

MECHATRONICS FINAL PROJECT

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WHAT'S GOING ON?



TANGIBLE TODDLER TEACHING AND MONITORING SYSTEM



IDEA

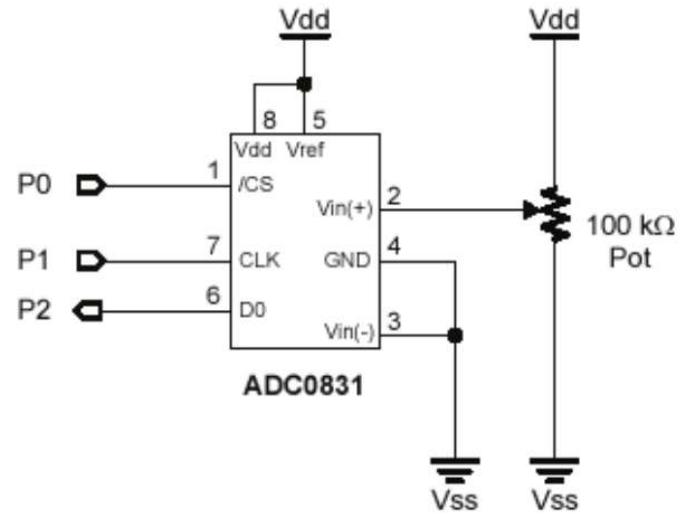
To develop a Mechanical System to help teach basic Alphabets to the kids.

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.

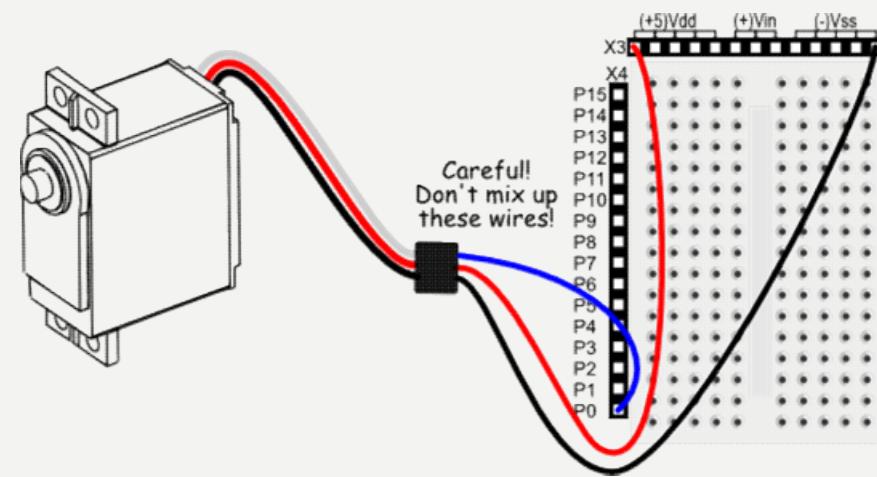
CIRCUIT & CODE: PART 1 ADC

```
' ($STAMP BS2)
' (SPBASIC 2.5)
HIGH CS
LOW CS
LOW CLK
PULSOUT CLK, 210
SHIFTIN Datain3,CLK,MSBPOST,[ADC3\8]
IF (ADC3<32) THEN
  SEROUT TX, baud,[\$0]  'A
  Alpha3 = 0
ELSEIF(ADC3<64) THEN
  SEROUT TX, baud,[\$1]  'B
  Alpha3 = 1
ELSEIF(ADC3<96) THEN
  SEROUT TX, baud,[\$2]  'C
  Alpha3 = 2
ELSEIF(ADC3<128) THEN
  SEROUT TX, baud,[\$3]  'D
  Alpha3 = 3
ELSEIF(ADC3<160) THEN
  SEROUT TX, baud,[\$4]  'E
  Alpha3 = 4
ELSEIF(ADC3<192) THEN
  SEROUT TX, baud,[\$4F]  'O
  Alpha3 = 5
ELSEIF(ADC3<224) THEN
  SEROUT TX, baud,[\$5]  'R
  Alpha3 = 6
ELSEIF(ADC3<256) THEN
  SEROUT TX, baud,[\$6]  'T
  Alpha3 = 7
ENDIF
```



PART 2 SERVO MOTOR:

