

School of Electronics And Computer Science

ELEC6050 MEng Group Design Project

Project Specification And Plan

Title: Unmanned Aircraft Camera Module (GDP Group 18)

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Customer: Dr. Matt Bennett, SkyCircuits (m.bennett@skycircuits.com)

Project Specification:

To design, build and test an electronic module capable of capturing still images from an unmanned aerial vehicle (UAV) and transmitting them to a base station. The module must use the UAV autopilot's low-bandwidth RS485 serial link (38.4 kBaud). The weight of the module must not exceed a few hundred grams. A program must be written to interface with the base station software over a TCP/IP link, allowing image data to be received and displayed to the user.

Deliverables to the customer include:

- Hardware: Camera module, constructed on PCB, including all schematics and PCB layout designs.
- Software: all firmware for the electronic module, and software on the base station for viewing images. Executables and source code must be presented.
- Documentation: Technical and User Documentation.

Name		Work	
Deadlines			
Opening lecture			
First progress seminar			
Second progress seminar			
Final report			
Final presentation			
Acquire Equipment		20d	
Acquire camera		5d	
Acquire Schematic Parts		5d	
Acquire final payload controller		5d	
Acquire autopilot and basestation		5d	
Payload Module		56d	
Camera module communication		9d	
Prototype camera module communication		6d	
Payload controller <-> camera module communication		3d	
Image Encoding and Transmission		23d	
Basic Raw encoding/(JPEG?)		5d	
Payload controller implementation		5d	
Custom (compressed) encoding		18d	
Matlab algorithm prototype		10d	
Payload controller implementation		8d	
Compression algorithm implementation		6d	
Data breakdown and transmission		2d	
Payload module construction		24d	
Payload breadboard prototype		4d	
Payload PCB design		4d	
Acquiring payload PCB		10d	
Payload PCB construction and debugging		6d	
Image receive/viewing software		19d	
TCP/IP Basestation Communications		7d	
Basic dummy server communications		4d	
Basestation communications		3d	
Decode Image		7d	
Basic image decoding		2d	
Custom (decompression) decoding		5d	
Matlab algorithm		2d	
Working implementation		3d	
UI		5d	
Functional user interface		5d	
Integration		3d	
Payload controller to autopilot/base station		3d	
Background Research		19d	
Camera selection		3d	
Payload controller (e.g. microcontroller/FPGA) selection		4d	
Communication protocols		3d	
Image processing/compression		6d	
Programming language		3d	
Prepare presentation		10d	
Progress seminar 1		3d	
Progress seminar 2		3d	
Final presentation		4d	
Report Writing		10d	
Whole System Testing		5d	

