

LIST OF FIGURES

Fig.3.1 Arduino Uno	32
Fig.3.2 Flex sensor	34
Fig.3.3 RFID reader and tags	35
Fig.3.4 RF modem	36
Fig.3.5 Flow chart for the system	37
Fig.3.6 Pictorial diagram of the system	38
Fig.3.7 Data flow between all the three sections	39
Fig.3.8 Block diagram of Helmet node for Method1	40
Fig.3.9 Block diagram of Helmet node for Method2	41
Fig.3.10 Block diagram of two-wheeler node	42
Fig.3.11 Block diagram of Server/Data logger	43
Fig.3.12 Circuit diagram of the system	44
Fig.3.13 Circuit diagram for the server/data logger	46
Fig.3.14 Proteus simulation model for the system	47
Fig.3.15 Proteus simulation model for the server	47
Fig.4.1 Arrangement for reading flex sensor	51
Fig.4.2 Placement of flex sensors	52
Fig.4.3 Circuit diagram for RFID code extraction	53
Fig.4.4 Terminal v1.9 for data process from RFID tag	54
Fig.4.5 Visa Configure Serial port	62
Fig.4.6 VISA serial Read	63
Fig.4.7 Match Pattern	63
Fig.4.8 Decimal String to Number converter	63
Fig.4.9 VISA Close	64
Fig.4.10 Defining VISA resource name	64
Fig.4.11 Visa Configure Serial port	64
Fig.4.12 VISA Serial Write	65
Fig.4.13 VISA Close	66

Fig.4.14 VSPE window	67
Fig.4.15 VSPE window for pairing two virtual ports	67
Fig.4.16 VSPE window for assigning COM port number	68
Fig.4.17 VSPE window showing paired COM ports	68
Fig.4.18 COMPIM and Arduino connection in Proteus	69
Fig.4.19 Configure the COMPIM in Proteus to interface with LabVIEW	69
Fig.4.20 Proteus Simulation Model showing sensor value at virtual terminal	70
Fig.4.21 Flow chart for helmet node	72
Fig.4.22 Flow chart for two-wheeler node	73
Fig.4.23 Flow chart for LabVIEW GUI	74
Fig. 5.1 RTL view of helmet node controller	79
Fig.5.2 Internal architecture of the controller for helmet node	80
Fig.5.3 Simulation waveform for test case -1	81
Fig.5.4 Simulation waveform for test case 1 to 4	82
Fig. 5.5 Simulation waveform for test case-5	82
Fig.5.6 Simulation waveform for test case-5 to 9	83
Fig. 5.7 RTL view of receiver node controller	85
Fig.5.8 Internal architecture of the controller of two wheeler node	86
Fig.5.9 The results of modelsim simulation of receiver (scooty on)	88
Fig.5.10 The results of modelsim simulation of receiver (scooty on)	89
Fig.5.11 Modelsim simulation of receiver (scooty OFF)	89
Fig.6.1 Block diagram for LabVIEW GUI for flex sensor analysis and data logger	94
Fig.6.2 Front Panel for LabVIEW GUI for flex sensor analysis and data logger	95
Fig.6.3 Snapshot for the data logger recording	95
Fig.6.4 Block Diagram for Lab VIEW for system analysis	96
Fig.6.5 Front Panel for Lab VIEW for system analysis showing vehicle is not ignited	97

Fig.6.6 Front Panel for Lab VIEW for system analysis showing vehicle is ignited	97
Fig.6.7 Channels settings at Thingspeak	99
Fig.6.8 Write API key	99
Fig.6.9 Channel fields	100
Fig.6.10 Channel1 '1' field1 showing Flex1 level	100
Fig.6.11 Channel1 '1' field2 showing Flex2 level	101
Fig.6.12 Channel1 '1' field3 showing Flex3 level	101
Fig.6.13 Channel1 '1' field4 showing mean level of three flex sensors	102
Fig.6.14 Channel1 '1' field5 showing flex1 output voltage (mV)	102
Fig.6.15 Channel1 '1' field6 showing flex2 output voltage (mV)	103
Fig.6.16 Channel1 '1' field7 showing flex3 output voltage (mV)	103
Fig.6.17 Channel1 '1' field8 showing mean output voltage (mV) of three flex sensors	104
Fig.6.18 Channel1 location of the user	104
Fig.6.19 Sample variation in the output level values for flex1 in the month of Feb.2016	108
Fig.6.20 Sample variation in the output level values for flex2 in the month of Feb.2016	108
Fig.6.21 Sample variation in the output level values for flex3 in the month of Feb.2016	109
Fig.6.22 Flex sensors mean level variations for samples in the month of Feb.2016	109
Fig.6.23 Sample variation in the output level values for flex1 in the month of April 2016	112
Fig.6.24 Sample variation in the output level values for flex2 in the month of April 2016	113
Fig.6.25 Sample variation in the output level values for flex3 in the month of April 2016	113
Fig.6.26 Flex sensor mean level variations for samples in the month of	114

April 2016	
Fig.6.27 Sample variation in the output level values for flex1 in the month of June 2016	117
Fig.6.28 Sample variation in the output level values for flex2 in the month of June 2016	117
Fig.6.29 Sample variation in the output level values for flex3 in the month of June 2016	118
Fig.6.30 Flex sensors mean level variations for samples in the month of June 2016	118
Fig.6.31 Sample variation in the output level values for flex1 in the month of August 2016	121
Fig.6.32 Sample variation in the output level values for flex2 in the month of August 2016	122
Fig.6.33 Sample variation in the output level values for flex3 in the month of August 2016	122
Fig.6.34 Flex sensors mean level variations for samples in the month of August 2016	123
Fig.6.35 Sample variation in the output level values for flex1 in the month of October 2016	126
Fig.6.36 Sample variation in the output level values for flex2 in the month of October 2016	126
Fig.6.37 Sample variation in the output level values for flex3 in the month of October 2016	127
Fig.6.38 Flex sensors mean level variations for samples in the month of October 2016	127
Fig.6.39 Snapshot of developed Helmet section	128
Fig.6.40 Snapshot of developed two-wheeler section	128
Fig.6.41 Snapshot2 of developed two-wheeler section	129