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



PART 3 LCD DISPLAY

```
' {$STAMP BS2}
' {$PBASIC 2.5}
Reset:
  HIGH TX          ' setup serial output pin
  PAUSE 100         ' allow LCD to initialize

  SEROUT TX, baud, [$19, $0C]      ' cursor on, clear display

'A
SEROUT TX, baud,[$F8,$00,$11,$11,$1F,$11,$11,$0A,$04]

'B
SEROUT TX, baud,[ $F9,$00,$0F,$11,$11,$0F,$11,$11,$0F]

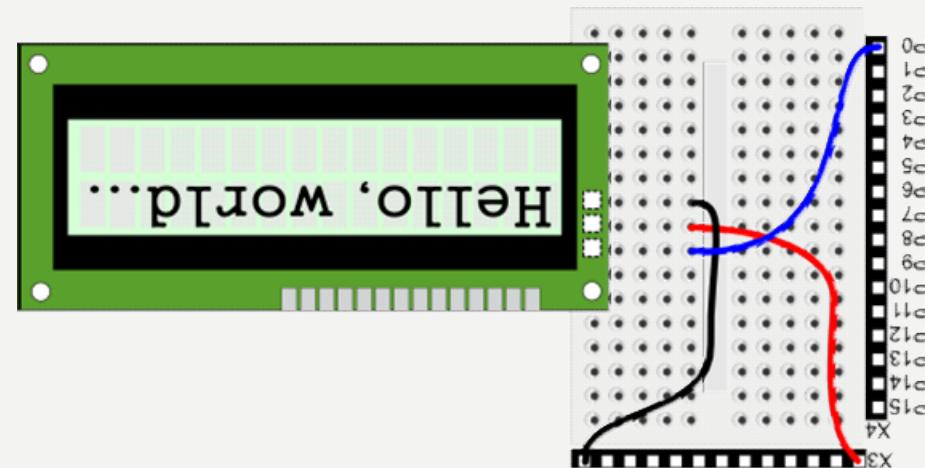
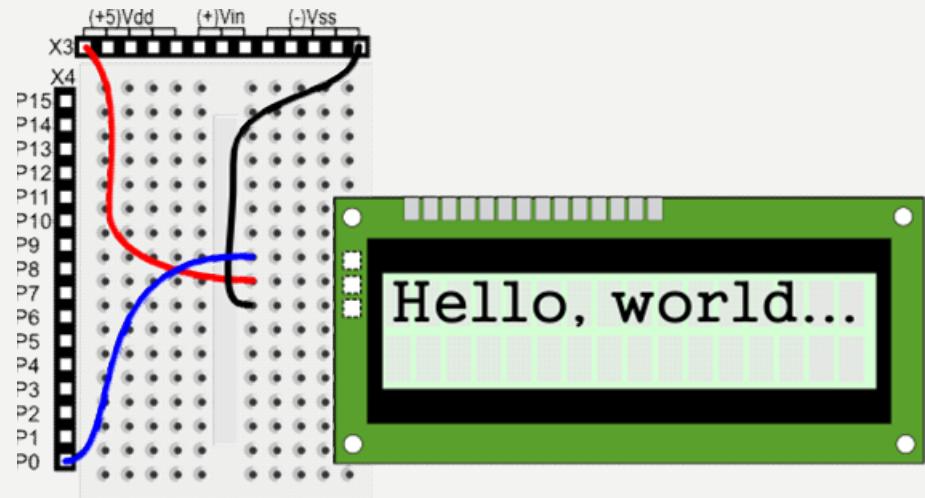
'C
SEROUT TX, baud,[ $FA,$00,$0E,$11,$01,$01,$01,$11,$0E]

'D
SEROUT TX, baud,[ $FB,$00,$0F,$11,$11,$11,$11,$11,$0F]

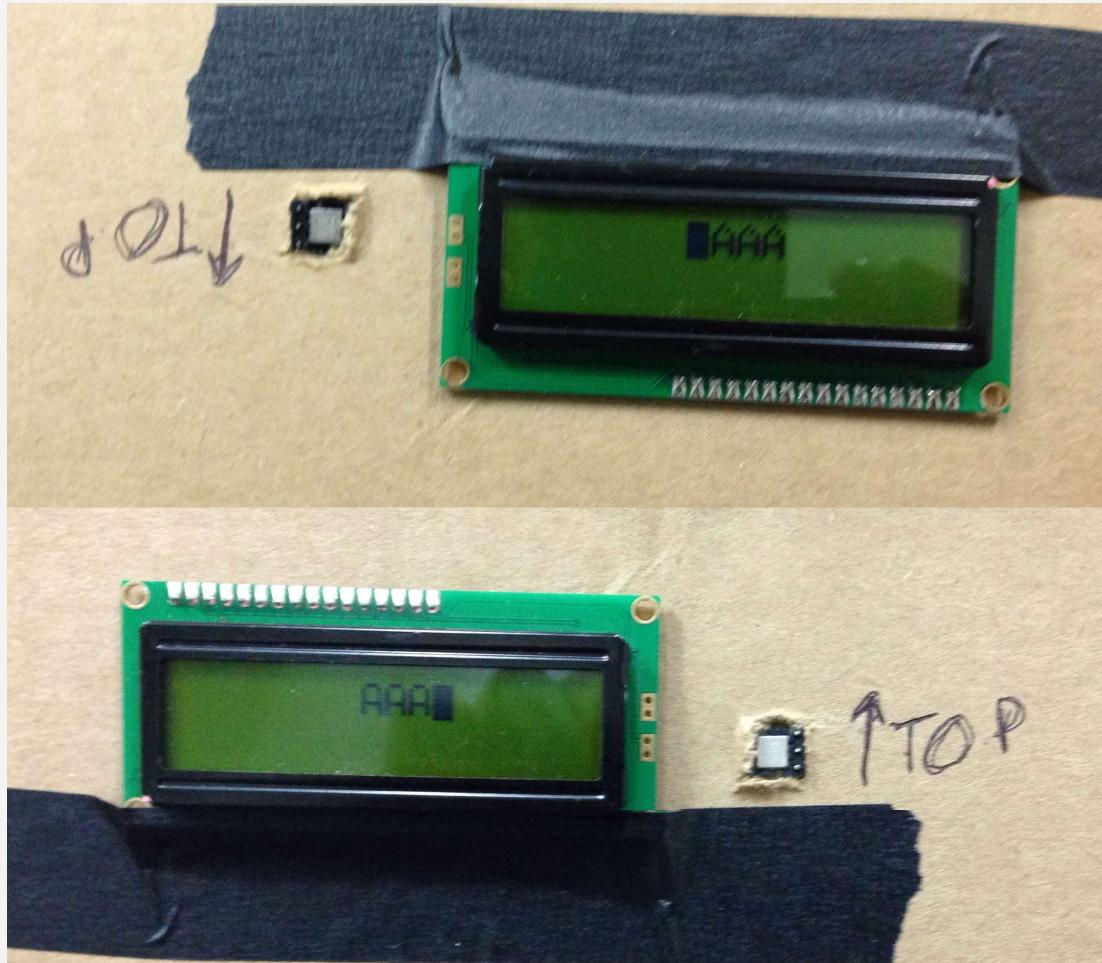
'E
SEROUT TX, baud,[ $FC,$00,$1F,$01,$01,$1F,$01,$01,$1F]

'R
SEROUT TX, baud,[ $FD,$00,$11,$09,$05,$0F,$11,$11,$0F]

'T
SEROUT TX, baud,[ $FE,$00,$04,$04,$04,$04,$04,$04,$1F]
```