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WBS	Name	Start	Finish	Work	Duration	Slack	Cost	Assigned to	% Complete
1	Deadlines	5 Oct	11 Jan		84d		0		0
1.1	Opening lecture	5 Oct	5 Oct	N/A	N/A	84d	0		0
1.2	First progress seminar	26 Oct	26 Oct	N/A	N/A	66d	0		0
1.3	Second progress seminar	30 Nov	30 Nov	N/A	N/A	27d	0		0
1.4	Final report	15 Dec	15 Dec	N/A	N/A	23d	0		0
1.5	Final presentation	11 Jan	11 Jan	N/A	N/A		0		0
2	Acquire Equipment	5 Oct	21 Oct	20d	15d	69d	0		0
2.1	Acquire camera	5 Oct	10 Oct	5d	5d	50d	0		0
2.2	Acquire Schematic Parts	5 Oct	10 Oct	5d	5d	50d	0		0
2.3	Acquire final payload controller	17 Oct	21 Oct	5d	5d	40d	0		0
2.4	Acquire autopilot and basestation	5 Oct	10 Oct	5d	5d	71d	0		0
3	Payload Module	5 Oct	18 Nov	56d	39d	40d	0		0
3.1	Camera module communication	11 Oct	20 Oct	9d	9d	65d	0		0
3.1.1	Prototype camera module communication	11 Oct	17 Oct	6d	6d	53d	0		0
3.1.2	Payload controller <-> camera module communication	18 Oct	20 Oct	3d	3d	53d	0		0
3.2	Image Encoding and Transmission	5 Oct	26 Oct	23d	19d	60d	0		0
3.2.1	Basic Raw encoding(JPEG?)	21 Oct	26 Oct	5d	5d	60d	0		0
3.2.1.1	Payload controller implementation	21 Oct	26 Oct	5d	5d	53d	0		0
3.2.2	Custom (compressed) encoding	5 Oct	25 Oct	18d	18d	61d	0		0
3.2.2.1	Matlab algorithm prototype	5 Oct	15 Oct	10d	10d	58d	0		0
3.2.2.2	Payload controller implementation	17 Oct	25 Oct	8d	8d	61d	0		0
3.2.2.2.1	Compression algorithm implementation	17 Oct	22 Oct	6d	6d	58d	0		0
3.2.2.2.2	Data breakdown and transmission	24 Oct	25 Oct	2d	2d	58d	0		0
3.3	Payload module construction	22 Oct	18 Nov	24d	24d	40d	0		0
3.3.1	Payload breadboard prototype	22 Oct	26 Oct	4d	4d	40d	0		0
3.3.2	Payload PCB design	27 Oct	31 Oct	4d	4d	41d	0		0
3.3.3	Aquiring payload PCB	1 Nov	11 Nov	10d	10d	40d	0		0
3.3.4	Payload PCB construction and debugging	12 Nov	18 Nov	6d	6d	40d	0		0
4	Image recieve/viewing software	5 Oct	3 Nov	19d	26d	53d	0		0
4.1	TCP/IP Basestation Communications	5 Oct	13 Oct	7d	8d	71d	0		0
4.1.1	Basic dummy server communication	5 Oct	8 Oct	4d	4d	75d	0		0
4.1.2	Basestation communications	11 Oct	13 Oct	3d	3d	71d	0		0
4.2	Decode Image	17 Oct	28 Oct	7d	11d	58d	0		0
4.2.1	Basic image decoding	27 Oct	28 Oct	2d	2d	53d	0		0
4.2.2	Custom (decompression) decoding	17 Oct	28 Oct	5d	11d	58d	0		0
4.2.2.1	Matlab algorithm	17 Oct	18 Oct	2d	2d	64d	0		0
4.2.2.2	Working implementation	26 Oct	28 Oct	3d	3d	58d	0		0
4.3	UI	29 Oct	3 Nov	5d	5d	53d	0		0
4.3.1	Functional user interface	29 Oct	3 Nov	5d	5d	53d	0		0
5	Integration	27 Oct	29 Oct	3d	3d	62d	0		0
5.1	Payload controller to autopilot/base station	27 Oct	29 Oct	3d	3d	62d	0		0
6	Background Research	5 Oct	15 Oct	19d	10d	74d	0		0
6.1	Camera selection	5 Oct	7 Oct	3d	3d	81d	0		0
6.2	Payload controller (e.g. microcontroller/FPGA) selection	12 Oct	15 Oct	4d	4d	40d	0		0
6.3	Communication protocols	5 Oct	7 Oct	3d	3d	81d	0		0
6.4	Image processing/compression	5 Oct	11 Oct	6d	6d	40d	0		0
6.5	Programming language	5 Oct	7 Oct	3d	3d	81d	0		0
7	Prepare presentation	22 Oct	10 Jan	10d	69d	0	0		0
7.1	Progress seminar 1	22 Oct	25 Oct	3d	3d	66d	0		0
7.2	Progress seminar 2	25 Nov	28 Nov	3d	3d	37d	0		0
7.3	Final presentation	6 Jan	10 Jan	4d	4d		0		0
8	Report Writing	30 Nov	10 Dec	10d	10d	26d	0		0
9	Whole System Testing	19 Nov	24 Nov	5d	5d	40d	0		0