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ECE 387 A - Embedded Systems Design

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Development of Multifunctional Wearable Device

The goal of our project is to create a wearable device that tracks heart rate to ensure the user stays within a certain fitness mode (i.e. fat burn, cardio, peak). This will then speed up the treadmill to maintain the desired heart rate level. The wearable device will also sense if the user is having a heart attack and call 911.

The features of the wearable device will include a heart rate monitor, control of treadmill, sense heart attacks and the ability to call 911.

The preliminary plan is to have the heart rate monitor to control a rotor motor based on various heart rate settings. A Liquid Crystal Display (LCD) screen and buttons will be used for the user to interface with the device to set the desired fitness mode. After testing of preliminary features. The development of the heart attack monitor and dialing feature will be added.

The work will be split between our group members: Ruoyu Xu and Morgan Harmon. Morgan Harmon will work on the user interface involving the LCD display and the buttons. Ruoyu Xu will work on determining the acceleration of the treadmill in correlation to the desired heart rate. The additional feature will be split into the dialing feature and the heart attack monitor. Morgan Harmon will work on the heart attack monitor. Ruoyu Xu will work on the having the wearable device call 911.

To define the heart rate to a specific fitness mode, the following chart will be used,

		EXERCISE ZONES									
		AGE									
BEATS PER MINUTE		20	25	30	35	40	45	50	55	65	70
	100%	200	195	190	185	180	175	170	165	155	150
	VO2 Max (Maximum effort)										
	90%	180	176	171	167	162	158	153	149	140	135
	Anaerobic (Hardcore training)										
	80%	160	156	152	148	144	140	136	132	124	120
	Aerobic (Cardio training / Endurance)										
	70%	140	137	133	130	126	123	119	116	109	105
	Weight control (Fitness / Fat burn)										
	60%	120	117	114	111	108	105	102	99	93	90
	Moderate activity (Maintenance / Warm up)										
	50%	100	98	95	93	90	88	85	83	78	75

Figure 1. The five exercise zones based on heart rate.