PART 3 LCD DISPLAY



ULLABY:

- 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:

```
' {$STAMP BS2}
' {$PBASIC 2.5}

IF(IN8 = 1) THEN
    nightLamp = nightLamp ^ 1
ENDIF

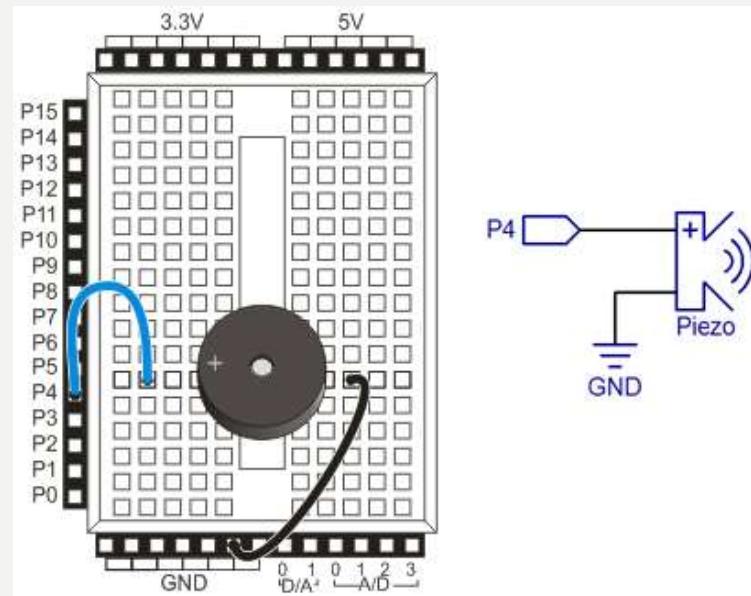
IF(nightLamp = 1) THEN
HIGH Enable555
DC UNTIL noteLetter = "Q"
READ Notes + index, noteLetter

LOOKDOWN noteLetter, [ "C", "d", "D", "e", "E",
    "F", "g", "G", "a", "A",
    "B", "B", "R", "Q" ], offset

LOOKUP offset,      [ 4186, 4435, 4699, 4978, 5274,
    5588, 5920, 6272, 6645, 7040,
    7459, 7902, 0, 0 ], noteFreq

READ Octaves + index, noteOctave
noteOctave = 8 - noteOctave
noteFreq = noteFreq / (DCD 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 than 34 degrees Celsius.
- Red LED lights up in case the milk is too hot i.e. above 39 degrees Celsius.

CODES:

Read Temperature

