, $0E, $11, $01, $01, $01, $01, $0E]
'D
SERGUT TX, baud, [$FB, $00, $0F, $11, $11, $11, $11, $11, $0F]
'E
SERGUT TX, baud, [$FC, $00, $1F, $01, $01, $01, $01, $1F]
'R
SERGUT TX, baud, [$FD, $00, $11, $09, $05, $0F, $11, $11, $0F]
'T
SERGUT TX, baud, [$FE, $00, $04, $04, $04, $04, $04, $04, $1F]
PART 3 LCD DISPLAY
LULLABY:

- Generates a lullaby by using piezo buzzers.
- Along with lullaby an LED also lights up as a night lamp.
- The color of the LED can be changed by using the potentiometer on R1 of the 555 timer.
CODE AND SPECS:

* (STAMP B32)
* (SBASIC 2.5)

IF(INS = 1) THEN
  nightLamp = nightLamp ^ 1
ENDIF

IF(nightLamp = 1) THEN
  HIGH Enable555
  DC UNTIL noteLetter = "Q"
  READ Notes + index, noteLetter
  LOOKUP offset, [ 4186, 4406, 4699, 4978, 5274, 5580, 5920, 6272, 6664, 7040, 7459, 7902, 0, 0 ], offset
  READ Octaves + index, noteOctave
  noteOctave = 8 - noteOctave
  noteFreq = noteFreq / (440 noteOctave)
  READ Durations + index, noteDuration
  noteDuration = 1000 / noteDuration
FEEDING: DETERMINING THE CORRECT TEMPERATURE OF MILK

- Warm milk is considered good for infants.
- Coupled a temperature sensor with two LED’s.
- Blue LED will glow when it’s too cold, i.e. less the 34 degrees Celsius.
- Red LED lights up in case the milk is too hot i.e. above 39 degrees Celsius.
CODES:

Read Temperature

```c
Read_DS1620:
HIGH Reset ' alert the DS1620
SHIFTOUT DQ, Clock, LSBFIRST, [RdTemp] ' give command to read temp
SHIFTIN DQ, Clock, LSBFIRST, [tempIn\9] ' read it in
LOW Reset ' release the DS1620
#endif
#if _Testing #THEN
tempIn = 011111111 ' -0.5 C
#endif
tempIn.BYTE1 = -sign ' extend sign bit
tC = tempIn * 5 ' convert to tenths
IF (tC.BIT15 = 0) THEN ' temp C is positive
tF = tC */ $01CC + 320 ' convert to F
ELSE ' temp C is negative
tF = 320 - (ABS tC) */ $01CC ' convert to F
ENDIF
RETURN
```

Setting Temperature Thresholds

```c
Write_DS1620_HiT:
HIGH Reset ' alert the DS1620
SHIFTOUT DQ, Clock, LSBFIRST, [WrHi] ' give command to write Hi Thresh temp
SHIFTOUT DQ, Clock, LSBFIRST, [$039\9] ' give Hi Thresh temp
LOW Reset ' release the DS1620
RETURN
```

```c
Write_DS1620_LoT:
HIGH Reset ' alert the DS1620
SHIFTOUT DQ, Clock, LSBFIRST, [WrLo] ' give command to write Lo Thresh temp
SHIFTOUT DQ, Clock, LSBFIRST, [$036\9] ' give Lo Thresh temp
LOW Reset ' release the DS1620
RETURN
```
INSPIRATION

Hole in the Wall: Dr. Sugata Mitra.
MARKETING STRATEGY

• Potential Markets: Government in Developing Nations

Strategy:
• The kit evolves along with the students.
• Learning is facilitated by doing.
• In the present day world it can replace the GI Joe’s and the Barbie’s.
## COST

<table>
<thead>
<tr>
<th>Component</th>
<th>Cost/Piece in USD</th>
<th>Quantity</th>
<th>Cost</th>
<th>Cost for Mass production</th>
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</thead>
<tbody>
<tr>
<td>Basic Stamp 2</td>
<td>99.95</td>
<td>1</td>
<td>99.95</td>
<td>99.95</td>
</tr>
<tr>
<td>Potentiometer</td>
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<td>3</td>
<td>0.9</td>
<td>0.9-</td>
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<tr>
<td>ADC</td>
<td>1.3</td>
<td>3</td>
<td>3.9</td>
<td>3.9</td>
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<tr>
<td>Standard servo</td>
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<td>1</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Bicolor LED</td>
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<td>1</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>555timer</td>
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<td>1</td>
<td>0.5</td>
<td>0.5</td>
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<tr>
<td>LCD display</td>
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<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Accelerometer</td>
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<td>10</td>
<td>10-</td>
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<td>Wire spool</td>
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<td>3</td>
<td>15</td>
<td>15-</td>
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<td>Battery</td>
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<td><strong>$155.95</strong></td>
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IF WE HAD MORE TIME, AND.. PINS

• ABC: Automatic Barrier Constructor
**IMPROVEMENTS:**

- Using all the alphabets, in the English Language.
- Better integration of the circuitry.
- Increasing the number of words that can be learnt.
- Making the system more robust.
- Coding can be optimized for better efficiency.
- Use of EEPROM to save memory.
- Displaying pictures on the LCD.
Any questions?
THANK YOU