```
Read_DS1620:
    HIGH Reset ' alert the DS1620
    SHIFTOUT DQ, Clock, LSBFIRST, [RdTmp] ' give command to read temp
    SHIFTIN DQ, Clock, LSBPRE, [tempIn\9] ' read it in
    LOW Reset ' release the DS1620
    #IF _Testing #THEN
        tempIn = %11111111 ' -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

```
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
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

Component	Cost/Piece in USD	Quantity	Cost	Cost for Mass production
Basic Stamp 2	99.95	1	99.95	99.95
Potentiometer	0.3	3	0.9	0.9-
ADC	1.3	3	3.9	3.9
Standard servo	15	1	15	15
Bicolor LED	1.5	1	1.5	1.5
555timer	0.5	1	0.5	0.5
LCD display	5	1	5	5
Accelerometer	3	1	3	3
Resistor pack	10	1	10	10-
Wire spool	5	3	15	15-
Battery	1.2	1	1.2	1.2
Total cost	\$142.75		\$155.95	~\$125

IF WE HAD MORE TIME, AND.. PINS

- ABC:Automatic Barrier Constructor

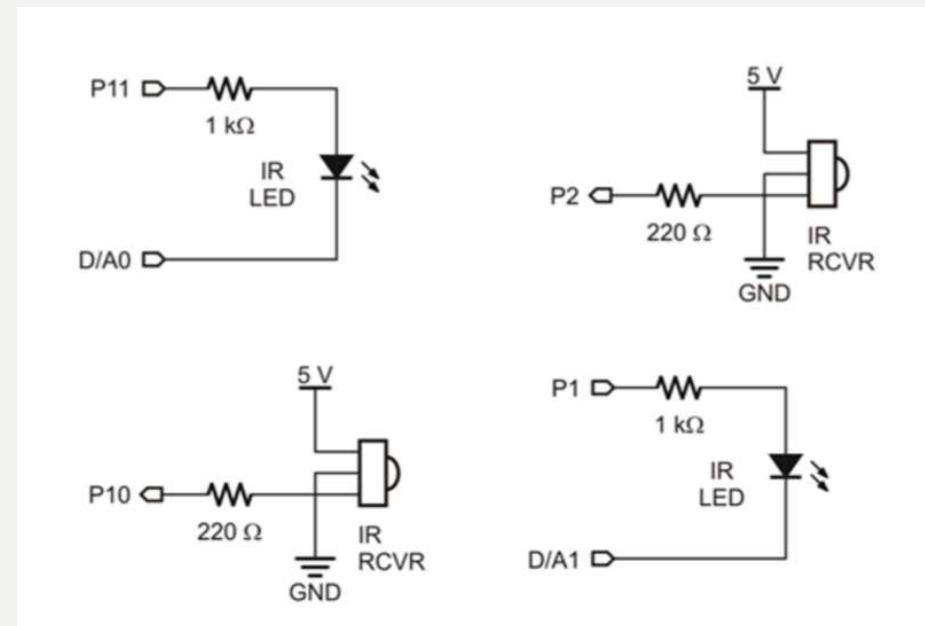
```
! ($$STAMP BS2)
! ($$PBASIC 2.5)

IR_detect1 VAR Bit
servo PIN 14
GATE VAR Bit
prevGATE VAR Bit

LOW 7

LOOP1:
  prevGATE = GATE
  'PAUSE 50
  FREQOUT 7, 1, 38500
  IR_detect = IN8
  IF IR_detect = 0 THEN
    GATE = GATE ^ 1
  END

  IF (GATE = 1 AND prevGATE = 0) THEN
    FOR i = 1 TO 1000
      PULSOUT servo, 600
    NEXT
    PAUSE 5000
  ELSEIF (GATE = 1 AND prevGATE = 0) THEN
    FOR i = 1 TO 1000
      PULSOUT servo, 900
    NEXT
    PAUSE 5000
  ENDIF
GOTC LOOP1
```



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
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THANK YOU